AN ENHANCED FINGERPRINT TEMPLATE PROTECTION SCHEME

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Abstrak

Perlindungan templat cap jari (FTP) diperlukan agar proses pengesahan selamat daripada serangan kerana cap jari telah digunakan secara meluas untuk sistem pengesahan pengguna. Pengesahan cap jari terdiri daripada mikropengawal, pengesan cap jari, kawalan akses keselamatan dan antara muka manusia. Oleh kerana ramai pengguna mengakses sistem seumpama ini, terdapat kemungkinan penyerang akan mereplika dan mengubahsuai cap jari. Pada masa ini, skema FTP sedia ada gagal memenuhi sifat sistem pengesahan cap jari (FAS) seperti kepelbagaian, kebolehbalikan, keselamatan, dan prestasi pemadanan/pengenalpastian kerana masalah perbezaan intra-pengguna dalam pengecam cap jari dan masalah pemadanan dalam domain tidak dienkripsi. Oleh itu, kajian ini bertujuan memperbaiki skema yang ada dengan menggunakan enkripsi berasaskan kekacauan dan fungsi cincang untuk memenuhi sifat dikehendaki dengan melindungi templat cap jari (FT) pengguna dalam sistem terbenam. Algoritma enkripsi berasaskan kekacauan yang dipertingkat telah dicadangkan untuk mengenkripsi FT. Simulasi MATLAB dengan data Fingerprint Verification Competition (FVC) 2002 digunakan untuk mengukur hasil enkripsi, ruang kunci rahsia, kepekaan kunci, histogram, korelasi, pembezaan, maklumat entropi, Analisa pemadanan/pengenalpastian, dan kebolehbalikan. Skema FTP yang dicadangkan telah dinilai menggunakan analisis logik Burrows–Abadi–Needham (BAN) dari segi ketahanan protokol terhadap serangan ulangan, penentangan terhadap serangan pengesahan dicuri, dan kerahsiaan kehadapan yang sempurna. Hasil menunjukkan algoritma enkripsi untuk FTP berasaskan kekacauan yang dipertingkat mengurangkan masa enkripsi, iaitu 0.24 saat lebih cepat daripada skema kajian penanda aras yang dipilih. Skema FTP juga dapat memenuhi sifat keselamatan, kebolehbalikan, kepelbagaian, dan prestasi pemadanan/pengenalpastian. Penilaian prestasi pemadanan/ pengenalpastian menghasilkan kadar pengesahan yang lebih tinggi, dan kadar penolakan palsu yang rendah masing-masing ialah 99.10 % dan 0.90%. Kadar ralat sepadan menurun daripada 2.10% kepada 1.05%. Sebagai kesimpulan, skema FTP yang dipertingkat ini adalah alternatif yang sesuai untuk dilaksanakan sebagai kaedah pengesahan sistem terbenam bagi menahan kemungkinan serangan dan menyediakan ciri keselamatan yang diinginkan. Skema ini juga boleh menjadi rujukan kepada analisis keselamatan yang komprehensif.

Kata Kunci: Perlindungan templat cap jari, Enkripsi cap jari, Fungsi cincang, Sistem pengesahan cap jari.

Abstract

Fingerprint template protection (FTP) is required to secure authentication due to fingerprint has been widely used for user authentication systems. Fingerprint authentication consists of a microcontroller, fingerprint sensor, secure access control, and human interface. However, as many users frequently assess the systems, fingerprints could be replicated and modified by attackers. Currently, most existing FTP schemes fail to meet the properties of fingerprint authentication systems, namely diversity, revocability, security, and match/recognition performance, due to intra-user variability in fingerprint identifiers and matching issues in unencrypted domains. Therefore, this study aims to enhance the existing schemes by using chaos-based encryption and hash functions to meet the specified properties by securing users' fingerprint templates (FT) within the embedded systems. Furthermore, an improved chaos-based encryption algorithm was proposed for encrypting FT. The MATLAB simulation with Fingerprint Verification Competition (FVC) 2002 database was used to measure the encryption results, secret key spaces, key sensitivity, histogram, correlation, differential, entropy information, matching/recognition analysis, and revocability. The proposed FTP scheme was also evaluated using Burrows–Abadi–Needham (BAN) logic analysis for protocol robustness with resistance to replay attacks, stolen-verifier attacks, and perfect forward secrecy. The results demonstrate that the enhanced chaos-based encryption algorithm for FTP improves its encryption time, which is 0.24 seconds faster than the selected benchmark study. The enhanced FTP scheme also achieved security, revocability, diversity, and matching/recognition performance properties. The matching/recognition performance evaluation produced higher verification rates and a low false rejection rate. The rates were 99.10 % and 0.90%, respectively. The equal error rate decreased from 2.10% to 1.05%. As a conclusion, the enhanced FTP scheme could be an alternative to the existing FTP for embedded system authentication to withstand various possible attacks and provides the desired security features. The scheme also can be a reference to comprehensive security analysis.

Keywords: Fingerprint template protection, Fingerprint encryption, Hash function, Fingerprint authentication system.

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List of Abbreviations

AAA	Authentication, Authorisation and Accounting
ARM	Attacks via Record Multiplicity
BAN	Burrows–Abadi–Needham
CBC	Cipher Block Chaining
CIA	Confidentiality-Integrity-Availability
DITOM	Densely Infinite-to-one Mapping
DP	Discriminability-Preserving
DRM	Design Research Methodology
ECC	Elliptic Curve Cryptography
EER	Equal Error Rate
FAR	False Accept Rate
FAS	Fingerprint Authentication System
FC	Fingerprint Cryptosystem
FMR	False Matching Rate
FNMR	False Non-Matching Rate
FPGA	Field-Programmable Gate Array
FRR	False Rejection Rate
FT	Fingerprint Template
FTP	Fingerprint Template Protection
GAR	Genuine Accept Rate
GPU	Graphics Processing Units
HD	Hamming Distance
ID	Identification
IDE	Integrated Development Environment
IoT	Internet of Things
LCD	Liquid Crystal Display
LSH	Locality Sensitive Hashing
MCC	Minutiae Cylinder Code
MVSTP	Multi-Variant Symmetric Ternary Pattern
NIST	National Institute of Standards and Technology

NPCR	Net Pixel Change Rate
NSA	National Security Agency
PIN	Personal Identification Number
RISC	Reduced Instruction Set Computer
SHA	Secure Hash Algorithms
UACI	Unified Average Changing Intensity

CHAPTER ONE
INTRODUCTION

1.1 Background

We are living in the advanced information age, where millions of kilobytes of personal data are sent daily via insecure communication devices (such as the internet, computer networks, communication systems, etc.). It creates the potential for data theft and the leakage of personal identity. Therefore, information protection is needed to improve the security identity management and user authentication methods. Conventional technologies, such as identification (ID) cards and personal identification numbers (PINs) are less reliable because they can be misplaced, forgotten, copied, forged, or misused. It is inadequate to secure the identity management and user authentication methods. Hence, the need for robust security practices is increasing. One of the practices is fingerprint authentication system (FAS).

FAS is more secure than an ID card or PIN (Ishengoma, 2014), where fingerprints have sixteen characteristics to distinguish each person, while a PIN only consists of a few numbers. FAS also provides excellent accuracy and speed so that it becomes a more reliable and precise solution for user authentication and identity management (Harikrishnan, Sunil Kumar, Joseph, & Nair, 2019). A fingerprint system is a commonly used technology for user authentication and access control devices. It can be used to control access in offices, banks, factories, hospitals, universities, homes, e-commerce, cell phones, personal systems, and others. This system can be implemented in an embedded system, combining hardware and software designed for specific functions in a particular device (Marwedel, 2018). The system consists of a

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Appendix A

Key Sensitivity Analysis Result

Table A-1 shows the results of the key sensitivity analysis of the enhanced chaos-based encryption algorithm that embeds Henon and logistic maps for the entire files in the dataset FVC2002.

Table A-1: Key sensitivity analysis of the enhanced chaos-based encryption algorithm for the entire files in the dataset FVC2002.

Datasheet (Encrypted image) DB1_B	Secret key	Diagonal correlation	Vertical correlation	Horizontal correlation	MEAN	Standard deviation
101_1	12345678**8**0ABCDEF1234567890ABCDEF	0.00114479	-0.006933178	0.00166696	-0.001373809	0.003936843
	1234567880ABCDEF1234567890ABCDEF	-0.002278412	2.53652E-05	-0.002938523	-0.001730523	0.00127051
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000526791	-0.013406289	0.005766598	-0.002722161	0.007979751
101_2	1234567890ABCDEF1234567890ABCDEF	0.003827172	-0.000406639	-0.002385411	0.000345041	0.002591372
	12345678**8**0ABCDEF1234567890ABCDEF	0.001641111	0.001174112	-0.000803984	0.000670413	0.001059845
	1234567890ABCDEF12345678**8**0ABCDEF	0.001401534	0.007070042	-0.001292538	0.002393013	0.003485251
101_3	1234567890ABCDEF1234567890ABCDEF	-0.002186195	0.0010494	-0.000092809	-0.000409868	0.001339817
	12345678**8**0ABCDEF1234567890ABCDEF	-0.002637356	0.002963745	-0.003357599	-0.001010403	0.002825488
	1234567890ABCDEF12345678**8**0ABCDEF	-0.004488027	0.000425888	-0.001210545	-0.001757561	0.002043047
101_4	1234567890ABCDEF1234567890ABCDEF	-0.002739065	-0.005720923	0.0011824	-0.002425863	0.002826958
	12345678**8**0ABCDEF1234567890ABCDEF	-0.001341203	0.003602326	-0.001100173	0.000386984	0.002275719
	1234567890ABCDEF12345678**8**0ABCDEF	0.00662007	-0.003472446	-0.001858034	0.000429863	0.004426479
101_5	1234567890ABCDEF1234567890ABCDEF	-9.57481E-05	0.000191421	-0.005801086	-0.001901805	0.0027597
	12345678**8**0ABCDEF1234567890ABCDEF	-0.001834241	0.000961237	0.001113719	8.02385E-05	0.001355172
	1234567890ABCDEF12345678**8**0ABCDEF	-0.00568901	0.002777111	-0.007113282	-0.003341727	0.004365568
101_6	1234567890ABCDEF1234567890ABCDEF	0.000339102	-0.001181433	0.00630077	0.00181948	0.003228981
	12345678**8**0ABCDEF1234567890ABCDEF	0.000208313	0.000787549	-0.002430929	-0.000478355	0.001400782
	1234567890ABCDEF12345678**8**0ABCDEF	0.003649535	0.000495186	-0.001065892	0.001026276	0.001961353
101_7	1234567890ABCDEF1234567890ABCDEF	0.003089146	-0.007440808	-0.007951305	-0.004100989	0.005088463
	12345678**8**0ABCDEF1234567890ABCDEF	0.002734601	-0.017515392	-0.00233507	-0.005705287	0.008603656
	1234567890ABCDEF12345678**8**0ABCDEF	0.013248738	-0.012537702	-0.006398633	-0.001895866	0.010998222
101_8	1234567890ABCDEF1234567890ABCDEF	0.003196661	0.008976692	0.006384168	0.00618584	0.002363851
	12345678**8**0ABCDEF1234567890ABCDEF	0.005747364	-0.010892551	0.006353176	0.000402663	0.007990751
	1234567890ABCDEF12345678**8**0ABCDEF	-0.005653336	0.008253129	-0.003259503	-0.000219903	0.00607052
102_1	1234567890ABCDEF1234567890ABCDEF	-0.003158228	-0.001611788	0.001044116	-0.001241967	0.001735415
	12345678**8**0ABCDEF1234567890ABCDEF	0.000388686	0.006141682	-0.012338403	-0.001936012	0.007721466
	1234567890ABCDEF12345678**8**0ABCDEF	-0.003378669	-0.002130307	0.000693988	-0.001604996	0.001703643
102_2	1234567890ABCDEF1234567890ABCDEF	-0.006478714	-0.001110893	0.004049472	-0.001180045	0.004298392
	12345678**8**0ABCDEF1234567890ABCDEF	0.003224588	0.003827413	-0.003779765	0.001090745	0.003452753
	1234567890ABCDEF12345678**8**0ABCDEF	0.003782901	-6.6951E-05	0.003592494	0.002436148	0.001771664
102_3	1234567890ABCDEF1234567890ABCDEF	-0.002936694	0.009875899	0.004076548	0.003671917	0.005238539

	12345678**8**0ABCDEF1234567890ABCDEF	0.002557439	-0.00104578	0.003632779	0.001714813	0.00200079
	1234567890ABCDEF12345678**8**0ABCDEF	0.00605981	-0.004194995	-0.006942632	-0.001692606	0.005595376
102_4	1234567890ABCDEF1234567890ABCDEF	-0.001855157	0.000145283	-0.002915523	-0.001541799	0.001269062
	12345678**8**0ABCDEF1234567890ABCDEF	-0.001758237	-0.005139265	0.008582274	0.00056159	0.005837029
	1234567890ABCDEF12345678**8**0ABCDEF	-0.002360705	0.00214701	-0.001966631	-0.000726775	0.002038431
102_5	1234567890ABCDEF1234567890ABCDEF	-0.00594633	0.000372635	-0.001004724	-0.002192806	0.002713053
	12345678**8**0ABCDEF1234567890ABCDEF	0.006799472	0.000401098	-0.005122894	0.000692559	0.004871647
	1234567890ABCDEF12345678**8**0ABCDEF	0.001101682	-0.004113602	0.002017434	-0.000331495	0.002700358
102_6	1234567890ABCDEF1234567890ABCDEF	0.001413048	0.000236488	-0.00984905	-0.002733172	0.00505456
	12345678**8**0ABCDEF1234567890ABCDEF	-0.004365769	-0.002742507	0.000951435	-0.00205228	0.002224931
	1234567890ABCDEF12345678**8**0ABCDEF	-0.002476203	-0.004723401	-0.006621743	-0.004607116	0.001694406
102_7	1234567890ABCDEF1234567890ABCDEF	0.004693477	-0.005110247	-0.003466008	-0.001294259	0.00428685
	12345678**8**0ABCDEF1234567890ABCDEF	0.00140334	0.001232626	-0.007264586	-0.001542873	0.004046462
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000846091	-0.005809971	-0.00362204	-0.003426034	0.00203123
102_8	1234567890ABCDEF1234567890ABCDEF	0.007591938	-0.014698708	-0.005039099	-0.004048623	0.00912703
	12345678**8**0ABCDEF1234567890ABCDEF	-0.004813636	-0.000236174	0.0041015	-0.000316103	0.003640028
	1234567890ABCDEF12345678**8**0ABCDEF	-0.008194774	-0.002935512	-0.011452347	-0.007527544	0.003508848
103_1	1234567890ABCDEF1234567890ABCDEF	-0.005408398	0.000857588	-0.005277763	-0.003276191	0.00292351
	12345678**8**0ABCDEF1234567890ABCDEF	0.001312846	-0.006721914	-0.004719497	-0.003376188	0.003414938
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000526791	-0.013406289	0.005766598	-0.002722161	0.007979751
103_2	1234567890ABCDEF1234567890ABCDEF	0.00568389	-0.007043186	0.007613437	0.002084714	0.006502292
	12345678**8**0ABCDEF1234567890ABCDEF	-0.009898645	-0.008714067	0.003280305	-0.005110802	0.005953084
	1234567890ABCDEF12345678**8**0ABCDEF	0.001401534	0.007070042	-0.001292538	0.002393013	0.003485251
103_3	1234567890ABCDEF1234567890ABCDEF	0.006831196	0.001840259	0.009166496	0.005945984	0.00305572
	12345678**8**0ABCDEF1234567890ABCDEF	0.002074612	-0.005391676	-0.007181715	-0.003499593	0.004008731
	1234567890ABCDEF12345678**8**0ABCDEF	-0.004488027	0.000425888	-0.001210545	-0.001757561	0.002043047
103_4	1234567890ABCDEF1234567890ABCDEF	0.001683738	-0.00662462	-0.003223705	-0.002721529	0.003410409
	12345678**8**0ABCDEF1234567890ABCDEF	-0.007217428	-3.63964E-05	-0.010456574	-0.005903466	0.0043543
	1234567890ABCDEF12345678**8**0ABCDEF	-0.003092056	0.00727717	0.008692357	0.00429249	0.005253528
103_5	1234567890ABCDEF1234567890ABCDEF	0.008237545	0.010208249	-0.000057449	0.006129448	0.00444816
	12345678**8**0ABCDEF1234567890ABCDEF	0.002804658	-0.00584047	0.003159559	4.12489E-05	0.004161526
	1234567890ABCDEF12345678**8**0ABCDEF	-0.003102939	0.005503214	0.006127789	0.002842688	0.004211918
103_6	1234567890ABCDEF1234567890ABCDEF	-0.000779744	0.000209061	0.003661026	0.001030114	0.001903629
	12345678**8**0ABCDEF1234567890ABCDEF	0.006946911	0.003674404	-0.005144953	0.001825454	0.005106679
	1234567890ABCDEF12345678**8**0ABCDEF	-0.004849054	-0.004789717	-0.007998298	-0.005879023	0.001498749
103_7	1234567890ABCDEF1234567890ABCDEF	-0.004338054	-0.001898372	0.011504171	0.001755915	0.006964643
	12345678**8**0ABCDEF1234567890ABCDEF	0.009771008	-0.011771362	-0.006915326	-0.002971893	0.009226101
	1234567890ABCDEF12345678**8**0ABCDEF	0.001762009	0.002958922	0.00446111	0.003060681	0.00110425
103_8	1234567890ABCDEF1234567890ABCDEF	0.01312003	-0.013660455	0.013136029	0.004198535	0.012628214
	12345678**8**0ABCDEF1234567890ABCDEF	-0.01048533	-0.007174909	0.01033667	-0.00244119	0.009135827
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000455139	0.006052143	0.003051036	0.00288268	0.002659253
104_1	1234567890ABCDEF1234567890ABCDEF	-0.006816569	-0.005469209	0.001237844	-0.003682645	0.003522523
	12345678**8**0ABCDEF1234567890ABCDEF	-0.003029969	-0.00189738	0.001763887	-0.001054488	0.002045828
	1234567890ABCDEF12345678**8**0ABCDEF	-0.00430834	0.005331534	-0.001683398	-0.000220068	0.004069217
104_2	1234567890ABCDEF1234567890ABCDEF	0.003409937	-0.004412848	-0.009076336	-0.003359749	0.005151603

	12345678**8**0ABCDEF1234567890ABCDEF	0.004860162	-0.001933016	-0.004769433	-0.000614096	0.004040374
	1234567890ABCDEF12345678**8**0ABCDEF	0.004933112	0.002643415	0.006933508	0.004836678	0.00175275
104_3	1234567890ABCDEF1234567890ABCDEF	0.001208471	-0.000192454	0.007064476	0.002693498	0.003143219
	12345678**8**0ABCDEF1234567890ABCDEF	-0.002158031	-0.006634655	-0.001136907	-0.003309864	0.002387656
	1234567890ABCDEF12345678**8**0ABCDEF	-0.004338237	-0.001834112	-0.003564877	-0.003245742	0.001046915
104_4	1234567890ABCDEF1234567890ABCDEF	0.004513131	0.002672869	0.004785822	0.003990608	0.000938409
	12345678**8**0ABCDEF1234567890ABCDEF	0.003636248	-0.00661853	-0.007353531	-0.003445271	0.005016373
	1234567890ABCDEF12345678**8**0ABCDEF	0.007616766	-0.000186372	-0.004511177	0.000973072	0.005018631
104_5	1234567890ABCDEF1234567890ABCDEF	0.003901684	-0.004644595	-0.003487819	-0.001410244	0.003785671
	12345678**8**0ABCDEF1234567890ABCDEF	0.00069172	0.003593375	-0.012646919	-0.002787275	0.007071744
	1234567890ABCDEF12345678**8**0ABCDEF	-0.001364234	0.001510275	0.006167253	0.002104431	0.003103288
104_6	1234567890ABCDEF1234567890ABCDEF	-0.00027183	0.003308127	0.000233623	0.001089973	0.001581987
	12345678**8**0ABCDEF1234567890ABCDEF	-0.002921647	-0.007495032	-0.004693704	-0.005036794	0.001882772
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000198425	0.000581088	0.001097982	0.000493549	0.000532863
104_7	1234567890ABCDEF1234567890ABCDEF	1.15829E-05	-0.001938635	0.005959035	0.001343994	0.003359046
	12345678**8**0ABCDEF1234567890ABCDEF	0.001607213	-0.002317629	0.000475815	-7.82005E-05	0.001649504
	1234567890ABCDEF12345678**8**0ABCDEF	0.001806826	0.001341716	0.003494589	0.002214377	0.000924947
104_8	1234567890ABCDEF1234567890ABCDEF	0.00071799	0.01311119	-0.004266612	0.003187523	0.007306205
	12345678**8**0ABCDEF1234567890ABCDEF	-0.008743459	-0.015006672	-0.006138471	-0.009962868	0.00372169
	1234567890ABCDEF12345678**8**0ABCDEF	-0.001394631	-0.000757681	-0.018784299	-0.00697887	0.008351748
105_1	1234567890ABCDEF1234567890ABCDEF	0.005416745	0.000303578	0.002469225	0.002729849	0.002095561
	12345678**8**0ABCDEF1234567890ABCDEF	0.000685876	0.000793525	0.001275067	0.000918156	0.000256172
	1234567890ABCDEF12345678**8**0ABCDEF	0.002153557	0.002880619	0.000251502	0.001761892	0.001108487
105_2	1234567890ABCDEF1234567890ABCDEF	0.000252163	-0.002450299	-0.004745514	-0.00231455	0.00204255
	12345678**8**0ABCDEF1234567890ABCDEF	0.001428582	-0.000381129	-0.002591869	-0.000514805	0.001644062
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000588764	-7.0499E-05	-0.005028092	-0.001895785	0.002224959
105_3	1234567890ABCDEF1234567890ABCDEF	-0.006204014	0.001544694	-0.005794455	-0.003484592	0.00356017
	12345678**8**0ABCDEF1234567890ABCDEF	0.006154638	-0.010525207	-0.000611743	-0.001660771	0.006849801
	1234567890ABCDEF12345678**8**0ABCDEF	-0.003031243	-0.000350354	0.002268801	-0.000370932	0.002163783
105_4	1234567890ABCDEF1234567890ABCDEF	-0.00188666	-0.004161487	0.005516407	-0.000177247	0.004131746
	12345678**8**0ABCDEF1234567890ABCDEF	-0.003063263	0.006766691	-0.002858034	0.000281798	0.004586277
	1234567890ABCDEF12345678**8**0ABCDEF	-0.004438253	0.001351692	-0.002484411	-0.001856991	0.00240501
105_5	1234567890ABCDEF1234567890ABCDEF	-0.004799192	-0.003069071	-0.003442229	-0.003770164	0.000743409
	12345678**8**0ABCDEF1234567890ABCDEF	-0.002196381	0.000680903	-0.01056646	-0.004027313	0.004770746
	1234567890ABCDEF12345678**8**0ABCDEF	0.003732627	0.003022899	-8.00348E-05	0.002225164	0.001655573
105_6	1234567890ABCDEF1234567890ABCDEF	0.000518392	-0.001108597	0.000107181	-0.000161008	0.000690757
	12345678**8**0ABCDEF1234567890ABCDEF	0.002184325	-0.000156182	-0.0061927	-0.001388186	0.003529118
	1234567890ABCDEF12345678**8**0ABCDEF	0.001505978	-0.002028195	-0.002101202	-0.000874473	0.001683497
105_7	1234567890ABCDEF1234567890ABCDEF	0.000245526	-0.008874043	-0.001380499	-0.003336339	0.003971617
	12345678**8**0ABCDEF1234567890ABCDEF	-0.003654087	-0.001665158	-0.003482024	-0.002933757	0.000899781
	1234567890ABCDEF12345678**8**0ABCDEF	0.00116974	-0.009803095	0.000662336	-0.002657006	0.005057292
105_8	1234567890ABCDEF1234567890ABCDEF	0.000400853	-0.005190288	0.003717525	-0.000357303	0.003675902
	12345678**8**0ABCDEF1234567890ABCDEF	0.000744276	-0.0055444	-0.002188638	-0.002329587	0.002569275
	1234567890ABCDEF12345678**8**0ABCDEF	0.006717697	-0.000899668	-0.005303356	0.000171557	0.004965687
106_1	1234567890ABCDEF1234567890ABCDEF	0.003976755	-0.006358493	-0.006985772	-0.003122504	0.005026461

	1234567880ABCDEF1234567890ABCDEF	0.004418294	-0.016581158	-0.007287207	-0.006483357	0.008591813
	1234567890ABCDEF1234567880ABCDEF	0.010466937	-0.008965358	-0.005085163	-0.001194528	0.008396678
106_2	1234567890ABCDEF1234567890ABCDEF	-0.00024139	-0.004681478	-0.008182322	-0.004368397	0.003249422
	1234567880ABCDEF1234567890ABCDEF	0.002787447	-0.009133674	-0.00952827	-0.005291499	0.005714949
	1234567890ABCDEF1234567880ABCDEF	0.005717211	-0.006719076	-0.007891537	-0.002964468	0.006157506
106_3	1234567890ABCDEF1234567890ABCDEF	0.013024839	0.016273546	-0.000715451	0.009527645	0.007363391
	1234567880ABCDEF1234567890ABCDEF	-0.002012183	0.006207114	0.002002843	0.002065924	0.00335581
	1234567890ABCDEF1234567880ABCDEF	0.003877297	-0.002167293	0.006407943	0.002705982	0.003597467
106_4	1234567890ABCDEF1234567890ABCDEF	0.000724402	0.007498216	0.005403178	0.004541932	0.00283166
	1234567880ABCDEF1234567890ABCDEF	-0.000598288	-0.002104683	0.004230235	0.000509088	0.00270216
	1234567890ABCDEF1234567880ABCDEF	-0.010045011	-0.002540354	-2.27476E-05	-0.004202704	0.004257072
106_5	1234567890ABCDEF1234567890ABCDEF	0.005221333	-0.007758519	0.008230814	0.001897876	0.006937757
	1234567880ABCDEF1234567890ABCDEF	-0.010151473	-0.006730919	0.012010464	-0.001623976	0.009741612
	1234567890ABCDEF1234567880ABCDEF	-0.000636316	0.003752741	0.004291215	0.002469213	0.002206917
106_6	1234567890ABCDEF1234567890ABCDEF	0.006494026	0.010555265	-0.002369428	0.004893288	0.005396523
	1234567880ABCDEF1234567890ABCDEF	-0.002699255	0.005346322	-0.010839784	-0.002730906	0.006607988
	1234567890ABCDEF1234567880ABCDEF	-0.006687929	0.001772371	-0.003760365	-0.002891974	0.003508062
106_7	1234567890ABCDEF1234567890ABCDEF	-0.001573148	0.003853772	-0.007430739	-0.001716705	0.004608001
	1234567880ABCDEF1234567890ABCDEF	-0.001080032	-0.00083591	0.006608777	0.001564279	0.003568391
	1234567890ABCDEF1234567880ABCDEF	0.003772072	0.006107122	0.004801053	0.004893416	0.000955515
106_8	1234567890ABCDEF1234567890ABCDEF	0.001252314	0.011294143	-0.004339046	0.002735804	0.006467854
	1234567880ABCDEF1234567890ABCDEF	-0.009471054	-0.011556536	-0.007070765	-0.009366118	0.001832811
	1234567890ABCDEF1234567880ABCDEF	-0.000518789	0.00196859	-0.010559294	-0.003036498	0.005415478
107_1	1234567890ABCDEF1234567890ABCDEF	-0.009487317	0.004070312	-0.011024199	-0.005480401	0.006782458
	1234567880ABCDEF1234567890ABCDEF	0.010610437	-0.009056009	0.003409865	0.001654764	0.008124144
	1234567890ABCDEF1234567880ABCDEF	-0.004815197	-0.011633198	0.011672742	-0.001591885	0.009783797
107_2	1234567890ABCDEF1234567890ABCDEF	-0.001826117	-0.001317393	-0.004938611	-0.00269404	0.001600682
	1234567880ABCDEF1234567890ABCDEF	0.000718069	-0.001614262	0.003451533	0.00085178	0.002070262
	1234567890ABCDEF1234567880ABCDEF	0.001103035	0.003890206	-0.001819428	0.001057938	0.002331166
107_3	1234567890ABCDEF1234567890ABCDEF	0.001509791	0.004059229	-0.005162954	0.000135355	0.003888356
	1234567880ABCDEF1234567890ABCDEF	0.005039137	-0.007349089	0.005237017	0.000975688	0.005887061
	1234567890ABCDEF1234567880ABCDEF	-0.001977874	-0.003717358	0.009397192	0.001233987	0.005815777
107_4	1234567890ABCDEF1234567890ABCDEF	-2.12805E-05	-0.006859993	0.010030447	0.001049724	0.006936955
	1234567880ABCDEF1234567890ABCDEF	0.000501106	-0.010036801	0.001935626	-0.002533357	0.00533796
	1234567890ABCDEF1234567880ABCDEF	-0.006048832	0.011298693	0.002164702	0.002471521	0.00708542
107_5	1234567890ABCDEF1234567890ABCDEF	0.000834856	-0.002366797	-0.014612447	-0.005381463	0.006656873
	1234567880ABCDEF1234567890ABCDEF	0.004572753	-0.010441219	0.002549266	-0.0011064	0.006652205
	1234567890ABCDEF1234567880ABCDEF	-0.002405724	0.000115299	0.008892474	0.002200683	0.004842447
107_6	1234567890ABCDEF1234567890ABCDEF	0.003900269	-0.005491117	-0.007430836	-0.003007228	0.004948115
	1234567880ABCDEF1234567890ABCDEF	0.002996056	-0.004654868	-0.000416134	-0.000691649	0.003129546
	1234567890ABCDEF1234567880ABCDEF	-0.004455173	-0.001760293	0.004773445	-0.000480674	0.003874697
107_7	1234567890ABCDEF1234567890ABCDEF	0.001423973	-0.006124375	-0.000738037	-0.001812813	0.00317393
	1234567880ABCDEF1234567890ABCDEF	-0.000175224	-0.002577438	-0.003427392	-0.002060018	0.001377181
	1234567890ABCDEF1234567880ABCDEF	-4.87108E-05	-0.003697248	0.000570498	-0.001058487	0.001882932
107_8	1234567890ABCDEF1234567890ABCDEF	-0.004083923	0.002529532	-0.007168063	-0.002907485	0.004045478

	12345678**8**0ABCDEF1234567890ABCDEF	-0.000333353	-0.002717171	0.004308246	0.00041924	0.002917067
	1234567890ABCDEF12345678**8**0ABCDEF	0.003723669	0.001411161	-0.005026455	3.61249E-05	0.003702181
108_1	1234567890ABCDEF1234567890ABCDEF	0.005071663	0.008207098	-0.00307125	0.003402504	0.004753234
	12345678**8**0ABCDEF1234567890ABCDEF	0.005498211	0.013155304	-0.021692851	-0.001013112	0.014953182
	1234567890ABCDEF12345678**8**0ABCDEF	0.006006957	-0.001631586	0.008942683	0.004439351	0.004456967
108_2	1234567890ABCDEF1234567890ABCDEF	0.004661366	-0.007486296	0.014954364	0.004043145	0.009171785
	12345678**8**0ABCDEF1234567890ABCDEF	-0.004445337	-0.000331663	-0.001621318	-0.002132773	0.0017179
	1234567890ABCDEF12345678**8**0ABCDEF	-0.008968078	0.00323449	0.002474839	-0.00108625	0.005581916
108_3	1234567890ABCDEF1234567890ABCDEF	0.00222727	0.014284594	0.015538097	0.01068332	0.006001189
	12345678**8**0ABCDEF1234567890ABCDEF	-0.00399007	-0.007454954	0.009509256	-0.000645256	0.00731833
	1234567890ABCDEF12345678**8**0ABCDEF	-0.009210724	0.002115351	-0.01698472	-0.008026698	0.00784239
108_4	1234567890ABCDEF1234567890ABCDEF	0.010525622	0.004236584	0.000145461	0.004969222	0.004269231
	12345678**8**0ABCDEF1234567890ABCDEF	0.000699447	0.004005093	0.00387367	0.002859403	0.001528262
	1234567890ABCDEF12345678**8**0ABCDEF	0.006394014	0.00245058	-0.002419116	0.002141826	0.003604563
108_5	1234567890ABCDEF1234567890ABCDEF	-0.005666993	0.003747132	0.000597695	-0.000440722	0.003912814
	12345678**8**0ABCDEF1234567890ABCDEF	0.006182293	0.007393282	-0.013265297	0.000103426	0.009466034
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000529353	-0.003471719	-0.01641387	-0.006804981	0.006899877
108_6	1234567890ABCDEF1234567890ABCDEF	-0.006004058	-0.004674195	0.011077738	0.000133162	0.007758004
	12345678**8**0ABCDEF1234567890ABCDEF	0.00738825	-0.000354777	0.00390546	0.003646311	0.003166385
	1234567890ABCDEF12345678**8**0ABCDEF	0.001302227	-0.000897907	0.001648575	0.000684298	0.001127688
108_7	1234567890ABCDEF1234567890ABCDEF	0.001086882	-0.002556229	-0.006044298	-0.002504548	0.002911521
	12345678**8**0ABCDEF1234567890ABCDEF	0.00014517	-0.000971021	-0.005608564	-0.002144805	0.002491277
	1234567890ABCDEF12345678**8**0ABCDEF	0.001810237	0.005654419	0.00909875	0.005521136	0.002977015
108_8	1234567890ABCDEF1234567890ABCDEF	-0.000493742	-0.005423379	-0.006866701	-0.004261274	0.002728433
	12345678**8**0ABCDEF1234567890ABCDEF	-0.00497171	-0.023113856	-0.002359213	-0.01014826	0.00922989
	1234567890ABCDEF12345678**8**0ABCDEF	0.007186981	-0.008554216	0.002929771	0.000520845	0.006648234
109_1	1234567890ABCDEF1234567890ABCDEF	-0.001308488	-0.000777238	0.000284469	-0.000600419	0.000662232
	12345678**8**0ABCDEF1234567890ABCDEF	-0.000877619	0.000122201	-0.000519386	-0.000424935	0.000413603
	1234567890ABCDEF12345678**8**0ABCDEF	0.003032163	0.001606793	3.19945E-05	0.001556984	0.00122532
109_2	1234567890ABCDEF1234567890ABCDEF	0.00550537	0.000311251	0.001496218	0.002437613	0.002222519
	12345678**8**0ABCDEF1234567890ABCDEF	-0.000167693	-0.003798678	-0.003531749	-0.002499373	0.001652344
	1234567890ABCDEF12345678**8**0ABCDEF	0.001660896	0.002584055	-6.78509E-05	0.001392367	0.001099161
109_3	1234567890ABCDEF1234567890ABCDEF	-0.000728099	0.000263205	-0.002273977	-0.000912957	0.001044015
	12345678**8**0ABCDEF1234567890ABCDEF	0.003431958	0.000746071	0.00359188	0.00258997	0.001305467
	1234567890ABCDEF12345678**8**0ABCDEF	0.001079801	8.46385E-05	0.003969003	0.001711147	0.001647427
109_4	1234567890ABCDEF1234567890ABCDEF	0.000968445	-0.001198622	-0.006397848	-0.002209342	0.003091033
	12345678**8**0ABCDEF1234567890ABCDEF	0.001437831	0.000193307	-0.012024003	-0.003464289	0.00607392
	1234567890ABCDEF12345678**8**0ABCDEF	0.002637382	0.001846788	-0.002204389	0.000759927	0.002120792
109_5	1234567890ABCDEF1234567890ABCDEF	-0.0018018	0.006997219	-0.008983402	-0.001262661	0.00653519
	12345678**8**0ABCDEF1234567890ABCDEF	-0.010338893	-0.003738507	0.00633201	-0.002581797	0.006854839
	1234567890ABCDEF12345678**8**0ABCDEF	0.000671098	-0.004494332	-0.006462243	-0.003428493	0.003008117
109_6	1234567890ABCDEF1234567890ABCDEF	0.00134227	0.002754076	-0.003306983	0.000263121	0.002589405
	12345678**8**0ABCDEF1234567890ABCDEF	0.003890995	-0.000759131	-0.002551549	0.000193439	0.002715036
	1234567890ABCDEF12345678**8**0ABCDEF	-0.001702415	-0.004463787	-0.00200748	-0.002724561	0.001236109
109_7	1234567890ABCDEF1234567890ABCDEF	-0.004282805	-0.004229387	-0.007771796	-0.005427996	0.00165746

	12345678**8**0ABCDEF1234567890ABCDEF	-0.000814863	0.000095127	-0.000028564	-0.000249433	0.000402996
	1234567890ABCDEF123456788**0**ABCDEF	-0.002584053	-0.009148163	-0.007283692	-0.006338636	0.002761851
109_8	1234567890ABCDEF1234567890ABCDEF	0.004147096	-0.006564302	-0.023540209	-0.008652472	0.011399329
	12345678**8**0ABCDEF1234567890ABCDEF	0.000710586	-0.009883169	-0.004279575	-0.004484053	0.004327299
	1234567890ABCDEF123456788**0**ABCDEF	-0.007161209	0.00324745	0.01142155	0.002502597	0.007604641
110_1	1234567890ABCDEF1234567890ABCDEF	-0.001419978	0.003422856	-0.002227108	-7.47433E-05	0.002495031
	12345678**8**0ABCDEF1234567890ABCDEF	0.003116358	-0.008143952	0.002992105	-0.000678497	0.005279118
	1234567890ABCDEF123456788**0**ABCDEF	0.004721702	-0.008490922	0.006404642	0.000878474	0.006660693
110_2	1234567890ABCDEF1234567890ABCDEF	0.002060488	0.001344628	-0.002554618	0.000283499	0.00202802
	12345678**8**0ABCDEF1234567890ABCDEF	0.003073104	-0.003952182	-0.001888592	-0.000922557	0.002948285
	1234567890ABCDEF123456788**0**ABCDEF	-0.001207326	-0.002221955	0.001061418	-0.000789288	0.001372638
110_3	1234567890ABCDEF1234567890ABCDEF	-0.000370235	0.009015666	-0.006603992	0.00068048	0.006419835
	12345678**8**0ABCDEF1234567890ABCDEF	0.002565993	-0.006400035	-0.005980201	-0.003271415	0.004131227
	1234567890ABCDEF123456788**0**ABCDEF	0.009065002	-0.003513023	-0.001857322	0.001231553	0.005580175
110_4	1234567890ABCDEF1234567890ABCDEF	-0.000995107	-0.002595197	0.012385377	0.002931691	0.006716607
	12345678**8**0ABCDEF1234567890ABCDEF	0.009393053	-0.005784042	-0.00905859	-0.001816526	0.008038311
	1234567890ABCDEF123456788**0**ABCDEF	0.005953798	-0.001736876	0.012680296	0.005632406	0.005890172
110_5	1234567890ABCDEF1234567890ABCDEF	-0.004071998	-0.005983024	0.00530015	-0.001584957	0.004930621
	12345678**8**0ABCDEF1234567890ABCDEF	-0.001518044	0.001711695	-0.001327932	-0.000378094	0.001479741
	1234567890ABCDEF123456788**0**ABCDEF	-0.007223524	-0.006503627	-0.00139166	-0.005039604	0.002596175
110_6	1234567890ABCDEF1234567890ABCDEF	0.004683012	0.009188146	0.003820161	0.005897106	0.002353626
	12345678**8**0ABCDEF1234567890ABCDEF	-0.001270292	0.005824308	0.002670916	0.002408311	0.002902305
	1234567890ABCDEF123456788**0**ABCDEF	0.00271565	-0.008227242	0.00174874	-0.001254284	0.004946402
110_7	1234567890ABCDEF1234567890ABCDEF	-0.005834698	-0.007618909	0.000947409	-0.004168733	0.003690261
	12345678**8**0ABCDEF1234567890ABCDEF	0.006895272	-0.000490511	-0.010077133	-0.001224124	0.006948346
	1234567890ABCDEF123456788**0**ABCDEF	0.00469787	-0.006674195	0.006513461	0.001512379	0.005836042
110_8	1234567890ABCDEF1234567890ABCDEF	-0.011292341	-0.008647141	-0.010254743	-0.010064742	0.001088223
	12345678**8**0ABCDEF1234567890ABCDEF	0.008890064	0.000213352	-0.00664573	0.000819229	0.006356914
	1234567890ABCDEF123456788**0**ABCDEF	-0.005918152	-0.009592567	-0.000857806	-0.005456175	0.003580882
Datasheet (Encrypted image) DB2_B	**Secret Key**	**Diagonal Correlation**	**Vertical Correlation**	**Horizontal Correlation**	**Mean**	**Standard Deviation**
101_1	12345678**8**0ABCDEF1234567890ABCDEF	0.00114479	-0.006933178	0.00166696	-0.001373809	0.003936843
	1234567880ABCDEF1234567890ABCDEF	-0.002278412	0.00002536	-0.002938523	-0.001730525	0.001270508
	1234567890ABCDEF123456788**0**ABCDEF	-0.000526791	-0.013406289	0.005766598	-0.002722161	0.007979751
101_2	1234567890ABCDEF1234567890ABCDEF	0.003827172	-0.000406639	-0.002385411	0.000345041	0.002591372
	12345678**8**0ABCDEF1234567890ABCDEF	0.001641111	0.001174112	-0.000803984	0.000670413	0.001059845
	1234567890ABCDEF123456788**0**ABCDEF	0.001401534	0.007070042	-0.001292538	0.002393013	0.003485251
101_3	1234567890ABCDEF1234567890ABCDEF	-0.002186195	0.0010494	-9.28091E-05	-0.000409868	0.001339817
	12345678**8**0ABCDEF1234567890ABCDEF	-0.002637356	0.002963745	-0.003357599	-0.001010403	0.002825488
	1234567890ABCDEF123456788**0**ABCDEF	-0.004488027	0.000425888	-0.001210545	-0.001757561	0.002043047
101_4	1234567890ABCDEF1234567890ABCDEF	-0.002739065	-0.005720923	0.0011824	-0.002425863	0.002826958
	12345678**8**0ABCDEF1234567890ABCDEF	-0.001341203	0.003602326	-0.001100173	0.000386984	0.002275719
	1234567890ABCDEF123456788**0**ABCDEF	0.00662007	-0.003472446	-0.001858034	0.000429863	0.004426479

101_5	1234567890ABCDEF1234567890ABCDEF	-0.00009574	0.000191421	-0.005801086	-0.001901802	0.002759702
	12345678**8**0ABCDEF1234567890ABCDEF	-0.001834241	0.000961237	0.001113719	8.02385E-05	0.001355172
	1234567890ABCDEF12345678**8**0ABCDEF	-0.00568901	0.002777111	-0.007113282	-0.003341727	0.004365568
101_6	1234567890ABCDEF1234567890ABCDEF	0.000339102	-0.001181433	0.00630077	0.00181948	0.003228981
	12345678**8**0ABCDEF1234567890ABCDEF	0.000208313	0.000787549	-0.002430929	-0.000478355	0.001400782
	1234567890ABCDEF12345678**8**0ABCDEF	0.003649535	0.000495186	-0.001065892	0.001026276	0.001961353
101_7	1234567890ABCDEF1234567890ABCDEF	0.003089146	-0.007440808	-0.007951305	-0.004100989	0.005088463
	12345678**8**0ABCDEF1234567890ABCDEF	0.002734601	-0.017515392	-0.00233507	-0.005705287	0.008603656
	1234567890ABCDEF12345678**8**0ABCDEF	0.013248738	-0.012537702	-0.006398633	-0.001895866	0.010998222
101_8	1234567890ABCDEF1234567890ABCDEF	0.003196661	0.008976692	0.006384168	0.00618584	0.002363851
	12345678**8**0ABCDEF1234567890ABCDEF	0.005747364	-0.010892551	0.006353176	0.000402663	0.007990751
	1234567890ABCDEF12345678**8**0ABCDEF	-0.005653336	0.008253129	-0.003259503	-0.000219903	0.00607052
102_1	1234567890ABCDEF1234567890ABCDEF	-0.003158228	-0.001611788	0.001044116	-0.001241967	0.001735415
	12345678**8**0ABCDEF1234567890ABCDEF	0.000388686	0.006141682	-0.012338403	-0.001936012	0.007721466
	1234567890ABCDEF12345678**8**0ABCDEF	-0.003378669	-0.002130307	0.000693988	-0.001604996	0.001703643
102_2	1234567890ABCDEF1234567890ABCDEF	-0.006478714	-0.001110893	0.004049472	-0.001180045	0.004298392
	12345678**8**0ABCDEF1234567890ABCDEF	0.003224588	0.003827413	-0.003779765	0.001090745	0.003452753
	1234567890ABCDEF12345678**8**0ABCDEF	0.003782901	-6.6951E-05	0.003592494	0.002436148	0.001771664
102_3	1234567890ABCDEF1234567890ABCDEF	-0.002936694	0.009875899	0.004076548	0.003671917	0.005238539
	12345678**8**0ABCDEF1234567890ABCDEF	0.002557439	-0.00104578	0.003632779	0.001714813	0.00200079
	1234567890ABCDEF12345678**8**0ABCDEF	0.00605981	-0.004194995	-0.006942632	-0.001692606	0.005595376
102_4	1234567890ABCDEF1234567890ABCDEF	-0.001855157	0.000145283	-0.002915523	-0.001541799	0.001269062
	12345678**8**0ABCDEF1234567890ABCDEF	-0.001758237	-0.005139265	0.008582274	0.00056159	0.005837029
	1234567890ABCDEF12345678**8**0ABCDEF	-0.002360705	0.00214701	-0.001966631	-0.000726775	0.002038431
102_5	1234567890ABCDEF1234567890ABCDEF	-0.00594633	0.000372635	-0.001004724	-0.002192806	0.002713053
	12345678**8**0ABCDEF1234567890ABCDEF	0.006799472	0.000401098	-0.005122894	0.000692559	0.004871647
	1234567890ABCDEF12345678**8**0ABCDEF	0.001101682	-0.004113602	0.002017434	-0.000331495	0.002700358
102_6	1234567890ABCDEF1234567890ABCDEF	0.001413048	0.000236488	-0.00984905	-0.002733172	0.00505456
	12345678**8**0ABCDEF1234567890ABCDEF	-0.004365769	-0.002742507	0.000951435	-0.00205228	0.002224931
	1234567890ABCDEF12345678**8**0ABCDEF	-0.002476203	-0.004723401	-0.006621743	-0.004607116	0.001694406
102_7	1234567890ABCDEF1234567890ABCDEF	0.004693477	-0.005110247	-0.003466008	-0.001294259	0.00428685
	12345678**8**0ABCDEF1234567890ABCDEF	0.00140334	0.001232626	-0.007264586	-0.001542873	0.004046462
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000846091	-0.005809971	-0.00362204	-0.003426034	0.00203123
102_8	1234567890ABCDEF1234567890ABCDEF	0.007591938	-0.014698708	-0.005039099	-0.004048623	0.00912703
	12345678**8**0ABCDEF1234567890ABCDEF	-0.004813636	-0.000236174	0.0041015	-0.000316103	0.003640028
	1234567890ABCDEF12345678**8**0ABCDEF	-0.008194774	-0.002935512	-0.011452347	-0.007527544	0.003508848
103_1	1234567890ABCDEF1234567890ABCDEF	-0.005408398	0.000857588	-0.005277763	-0.003276191	0.00292351
	12345678**8**0ABCDEF1234567890ABCDEF	0.001312846	-0.006721914	-0.004719497	-0.003376188	0.003414938
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000526791	-0.013406289	0.005766598	-0.002722161	0.007979751
103_2	1234567890ABCDEF1234567890ABCDEF	0.00568389	-0.007043186	0.007613437	0.002084714	0.006502292
	12345678**8**0ABCDEF1234567890ABCDEF	-0.009898645	-0.008714067	0.003280305	-0.005110802	0.005953084
	1234567890ABCDEF12345678**8**0ABCDEF	0.001401534	0.007070042	-0.001292538	0.002393013	0.003485251
103_3	1234567890ABCDEF1234567890ABCDEF	0.006831196	0.001840259	0.009166496	0.005945984	0.00305572
	12345678**8**0ABCDEF1234567890ABCDEF	0.002074612	-0.005391676	-0.007181715	-0.003499593	0.004008731

	1234567890ABCDEF12345678**8**0ABCDEF	-0.004488027	0.000425888	-0.001210545	-0.001757561	0.002043047
103_4	1234567890ABCDEF1234567890ABCDEF	0.001683738	-0.00662462	-0.003223705	-0.002721529	0.003410409
	12345678**8**0ABCDEF1234567890ABCDEF	-0.007217428	-3.63964E-05	-0.010456574	-0.005903466	0.0043543
	1234567890ABCDEF12345678**8**0ABCDEF	-0.003092056	0.00727717	0.008692357	0.00429249	0.005253528
103_5	1234567890ABCDEF1234567890ABCDEF	0.008237545	0.010208249	-5.74496E-05	0.006129448	0.00444816
	12345678**8**0ABCDEF1234567890ABCDEF	0.002804658	-0.00584047	0.003159559	4.12489E-05	0.004161526
	1234567890ABCDEF12345678**8**0ABCDEF	-0.003102939	0.005503214	0.006127789	0.002842688	0.004211918
103_6	1234567890ABCDEF1234567890ABCDEF	-0.000779744	0.000209061	0.003661026	0.001030114	0.001903629
	12345678**8**0ABCDEF1234567890ABCDEF	0.006946911	0.003674404	-0.005144953	0.001825454	0.005106679
	1234567890ABCDEF12345678**8**0ABCDEF	-0.004849054	-0.004789717	-0.007998298	-0.005879023	0.001498749
103_7	1234567890ABCDEF1234567890ABCDEF	-0.004338054	-0.001898372	0.011504171	0.001755915	0.006964643
	12345678**8**0ABCDEF1234567890ABCDEF	0.009771008	-0.011771362	-0.006915326	-0.002971893	0.009226101
	1234567890ABCDEF12345678**8**0ABCDEF	0.001762009	0.002958922	0.00446111	0.003060681	0.00110425
103_8	1234567890ABCDEF1234567890ABCDEF	0.01312003	-0.013660455	0.013136029	0.004198535	0.012628214
	12345678**8**0ABCDEF1234567890ABCDEF	-0.01048533	-0.007174909	0.01033667	-0.00244119	0.009135827
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000455139	0.006052143	0.003051036	0.00288268	0.002659253
104_1	1234567890ABCDEF1234567890ABCDEF	-0.006816569	-0.005469209	0.001237844	-0.003682645	0.003522523
	12345678**8**0ABCDEF1234567890ABCDEF	-0.003029969	-0.00189738	0.001763887	-0.001054488	0.002045828
	1234567890ABCDEF12345678**8**0ABCDEF	-0.00430834	0.005331534	-0.001683398	-0.000220068	0.004069217
104_2	1234567890ABCDEF1234567890ABCDEF	0.003409937	-0.004412848	-0.009076336	-0.003359749	0.005151603
	12345678**8**0ABCDEF1234567890ABCDEF	0.004860162	-0.001933016	-0.004769433	-0.000614096	0.004040374
	1234567890ABCDEF12345678**8**0ABCDEF	0.004933112	0.002643415	0.006933508	0.004836678	0.00175275
104_3	1234567890ABCDEF1234567890ABCDEF	0.001208471	-0.000192454	0.007064476	0.002693498	0.003143219
	12345678**8**0ABCDEF1234567890ABCDEF	-0.002158031	-0.006634655	-0.001136907	-0.003309864	0.002387656
	1234567890ABCDEF12345678**8**0ABCDEF	-0.004338237	-0.001834112	-0.003564877	-0.003245742	0.001046915
104_4	1234567890ABCDEF1234567890ABCDEF	0.004513131	0.002672869	0.004785822	0.003990608	0.000938409
	12345678**8**0ABCDEF1234567890ABCDEF	0.003636248	-0.00661853	-0.007353531	-0.003445271	0.005016373
	1234567890ABCDEF12345678**8**0ABCDEF	0.007616766	-0.000186372	-0.004511177	0.000973072	0.005018631
104_5	1234567890ABCDEF1234567890ABCDEF	0.003901684	-0.004644595	-0.003487819	-0.001410244	0.003785671
	12345678**8**0ABCDEF1234567890ABCDEF	0.00069172	0.003593375	-0.012646919	-0.002787275	0.007071744
	1234567890ABCDEF12345678**8**0ABCDEF	-0.001364234	0.001510275	0.006167253	0.002104431	0.003103288
104_6	1234567890ABCDEF1234567890ABCDEF	-0.00027183	0.003308127	0.000233623	0.001089973	0.001581987
	12345678**8**0ABCDEF1234567890ABCDEF	-0.002921647	-0.007495032	-0.004693704	-0.005036794	0.001882772
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000198425	0.000581088	0.001097982	0.000493549	0.000532863
104_7	1234567890ABCDEF1234567890ABCDEF	1.15829E-05	-0.001938635	0.005959035	0.001343994	0.003359046
	12345678**8**0ABCDEF1234567890ABCDEF	0.001607213	-0.002317629	0.000475815	-7.82005E-05	0.001649504
	1234567890ABCDEF12345678**8**0ABCDEF	0.001806826	0.001341716	0.003494589	0.002214377	0.000924947
104_8	1234567890ABCDEF1234567890ABCDEF	0.00071799	0.01311119	-0.004266612	0.003187523	0.007306205
	12345678**8**0ABCDEF1234567890ABCDEF	-0.008743459	-0.015006672	-0.006138471	-0.009962868	0.00372169
	1234567890ABCDEF12345678**8**0ABCDEF	-0.001394631	-0.000757681	-0.018784299	-0.00697887	0.008351748
105_1	1234567890ABCDEF1234567890ABCDEF	0.005416745	0.000303578	0.002469225	0.002729849	0.002095561
	12345678**8**0ABCDEF1234567890ABCDEF	0.000685876	0.000793525	0.001275067	0.000918156	0.000256172
	1234567890ABCDEF12345678**8**0ABCDEF	0.002153557	0.002880619	0.000251502	0.001761892	0.001108487
105_2	1234567890ABCDEF1234567890ABCDEF	0.000252163	-0.002450299	-0.004745514	-0.00231455	0.00204255

	1234567880ABCDEF1234567890ABCDEF	0.001428582	-0.000381129	-0.002591869	-0.000514805	0.001644062
	1234567890ABCDEF1234567880ABCDEF	-0.000588764	-7.0499E-05	-0.005028092	-0.001895785	0.002224959
105_3	1234567890ABCDEF1234567890ABCDEF	-0.006204014	0.001544694	-0.005794455	-0.003484592	0.00356017
	1234567880ABCDEF1234567890ABCDEF	0.006154638	-0.010525207	-0.000611743	-0.001660771	0.006849801
	1234567890ABCDEF1234567880ABCDEF	-0.003031243	-0.000350354	0.002268801	-0.000370932	0.002163783
105_4	1234567890ABCDEF1234567890ABCDEF	-0.00188666	-0.004161487	0.005516407	-0.000177247	0.004131746
	1234567880ABCDEF1234567890ABCDEF	-0.003063263	0.006766691	-0.002858034	0.000281798	0.004586277
	1234567890ABCDEF1234567880ABCDEF	-0.004438253	0.001351692	-0.002484411	-0.001856991	0.00240501
105_5	1234567890ABCDEF1234567890ABCDEF	-0.004799192	-0.003069071	-0.003442229	-0.003770164	0.000743409
	1234567880ABCDEF1234567890ABCDEF	-0.002196381	0.000680903	-0.01056646	-0.004027313	0.004770746
	1234567890ABCDEF1234567880ABCDEF	0.003732627	0.003022899	-8.00348E-05	0.002225164	0.001655573
105_6	1234567890ABCDEF1234567890ABCDEF	0.000518392	-0.001108597	0.000107181	-0.000161008	0.000690757
	1234567880ABCDEF1234567890ABCDEF	0.002184325	-0.000156182	-0.0061927	-0.001388186	0.003529118
	1234567890ABCDEF1234567880ABCDEF	0.001505978	-0.002028195	-0.002101202	-0.000874473	0.001683497
105_7	1234567890ABCDEF1234567890ABCDEF	0.000245526	-0.008874043	-0.001380499	-0.003336339	0.003971617
	1234567880ABCDEF1234567890ABCDEF	-0.003654087	-0.001665158	-0.003482024	-0.002933757	0.000899781
	1234567890ABCDEF1234567880ABCDEF	0.00116974	-0.009803095	0.000662336	-0.002657006	0.005057292
105_8	1234567890ABCDEF1234567890ABCDEF	0.000400853	-0.005190288	0.003717525	-0.000357303	0.003675902
	1234567880ABCDEF1234567890ABCDEF	0.000744276	-0.0055444	-0.002188638	-0.002329587	0.002569275
	1234567890ABCDEF1234567880ABCDEF	0.006717697	-0.000899668	-0.005303356	0.000171557	0.004965687
106_1	1234567890ABCDEF1234567890ABCDEF	0.003976755	-0.006358493	-0.006985772	-0.003122504	0.005026461
	1234567880ABCDEF1234567890ABCDEF	0.004418294	-0.016581158	-0.007287207	-0.006483357	0.008591813
	1234567890ABCDEF1234567880ABCDEF	0.010466937	-0.008965358	-0.005085163	-0.001194528	0.008396678
106_2	1234567890ABCDEF1234567890ABCDEF	-0.00024139	-0.004681478	-0.008182322	-0.004368397	0.003249422
	1234567880ABCDEF1234567890ABCDEF	0.002787447	-0.009133674	-0.00952827	-0.005291499	0.005714949
	1234567890ABCDEF1234567880ABCDEF	0.005717211	-0.006719076	-0.007891537	-0.002964468	0.006157506
106_3	1234567890ABCDEF1234567890ABCDEF	0.013024839	0.016273546	-0.000715451	0.009527645	0.007363391
	1234567880ABCDEF1234567890ABCDEF	-0.002012183	0.006207114	0.002002843	0.002065924	0.00335581
	1234567890ABCDEF1234567880ABCDEF	0.003877297	-0.002167293	0.006407943	0.002705982	0.003597467
106_4	1234567890ABCDEF1234567890ABCDEF	0.000724402	0.007498216	0.005403178	0.004541932	0.00283166
	1234567880ABCDEF1234567890ABCDEF	-0.000598288	-0.002104683	0.004230235	0.000509088	0.00270216
	1234567890ABCDEF1234567880ABCDEF	-0.010045011	-0.002540354	-2.27476E-05	-0.004202704	0.004257072
106_5	1234567890ABCDEF1234567890ABCDEF	0.005221333	-0.007758519	0.008230814	0.001897876	0.006937757
	1234567880ABCDEF1234567890ABCDEF	-0.010151473	-0.006730919	0.012010464	-0.001623976	0.009741612
	1234567890ABCDEF1234567880ABCDEF	-0.000636316	0.003752741	0.004291215	0.002469213	0.002206917
106_6	1234567890ABCDEF1234567890ABCDEF	0.006494026	0.010555265	-0.002369428	0.004893288	0.005396523
	1234567880ABCDEF1234567890ABCDEF	-0.002699255	0.005346322	-0.010839784	-0.002730906	0.006607988
	1234567890ABCDEF1234567880ABCDEF	-0.006687929	0.001772371	-0.003760365	-0.002891974	0.003508062
106_7	1234567890ABCDEF1234567890ABCDEF	-0.001573148	0.003853772	-0.007430739	-0.001716705	0.004608001
	1234567880ABCDEF1234567890ABCDEF	-0.001080032	-0.00083591	0.006608777	0.001564279	0.003568391
	1234567890ABCDEF1234567880ABCDEF	0.003772072	0.006107122	0.004801053	0.004893416	0.000955515
106_8	1234567890ABCDEF1234567890ABCDEF	0.001252314	0.011294143	-0.004339046	0.002735804	0.006467854
	1234567880ABCDEF1234567890ABCDEF	-0.009471054	-0.011556536	-0.007070765	-0.009366118	0.001832811
	1234567890ABCDEF1234567880ABCDEF	-0.000518789	0.00196859	-0.010559294	-0.003036498	0.005415478

107_1	1234567890ABCDEF1234567890ABCDEF	-0.009487317	0.004070312	-0.011024199	-0.005480401	0.006782458
	12345678**8**0ABCDEF1234567890ABCDEF	0.010610437	-0.009056009	0.003409865	0.001654764	0.008124144
	1234567890ABCDEF12345678**8**0ABCDEF	-0.004815197	-0.011633198	0.011672742	-0.001591885	0.009783797
107_2	1234567890ABCDEF1234567890ABCDEF	-0.001826117	-0.001317393	-0.004938611	-0.00269404	0.001600682
	12345678**8**0ABCDEF1234567890ABCDEF	0.000718069	-0.001614262	0.003451533	0.00085178	0.002070262
	1234567890ABCDEF12345678**8**0ABCDEF	0.001103035	0.003890206	-0.001819428	0.001057938	0.002331166
107_3	1234567890ABCDEF1234567890ABCDEF	0.001509791	0.004059229	-0.005162954	0.000135355	0.003888356
	12345678**8**0ABCDEF1234567890ABCDEF	0.005039137	-0.007349089	0.005237017	0.000975688	0.005887061
	1234567890ABCDEF12345678**8**0ABCDEF	-0.001977874	-0.003717358	0.009397192	0.001233987	0.005815777
107_4	1234567890ABCDEF1234567890ABCDEF	-2.12805E-05	-0.006859993	0.010030447	0.001049724	0.006936955
	12345678**8**0ABCDEF1234567890ABCDEF	0.000501106	-0.010036801	0.001935626	-0.002533357	0.00533796
	1234567890ABCDEF12345678**8**0ABCDEF	-0.006048832	0.011298693	0.002164702	0.002471521	0.00708542
107_5	1234567890ABCDEF1234567890ABCDEF	0.000834856	-0.002366797	-0.014612447	-0.005381463	0.006656873
	12345678**8**0ABCDEF1234567890ABCDEF	0.004572753	-0.010441219	0.002549266	-0.0011064	0.006652205
	1234567890ABCDEF12345678**8**0ABCDEF	-0.002405724	0.000115299	0.008892474	0.002200683	0.004842447
107_6	1234567890ABCDEF1234567890ABCDEF	0.003900269	-0.005491117	-0.007430836	-0.003007228	0.004948115
	12345678**8**0ABCDEF1234567890ABCDEF	0.002996056	-0.004654868	-0.000416134	-0.000691649	0.003129546
	1234567890ABCDEF12345678**8**0ABCDEF	-0.004455173	-0.001760293	0.004773445	-0.000480674	0.003874697
107_7	1234567890ABCDEF1234567890ABCDEF	0.001423973	-0.006124375	-0.000738037	-0.001812813	0.00317393
	12345678**8**0ABCDEF1234567890ABCDEF	-0.000175224	-0.002577438	-0.003427392	-0.002060018	0.001377181
	1234567890ABCDEF12345678**8**0ABCDEF	-4.87108E-05	-0.003697248	0.000570498	-0.001058487	0.001882932
107_8	1234567890ABCDEF1234567890ABCDEF	-0.004083923	0.002529532	-0.007168063	-0.002907485	0.004045478
	12345678**8**0ABCDEF1234567890ABCDEF	-0.000333353	-0.002717171	0.004308246	0.00041924	0.002917067
	1234567890ABCDEF12345678**8**0ABCDEF	0.003723669	0.001411161	-0.005026455	3.61249E-05	0.003702181
108_1	1234567890ABCDEF1234567890ABCDEF	0.005071663	0.008207098	-0.00307125	0.003402504	0.004753234
	12345678**8**0ABCDEF1234567890ABCDEF	0.005498211	0.013155304	-0.021692851	-0.001013112	0.014953182
	1234567890ABCDEF12345678**8**0ABCDEF	0.006006957	-0.001631586	0.008942683	0.004439351	0.004456967
108_2	1234567890ABCDEF1234567890ABCDEF	0.004661366	-0.007486296	0.014954364	0.004043145	0.009171785
	12345678**8**0ABCDEF1234567890ABCDEF	-0.004445337	-0.000331663	-0.001621318	-0.002132773	0.0017179
	1234567890ABCDEF12345678**8**0ABCDEF	-0.008968078	0.00323449	0.002474839	-0.00108625	0.005581916
108_3	1234567890ABCDEF1234567890ABCDEF	0.00222727	0.014284594	0.015538097	0.01068332	0.006001189
	12345678**8**0ABCDEF1234567890ABCDEF	-0.00399007	-0.007454954	0.009509256	-0.000645256	0.00731833
	1234567890ABCDEF12345678**8**0ABCDEF	-0.009210724	0.002115351	-0.01698472	-0.008026698	0.00784239
108_4	1234567890ABCDEF1234567890ABCDEF	0.010525622	0.004236584	0.000145461	0.004969222	0.004269231
	12345678**8**0ABCDEF1234567890ABCDEF	0.000699447	0.004005093	0.00387367	0.002859403	0.001528262
	1234567890ABCDEF12345678**8**0ABCDEF	0.006394014	0.00245058	-0.002419116	0.002141826	0.003604563
108_5	1234567890ABCDEF1234567890ABCDEF	-0.005666993	0.003747132	0.000597695	-0.000440722	0.003912814
	12345678**8**0ABCDEF1234567890ABCDEF	0.006182293	0.007393282	-0.013265297	0.000103426	0.009466034
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000529353	-0.003471719	-0.01641387	-0.006804981	0.006899877
108_6	1234567890ABCDEF1234567890ABCDEF	-0.006004058	-0.004674195	0.011077738	0.000133162	0.007758004
	12345678**8**0ABCDEF1234567890ABCDEF	0.00738825	-0.000354777	0.00390546	0.003646311	0.003166385
	1234567890ABCDEF12345678**8**0ABCDEF	0.001302227	-0.000897907	0.001648575	0.000684298	0.001127688
108_7	1234567890ABCDEF1234567890ABCDEF	0.001086882	-0.002556229	-0.006044298	-0.002504548	0.002911521
	12345678**8**0ABCDEF1234567890ABCDEF	0.00014517	-0.000971021	-0.005608564	-0.002144805	0.002491277

	1234567890ABCDEF12345678**8**0ABCDEF	0.001810237	0.005654419	0.00909875	0.005521136	0.002977015
108_8	1234567890ABCDEF1234567890ABCDEF	-0.000493742	-0.005423379	-0.006866701	-0.004261274	0.002728433
	12345678**8**0ABCDEF1234567890ABCDEF	-0.00497171	-0.023113856	-0.002359213	-0.01014826	0.00922989
	1234567890ABCDEF12345678**8**0ABCDEF	0.007186981	-0.008554216	0.002929771	0.000520845	0.006648234
109_1	1234567890ABCDEF1234567890ABCDEF	-0.001308488	-0.000777238	0.000284469	-0.000600419	0.000662232
	12345678**8**0ABCDEF1234567890ABCDEF	-0.000877619	0.000122201	-0.000519386	-0.000424935	0.000413603
	1234567890ABCDEF12345678**8**0ABCDEF	0.003032163	0.001606793	3.19945E-05	0.001556984	0.00122532
109_2	1234567890ABCDEF1234567890ABCDEF	0.00550537	0.000311251	0.001496218	0.002437613	0.002222519
	12345678**8**0ABCDEF1234567890ABCDEF	-0.000167693	-0.003798678	-0.003531749	-0.002499373	0.001652344
	1234567890ABCDEF12345678**8**0ABCDEF	0.001660896	0.002584055	-6.78509E-05	0.001392367	0.001099161
109_3	1234567890ABCDEF1234567890ABCDEF	-0.000728099	0.000263205	-0.002273977	-0.000912957	0.001044015
	12345678**8**0ABCDEF1234567890ABCDEF	0.003431958	0.000746071	0.00359188	0.00258997	0.001305467
	1234567890ABCDEF12345678**8**0ABCDEF	0.001079801	8.46385E-05	0.003969003	0.001711147	0.001647427
109_4	1234567890ABCDEF1234567890ABCDEF	0.000968445	-0.001198622	-0.006397848	-0.002209342	0.003091033
	12345678**8**0ABCDEF1234567890ABCDEF	0.001437831	0.000193307	-0.012024003	-0.003464289	0.00607392
	1234567890ABCDEF12345678**8**0ABCDEF	0.002637382	0.001846788	-0.002204389	0.000759927	0.002120792
109_5	1234567890ABCDEF1234567890ABCDEF	-0.0018018	0.006997219	-0.008983402	-0.001262661	0.00653519
	12345678**8**0ABCDEF1234567890ABCDEF	-0.010338893	-0.003738507	0.00633201	-0.002581797	0.006854839
	1234567890ABCDEF12345678**8**0ABCDEF	0.000671098	-0.004494332	-0.006462243	-0.003428493	0.003008117
109_6	1234567890ABCDEF1234567890ABCDEF	0.00134227	0.002754076	-0.003306983	0.000263121	0.002589405
	12345678**8**0ABCDEF1234567890ABCDEF	0.003890995	-0.000759131	-0.002551549	0.000193439	0.002715036
	1234567890ABCDEF12345678**8**0ABCDEF	-0.001702415	-0.004463787	-0.00200748	-0.002724561	0.001236109
109_7	1234567890ABCDEF1234567890ABCDEF	-0.004282805	-0.004229387	-0.007771796	-0.005427996	0.00165746
	12345678**8**0ABCDEF1234567890ABCDEF	-0.000814863	9.51277E-05	-2.8564E-05	-0.000249433	0.000402996
	1234567890ABCDEF12345678**8**0ABCDEF	-0.002584053	-0.009148163	-0.007283692	-0.006338636	0.002761851
109_8	1234567890ABCDEF1234567890ABCDEF	0.004147096	-0.006564302	-0.023540209	-0.008652472	0.011399329
	12345678**8**0ABCDEF1234567890ABCDEF	0.000710586	-0.009883169	-0.004279575	-0.004484053	0.004327299
	1234567890ABCDEF12345678**8**0ABCDEF	-0.007161209	0.00324745	0.01142155	0.002502597	0.007604641
110_1	1234567890ABCDEF1234567890ABCDEF	-0.001419978	0.003422856	-0.002227108	-7.47433E-05	0.002495031
	12345678**8**0ABCDEF1234567890ABCDEF	0.003116358	-0.008143952	0.002992105	-0.000678497	0.005279118
	1234567890ABCDEF12345678**8**0ABCDEF	0.004721702	-0.008490922	0.006404642	0.000878474	0.006660693
110_2	1234567890ABCDEF1234567890ABCDEF	0.002060488	0.001344628	-0.002554618	0.000283499	0.00202802
	12345678**8**0ABCDEF1234567890ABCDEF	0.003073104	-0.003952182	-0.001888592	-0.000922557	0.002948285
	1234567890ABCDEF12345678**8**0ABCDEF	-0.001207326	-0.002221955	0.001061418	-0.000789288	0.001372638
110_3	1234567890ABCDEF1234567890ABCDEF	-0.000370235	0.009015666	-0.006603992	0.00068048	0.006419835
	12345678**8**0ABCDEF1234567890ABCDEF	0.002565993	-0.006400035	-0.005980201	-0.003271415	0.004131227
	1234567890ABCDEF12345678**8**0ABCDEF	0.009065002	-0.003513023	-0.001857322	0.001231553	0.005580175
110_4	1234567890ABCDEF1234567890ABCDEF	-0.000995107	-0.002595197	0.012385377	0.002931691	0.006716607
	12345678**8**0ABCDEF1234567890ABCDEF	0.009393053	-0.005784042	-0.00905859	-0.001816526	0.008038311
	1234567890ABCDEF12345678**8**0ABCDEF	0.005953798	-0.001736876	0.012680296	0.005632406	0.005890172
110_5	1234567890ABCDEF1234567890ABCDEF	-0.004071998	-0.005983024	0.00530015	-0.001584957	0.004930621
	12345678**8**0ABCDEF1234567890ABCDEF	-0.001518044	0.001711695	-0.001327932	-0.000378094	0.001479741
	1234567890ABCDEF12345678**8**0ABCDEF	-0.007223524	-0.006503627	-0.00139166	-0.005039604	0.002596175
110_6	1234567890ABCDEF1234567890ABCDEF	0.004683012	0.009188146	0.003820161	0.005897106	0.002353626

	12345678**8**0ABCDEF1234567890ABCDEF	-0.001270292	0.005824308	0.002670916	0.002408311	0.002902305
	1234567890ABCDEF12345678**8**0ABCDEF	0.00271565	-0.008227242	0.00174874	-0.001254284	0.004946402
110_7	1234567890ABCDEF1234567890ABCDEF	-0.005834698	-0.007618909	0.000947409	-0.004168733	0.003690261
	12345678**8**0ABCDEF1234567890ABCDEF	0.006895272	-0.000490511	-0.010077133	-0.001224124	0.006948346
	1234567890ABCDEF12345678**8**0ABCDEF	0.00469787	-0.006674195	0.006513461	0.001512379	0.005836042
110_8	1234567890ABCDEF1234567890ABCDEF	-0.011292341	-0.008647141	-0.010254743	-0.010064742	0.001088223
	12345678**8**0ABCDEF1234567890ABCDEF	0.008890064	0.000213352	-0.00664573	0.000819229	0.006356914
	1234567890ABCDEF12345678**8**0ABCDEF	-0.005918152	-0.009592567	-0.000857806	-0.005456175	0.003580882
Datasheet (Encrypted image) DB3_B	**Secret Key**	**Diagonal Correlation**	**Vertical Correlation**	**Horizontal Correlation**	**Mean**	**Standard Deviation**
101_1	1234567890ABCDEF1234567890ABCDEF	-0.002959428	0.002021814	0.007216912	0.002093099	0.004154779
	12345678**8**0ABCDEF1234567890ABCDEF	0.009172006	-0.003030854	0.004049129	0.00339676	0.005003108
	1234567890ABCDEF12345678**8**0ABCDEF	-0.010321725	-0.015430522	0.013952085	-0.003933388	0.012817762
101_2	1234567890ABCDEF1234567890ABCDEF	-0.004883189	-0.002180845	-0.010500591	-0.005854875	0.003465321
	12345678**8**0ABCDEF1234567890ABCDEF	0.011519852	-0.00812448	-0.010905249	-0.002503292	0.009980635
	1234567890ABCDEF12345678**8**0ABCDEF	0.008195199	-0.019546247	0.013760717	0.000803223	0.014567531
101_3	1234567890ABCDEF1234567890ABCDEF	-0.015856001	-0.009111137	0.001444415	-0.007840907	0.007119748
	12345678**8**0ABCDEF1234567890ABCDEF	0.015058102	-0.003940802	0.000756936	0.003958078	0.008079813
	1234567890ABCDEF12345678**8**0ABCDEF	0.00868893	-0.003065691	0.003684782	0.003102674	0.004816424
101_4	1234567890ABCDEF1234567890ABCDEF	0.010406167	-0.01272808	0.010810892	0.00282966	0.011002224
	12345678**8**0ABCDEF1234567890ABCDEF	0.014273351	-0.007471619	0.002303405	0.003035046	0.008892409
	1234567890ABCDEF12345678**8**0ABCDEF	-0.005373415	-0.01025546	-0.01615746	-0.010595445	0.004409127
101_5	1234567890ABCDEF1234567890ABCDEF	-0.004512414	0.013282065	0.000801217	0.003190289	0.007458401
	12345678**8**0ABCDEF1234567890ABCDEF	-0.003099459	0.016674581	-0.003623302	0.003317273	0.009447464
	1234567890ABCDEF12345678**8**0ABCDEF	0.001516367	0.003750928	0.01012799	0.005131762	0.003648748
101_6	1234567890ABCDEF1234567890ABCDEF	0.013518979	-0.00505724	-0.001214943	0.002415599	0.008006439
	12345678**8**0ABCDEF1234567890ABCDEF	-0.000394514	0.007378103	-0.02085641	-0.004624274	0.011908403
	1234567890ABCDEF12345678**8**0ABCDEF	0.006140708	0.006393441	-0.008406969	0.001375727	0.00691818
101_7	1234567890ABCDEF1234567890ABCDEF	0.008482241	0.013254293	-0.00116928	0.006855751	0.005999665
	12345678**8**0ABCDEF1234567890ABCDEF	-0.015505647	-0.001612006	0.000538383	-0.005526423	0.007110777
	1234567890ABCDEF12345678**8**0ABCDEF	-0.014622837	0.034164154	-0.001211586	0.00610991	0.020579049
101_8	1234567890ABCDEF1234567890ABCDEF	-0.016518564	-0.003875153	-0.006544358	-0.008979358	0.005441255
	12345678**8**0ABCDEF1234567890ABCDEF	0.002417335	-0.002160723	-0.006598658	-0.002114015	0.003680912
	1234567890ABCDEF12345678**8**0ABCDEF	0.012557153	-0.004704315	-0.001026245	0.002275531	0.00742365
102_1	1234567890ABCDEF1234567890ABCDEF	0.018413232	-0.014096019	0.008933335	0.00441685	0.013650686
	12345678**8**0ABCDEF1234567890ABCDEF	0.009073798	-0.025589713	-0.022847529	-0.013121148	0.015734074
	1234567890ABCDEF12345678**8**0ABCDEF	-0.004998446	-0.014598078	-0.004287008	-0.007961177	0.004701976
102_2	1234567890ABCDEF1234567890ABCDEF	0.004104011	0.002849831	0.01174359	0.006232478	0.003930438
	12345678**8**0ABCDEF1234567890ABCDEF	0.020588157	-0.010453211	0.011258853	0.007131266	0.013004342
	1234567890ABCDEF12345678**8**0ABCDEF	0.000929617	0.002472301	-0.004339806	-0.000312629	0.002916457
102_3	1234567890ABCDEF1234567890ABCDEF	-0.009153463	0.020474898	-0.010232122	0.000363105	0.014228002
	12345678**8**0ABCDEF1234567890ABCDEF	0.007270238	-0.004120918	-0.009579874	-0.002143518	0.007019694
	1234567890ABCDEF12345678**8**0ABCDEF	0.003223217	-0.001948021	0.007334542	0.002869913	0.003797816

102_4	1234567890ABCDEF1234567890ABCDEF	0.002785441	-0.002564206	-0.012601914	-0.004126893	0.006378305
	12345678**8**0ABCDEF1234567890ABCDEF	0.003201731	0.008320812	-0.018123716	-0.002200391	0.011451797
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000694793	-0.008732971	-0.017514643	-0.008980802	0.006868911
102_5	1234567890ABCDEF1234567890ABCDEF	0.000268849	0.002566775	0.008352323	0.003729316	0.003400908
	12345678**8**0ABCDEF1234567890ABCDEF	0.011055352	0.003976865	0.002448153	0.00582679	0.003749457
	1234567890ABCDEF12345678**8**0ABCDEF	-0.011062526	-0.015920927	0.011822877	-0.005053525	0.012097127
102_6	1234567890ABCDEF1234567890ABCDEF	-0.005434222	0.007424929	0.005063199	0.002351302	0.005588991
	12345678**8**0ABCDEF1234567890ABCDEF	0.003254101	-0.010173173	-0.001697165	-0.002872079	0.005544261
	1234567890ABCDEF12345678**8**0ABCDEF	-0.008530995	0.008129567	0.001351766	0.000316779	0.006840905
102_7	1234567890ABCDEF1234567890ABCDEF	0.012022997	-0.008491734	-0.005810547	-0.000759761	0.009104811
	12345678**8**0ABCDEF1234567890ABCDEF	0.00501019	0.008193289	-0.013210681	-2.40067E-06	0.009429635
	1234567890ABCDEF12345678**8**0ABCDEF	-0.004852871	-0.012304786	-0.019159396	-0.012105684	0.005842311
102_8	1234567890ABCDEF1234567890ABCDEF	-0.010137818	0.021065677	-0.010978203	-1.67817E-05	0.014911497
	12345678**8**0ABCDEF1234567890ABCDEF	0.012446514	-0.004005366	-0.013168474	-0.001575776	0.010597455
	1234567890ABCDEF12345678**8**0ABCDEF	0.007796453	0.002674106	0.005725925	0.005398828	0.002103942
103_1	1234567890ABCDEF1234567890ABCDEF	0.001659462	0.009948721	0.011637149	0.007748444	0.004360388
	12345678**8**0ABCDEF1234567890ABCDEF	0.012425892	0.000213506	-0.00272629	0.003304369	0.006560601
	1234567890ABCDEF12345678**8**0ABCDEF	0.015904467	-0.003719448	0.012381043	0.008188687	0.008542302
103_2	1234567890ABCDEF1234567890ABCDEF	-0.017609951	-0.005691466	-0.005633982	-0.009645133	0.005632025
	12345678**8**0ABCDEF1234567890ABCDEF	0.015159673	-0.003725066	-0.006496893	0.001645905	0.009622446
	1234567890ABCDEF12345678**8**0ABCDEF	0.01586559	-0.007717664	-0.005931874	0.000738684	0.010721155
103_3	1234567890ABCDEF1234567890ABCDEF	-0.002249105	0.010342632	0.013483859	0.007192462	0.006798246
	12345678**8**0ABCDEF1234567890ABCDEF	-0.011478313	0.001907875	-0.014204271	-0.007924903	0.007041323
	1234567890ABCDEF12345678**8**0ABCDEF	0.007625997	-0.001909682	-0.006414096	-0.000232594	0.005853234
103_4	1234567890ABCDEF1234567890ABCDEF	-0.008191436	0.000380314	0.008413307	0.000200728	0.006780047
	12345678**8**0ABCDEF1234567890ABCDEF	0.010865251	0.004585962	-0.000833656	0.004872519	0.004780355
	1234567890ABCDEF12345678**8**0ABCDEF	-0.003498864	-0.023337493	0.029578631	0.000914092	0.021827119
103_5	1234567890ABCDEF1234567890ABCDEF	-0.007791106	0.004643775	0.003293339	4.86696E-05	0.005570905
	12345678**8**0ABCDEF1234567890ABCDEF	0.025670836	0.008674693	-0.000253332	0.011364066	0.010752989
	1234567890ABCDEF12345678**8**0ABCDEF	0.020630061	-0.000405691	-0.000216117	0.006669418	0.009871969
103_6	1234567890ABCDEF1234567890ABCDEF	-0.007497799	0.016564695	0.012535105	0.007200667	0.010522771
	12345678**8**0ABCDEF1234567890ABCDEF	-0.006463016	0.007857163	-0.008248444	-0.002284765	0.007208374
	1234567890ABCDEF12345678**8**0ABCDEF	0.017555213	0.003741976	-0.000361501	0.006978563	0.00766415
103_7	1234567890ABCDEF1234567890ABCDEF	0.019418024	-0.014724678	0.007515732	0.004069693	0.014150087
	12345678**8**0ABCDEF1234567890ABCDEF	0.007183581	-0.032900457	-0.017897476	-0.014538117	0.016535749
	1234567890ABCDEF12345678**8**0ABCDEF	-0.004412833	-0.011357438	0.009201102	-0.002189723	0.008538933
103_8	1234567890ABCDEF1234567890ABCDEF	0.006232178	0.010040797	-0.009794456	0.002159506	0.008594545
	12345678**8**0ABCDEF1234567890ABCDEF	-0.013673879	0.003807964	-0.001757304	-0.003874406	0.007292247
	1234567890ABCDEF12345678**8**0ABCDEF	-0.016713366	0.026449566	-0.000851095	0.002961702	0.017826249
104_1	1234567890ABCDEF1234567890ABCDEF	-0.001714527	-0.017936177	-0.003520877	-0.00772386	0.007258755
	12345678**8**0ABCDEF1234567890ABCDEF	-0.014078924	-0.006978627	-0.015376191	-0.012144581	0.003691073
	1234567890ABCDEF12345678**8**0ABCDEF	-0.00856037	-0.005301274	0.010334603	-0.00117568	0.008247036
104_2	1234567890ABCDEF1234567890ABCDEF	0.001701649	-0.008338006	0.001866949	-0.001589803	0.004772178
	12345678**8**0ABCDEF1234567890ABCDEF	0.006892268	0.00749204	-0.004533845	0.003283488	0.005533109

	1234567890ABCDEF12345678**8**0ABCDEF	0.004199607	-0.001209257	-0.006442577	-0.001150742	0.004344851
104_3	1234567890ABCDEF1234567890ABCDEF	-0.003274764	0.002902817	-0.003079252	-0.001150399	0.002867168
	12345678**8**0ABCDEF1234567890ABCDEF	0.00068388	-0.005680801	0.008442093	0.001148391	0.005774996
	1234567890ABCDEF12345678**8**0ABCDEF	0.000668402	-0.008221796	-0.024860942	-0.010804778	0.010581137
104_4	1234567890ABCDEF1234567890ABCDEF	-0.004150006	-0.004056997	0.006725172	-0.000493944	0.005104827
	12345678**8**0ABCDEF1234567890ABCDEF	0.010200637	-0.010465415	-0.013545512	-0.00460343	0.010543309
	1234567890ABCDEF12345678**8**0ABCDEF	-0.021187667	-0.021407918	-0.016276699	-0.019624095	0.002368673
104_5	1234567890ABCDEF1234567890ABCDEF	0.002907151	-0.013173506	0.007087175	-0.001059727	0.008734067
	12345678**8**0ABCDEF1234567890ABCDEF	-0.014954928	0.016094161	0.007383231	0.002840821	0.013076355
	1234567890ABCDEF12345678**8**0ABCDEF	0.012336962	-0.001977424	0.014606304	0.008321947	0.007341447
104_6	1234567890ABCDEF1234567890ABCDEF	-0.001736564	-0.003775822	0.002794446	-0.00090598	0.002745846
	12345678**8**0ABCDEF1234567890ABCDEF	0.016262819	-0.002390959	-0.003495607	0.003458751	0.009065068
	1234567890ABCDEF12345678**8**0ABCDEF	0.007297467	-0.000149611	-0.005733676	0.000471394	0.005338034
104_7	1234567890ABCDEF1234567890ABCDEF	-0.003753699	0.006871674	-0.009419893	-0.002100639	0.006752937
	12345678**8**0ABCDEF1234567890ABCDEF	-0.011847163	-0.003151328	-0.001049217	-0.005349236	0.004674185
	1234567890ABCDEF12345678**8**0ABCDEF	0.012096874	0.004691992	-0.000302922	0.005495315	0.005093966
104_8	1234567890ABCDEF1234567890ABCDEF	0.015303011	0.025584819	-0.006362562	0.011508423	0.013315604
	12345678**8**0ABCDEF1234567890ABCDEF	-0.025029612	-1.21352E-05	0.006954032	-0.006029238	0.01373299
	1234567890ABCDEF12345678**8**0ABCDEF	-0.0159313	0.036967974	-0.008887918	0.004049585	0.023453749
105_1	1234567890ABCDEF1234567890ABCDEF	-0.011148664	0.003698774	-0.010086274	-0.005845388	0.006762664
	12345678**8**0ABCDEF1234567890ABCDEF	-0.005110186	-0.012941984	-0.009858787	-0.009303652	0.003221325
	1234567890ABCDEF12345678**8**0ABCDEF	-0.0246549	0.001680314	0.008997063	-0.004659174	0.014451194
105_2	1234567890ABCDEF1234567890ABCDEF	-0.009706393	0.009226977	0.003997644	0.001172743	0.007983449
	12345678**8**0ABCDEF1234567890ABCDEF	0.002024536	0.007375792	0.020137893	0.009846074	0.007598252
	1234567890ABCDEF12345678**8**0ABCDEF	-0.011185787	-0.000964615	0.011352772	-0.000265877	0.009214584
105_3	1234567890ABCDEF1234567890ABCDEF	-0.015834629	-0.017447898	-0.003718315	-0.012333614	0.006127435
	12345678**8**0ABCDEF1234567890ABCDEF	0.00185291	-0.016915298	-0.015910184	-0.010324191	0.008620282
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000891825	-0.002323129	0.000669774	-0.000848393	0.001222234
105_4	1234567890ABCDEF1234567890ABCDEF	0.010429015	0.00888598	0.002142446	0.00715248	0.003598201
	12345678**8**0ABCDEF1234567890ABCDEF	-0.004392219	0.009877457	-0.009807604	-0.001440788	0.008302956
	1234567890ABCDEF12345678**8**0ABCDEF	0.019594509	-0.002218839	0.018477704	0.011951125	0.010030045
105_5	1234567890ABCDEF1234567890ABCDEF	-0.002236569	0.006310265	-0.001187069	0.000962209	0.003805841
	12345678**8**0ABCDEF1234567890ABCDEF	0.007268341	-9.46095E-05	-0.009524981	-0.00078375	0.006873141
	1234567890ABCDEF12345678**8**0ABCDEF	0.013316748	-0.002550033	0.004041426	0.004936047	0.006508402
105_6	1234567890ABCDEF1234567890ABCDEF	0.000595424	-0.019267584	-0.007996258	-0.008889473	0.008133599
	12345678**8**0ABCDEF1234567890ABCDEF	-0.000932415	-0.001247107	-0.023316015	-0.008498512	0.010478344
	1234567890ABCDEF12345678**8**0ABCDEF	-0.023423307	0.003145461	-6.70756E-05	-0.006781641	0.011840295
105_7	1234567890ABCDEF1234567890ABCDEF	-0.000874378	-0.000990284	0.007236405	0.001790581	0.00385107
	12345678**8**0ABCDEF1234567890ABCDEF	0.007394546	-0.00147291	-0.020069134	-0.004715833	0.011444092
	1234567890ABCDEF12345678**8**0ABCDEF	-0.007247321	-0.000942418	-0.001983363	-0.003391034	0.002759723
105_8	1234567890ABCDEF1234567890ABCDEF	-0.014090037	-0.002167875	-0.005613233	-0.007290381	0.005009598
	12345678**8**0ABCDEF1234567890ABCDEF	0.010299481	0.002690415	-0.007642198	0.001782566	0.007352737
	1234567890ABCDEF12345678**8**0ABCDEF	0.011195331	-0.006623756	-0.001556536	0.001005013	0.007496715
106_1	1234567890ABCDEF1234567890ABCDEF	-0.001869356	-0.007100947	-0.004959812	-0.004643372	0.002147477

	1234567880ABCDEF1234567890ABCDEF	-0.000444135	0.001322871	-0.016698585	-0.005273283	0.008111051
	1234567890ABCDEF1234567880ABCDEF	-0.011308962	-0.009793708	-0.006058614	-0.009053761	0.002206382
106_2	1234567890ABCDEF1234567890ABCDEF	0.014933872	-0.00662573	-0.00507315	0.001078331	0.009817829
	1234567880ABCDEF1234567890ABCDEF	-0.007284084	0.000321259	0.01489294	0.002643372	0.009201422
	1234567890ABCDEF1234567880ABCDEF	0.011609996	-0.010117573	0.006635806	0.002709409	0.009294595
106_3	1234567890ABCDEF1234567890ABCDEF	-0.01514906	-0.000996097	0.01057802	-0.001855713	0.01052061
	1234567880ABCDEF1234567890ABCDEF	-0.007284084	0.000321259	0.01489294	0.002643372	0.009201422
	1234567890ABCDEF1234567880ABCDEF	-0.011855573	-0.000736574	0.00841092	-0.001393743	0.0082868
106_4	1234567890ABCDEF1234567890ABCDEF	-0.006523821	-0.024255581	-0.012261379	-0.014346927	0.007387646
	1234567880ABCDEF1234567890ABCDEF	0.004883594	-0.02198569	-0.020047481	-0.012383192	0.012235075
	1234567890ABCDEF1234567880ABCDEF	-0.007253887	0.00407386	-0.018981313	-0.007387114	0.009412707
106_5	1234567890ABCDEF1234567890ABCDEF	0.032284191	-0.016569939	-0.011334328	0.001459975	0.021900565
	1234567880ABCDEF1234567890ABCDEF	-0.007903466	-0.014428251	-0.008853818	-0.010395178	0.002878084
	1234567890ABCDEF1234567880ABCDEF	0.011015892	0.018939283	0.001041695	0.01033229	0.007322632
106_6	1234567890ABCDEF1234567890ABCDEF	-0.009645662	0.004994865	-0.014278968	-0.006309922	0.00821444
	1234567880ABCDEF1234567890ABCDEF	0.010058598	0.012275855	-0.003219276	0.006371726	0.006842005
	1234567890ABCDEF1234567880ABCDEF	0.000636921	-0.000805715	0.007277166	0.002369457	0.003519896
106_7	1234567890ABCDEF1234567890ABCDEF	0.006365357	-0.011531713	0.005649414	0.000161019	0.008273175
	1234567880ABCDEF1234567890ABCDEF	-0.01809921	-0.007777334	-0.001046723	-0.008974422	0.007012921
	1234567890ABCDEF1234567880ABCDEF	0.011256011	0.01555094	0.002187259	0.009664737	0.005570524
106_8	1234567890ABCDEF1234567890ABCDEF	-0.002793084	-0.006061973	-0.016764297	-0.008539785	0.005966761
	1234567880ABCDEF1234567890ABCDEF	0.003996883	0.001015914	-0.009569873	-0.001519025	0.005821435
	1234567890ABCDEF1234567880ABCDEF	0.018986147	-0.007129056	-0.012197202	-0.000113371	0.013662972
107_1	1234567890ABCDEF1234567890ABCDEF	-0.005613063	0.005116248	0.016364054	0.00528908	0.008972953
	1234567880ABCDEF1234567890ABCDEF	-0.004102269	0.002769115	-0.009136893	-0.003490016	0.00487985
	1234567890ABCDEF1234567880ABCDEF	-0.001732478	-0.008983114	0.000622094	-0.0033645	0.004087593
107_2	1234567890ABCDEF1234567890ABCDEF	-0.010576061	-0.015534289	-0.015812322	-0.013974224	0.002405544
	1234567880ABCDEF1234567890ABCDEF	0.018545957	0.01875547	-0.014969866	0.007443853	0.015849124
	1234567890ABCDEF1234567880ABCDEF	-0.010249772	-0.009949759	0.00732628	-0.004291084	0.008215629
107_3	1234567890ABCDEF1234567890ABCDEF	0.000699434	-0.021292364	-0.012282169	-0.010958366	0.00902678
	1234567880ABCDEF1234567890ABCDEF	0.007697617	-0.024700938	-0.030367799	-0.015790373	0.016768872
	1234567890ABCDEF1234567880ABCDEF	-0.005195259	0.008712326	-0.034968096	-0.010483676	0.018220324
107_4	1234567890ABCDEF1234567890ABCDEF	0.018188037	-0.016255309	0.012010268	0.004647666	0.014994265
	1234567880ABCDEF1234567890ABCDEF	0.005079743	-0.009274103	-0.0024961	-0.002230153	0.00586295
	1234567890ABCDEF1234567880ABCDEF	0.002312037	-0.013305659	0.004723341	-0.002090094	0.007991466
107_5	1234567890ABCDEF1234567890ABCDEF	-0.023327544	0.007535638	0.011393201	-0.001466235	0.015538293
	1234567880ABCDEF1234567890ABCDEF	-0.000361153	0.005605568	0.005887692	0.003710702	0.002881539
	1234567890ABCDEF1234567880ABCDEF	-0.00343924	-0.000899818	0.013947409	0.003202784	0.007668003
107_6	1234567890ABCDEF1234567890ABCDEF	0.002371059	-0.006081579	0.004961981	0.000417154	0.004715462
	1234567880ABCDEF1234567890ABCDEF	-0.012185389	0.006828633	-0.012441717	-0.005932825	0.00902432
	1234567890ABCDEF1234567880ABCDEF	0.015092554	0.004941261	-0.001568159	0.006155219	0.00685566
107_7	1234567890ABCDEF1234567890ABCDEF	0.006106199	0.010638124	-0.013996291	0.000916011	0.010705673
	1234567880ABCDEF1234567890ABCDEF	0.001797569	0.00863633	0.001797569	0.004077156	0.003223823
	1234567890ABCDEF1234567880ABCDEF	0.003995583	0.025280194	0.00264579	0.010640522	0.010366468

107_8	1234567890ABCDEF1234567890ABCDEF	-0.002928116	0.000667374	0.009538429	0.002425896	0.005239147
	12345678**8**0ABCDEF1234567890ABCDEF	0.008743684	0.003263665	-0.000206435	0.003933638	0.003684454
	1234567890ABCDEF12345678**8**0ABCDEF	-0.003907166	-6.87533E-05	0.000935472	-0.001013482	0.002086811
108_1	1234567890ABCDEF1234567890ABCDEF	-0.013226429	0.022977269	-0.017499047	-0.002582736	0.018157628
	12345678**8**0ABCDEF1234567890ABCDEF	-0.007058645	-0.004056885	0.009245478	-0.00062335	0.0070851
	1234567890ABCDEF12345678**8**0ABCDEF	-0.00506819	-0.001530636	0.004757208	-0.000613873	0.004063246
108_2	1234567890ABCDEF1234567890ABCDEF	0.011918682	-0.005570337	0.010385534	0.00557796	0.007907845
	12345678**8**0ABCDEF1234567890ABCDEF	0.022650429	-0.017994081	-0.001504406	0.001050647	0.01669112
	1234567890ABCDEF12345678**8**0ABCDEF	-0.002831885	-0.026912263	-0.020155424	-0.01663319	0.010141359
108_3	1234567890ABCDEF1234567890ABCDEF	0.019535109	-0.008831287	-0.01040217	0.000100551	0.013757264
	12345678**8**0ABCDEF1234567890ABCDEF	-0.000989771	0.01174054	-0.010684356	2.21378E-05	0.009182845
	1234567890ABCDEF12345678**8**0ABCDEF	-0.020694864	0.011463478	-4.15517E-05	-0.003090979	0.013304485
108_4	1234567890ABCDEF1234567890ABCDEF	0.014216246	-0.007568477	-0.008281566	-0.000544599	0.010441553
	12345678**8**0ABCDEF1234567890ABCDEF	-0.011358069	-0.008126136	0.005636329	-0.004615959	0.007368555
	1234567890ABCDEF12345678**8**0ABCDEF	-0.020341313	-0.003057286	0.01349731	-0.00330043	0.01381563
108_5	1234567890ABCDEF1234567890ABCDEF	0.004777202	-0.020374361	-0.012476548	-0.009357902	0.010502214
	12345678**8**0ABCDEF1234567890ABCDEF	-0.005316629	0.008164625	-0.015691198	-0.004281067	0.009766588
	1234567890ABCDEF12345678**8**0ABCDEF	-0.019854747	0.003272845	0.0269614	0.003459833	0.01911307
108_6	1234567890ABCDEF1234567890ABCDEF	0.007158059	-0.01556686	0.006407059	-0.000667247	0.010540077
	12345678**8**0ABCDEF1234567890ABCDEF	0.01827338	0.000928249	0.005011132	0.00807092	0.007404284
	1234567890ABCDEF12345678**8**0ABCDEF	0.001959336	-0.000231871	-0.005590375	-0.001287637	0.003171279
108_7	1234567890ABCDEF1234567890ABCDEF	2.92874E-05	0.011884899	-0.005324929	0.002196419	0.007191054
	12345678**8**0ABCDEF1234567890ABCDEF	-0.012790359	0.004087822	0.003147502	-0.001851678	0.007744336
	1234567890ABCDEF12345678**8**0ABCDEF	0.009822074	-0.003545786	0.004545681	0.003607323	0.005497594
108_8	1234567890ABCDEF1234567890ABCDEF	-0.011299248	0.019235681	0.003122967	0.003686467	0.012472199
	12345678**8**0ABCDEF1234567890ABCDEF	0.010895853	-0.004533531	-0.024298575	-0.005978751	0.014404361
	1234567890ABCDEF12345678**8**0ABCDEF	0.008415849	-0.002505597	-0.000157081	0.001917724	0.004693833
109_1	1234567890ABCDEF1234567890ABCDEF	-0.010322483	0.002256679	-0.012240542	-0.006768782	0.006429823
	12345678**8**0ABCDEF1234567890ABCDEF	0.008415344	0.001912328	-0.004232878	0.002031598	0.005164304
	1234567890ABCDEF12345678**8**0ABCDEF	0.013339007	-0.001701922	-0.009844317	0.000597589	0.009603209
109_2	1234567890ABCDEF1234567890ABCDEF	0.004374415	-0.012870922	-0.002717151	-0.003737886	0.00707728
	12345678**8**0ABCDEF1234567890ABCDEF	0.005404926	0.003806875	-0.007816595	0.000465069	0.005892249
	1234567890ABCDEF12345678**8**0ABCDEF	0.004639093	-0.000485946	-0.001175176	0.000992657	0.002593727
109_3	1234567890ABCDEF1234567890ABCDEF	-0.005337241	-0.009620769	-0.012682069	-0.00921336	0.003012321
	12345678**8**0ABCDEF1234567890ABCDEF	-0.013034984	-0.004004609	-0.001961062	-0.006333552	0.004811508
	1234567890ABCDEF12345678**8**0ABCDEF	-0.017529821	-0.005888256	-0.005870302	-0.009762793	0.005492123
109_4	1234567890ABCDEF1234567890ABCDEF	-0.009683832	0.02305684	-0.010116547	0.001085487	0.015537097
	12345678**8**0ABCDEF1234567890ABCDEF	-0.024911263	-0.0096686	0.015679502	-0.00630012	0.016741417
	1234567890ABCDEF12345678**8**0ABCDEF	0.008224708	-0.002838235	0.030603768	0.011996747	0.013910742
109_5	1234567890ABCDEF1234567890ABCDEF	-0.002031041	-0.002327268	-0.004589056	-0.002982455	0.001142457
	12345678**8**0ABCDEF1234567890ABCDEF	0.005051959	0.003826312	0.018526165	0.009134812	0.006659514
	1234567890ABCDEF12345678**8**0ABCDEF	-0.006021023	0.001001444	0.017236923	0.004072448	0.009740168
109_6	1234567890ABCDEF1234567890ABCDEF	0.008878109	0.021406695	0.02527974	0.018521514	0.006999837
	12345678**8**0ABCDEF1234567890ABCDEF	0.017402356	0.001442187	0.026305201	0.015049914	0.010285681

	1234567890ABCDEF1234567880ABCDEF	-0.001796766	-0.006522556	-0.010367687	-0.006229003	0.003505215
109_7	1234567890ABCDEF1234567890ABCDEF	0.018969669	-0.000469295	-0.017390403	0.00036999	0.014855796
	12345678**8**0ABCDEF1234567890ABCDEF	-0.006402887	0.008127381	-0.014144342	-0.004139949	0.009232121
	1234567890ABCDEF1234567880ABCDEF	0.007297979	-0.009432736	-0.003568021	-0.001900926	0.006931263
109_8	1234567890ABCDEF1234567890ABCDEF	-0.019409378	0.007300662	0.015926036	0.00127244	0.015042217
	12345678**8**0ABCDEF1234567890ABCDEF	0.001551304	0.003716802	-0.01222028	-0.002317391	0.007057986
	1234567890ABCDEF1234567880ABCDEF	-0.000820059	-0.006137076	0.042788731	0.011943865	0.021918363
110_1	1234567890ABCDEF1234567890ABCDEF	0.004527915	0.000595416	-0.004834122	9.64032E-05	0.003838289
	12345678**8**0ABCDEF1234567890ABCDEF	0.010852899	0.005678953	-0.014800091	0.000577254	0.011076686
	1234567890ABCDEF1234567880ABCDEF	-0.006572225	-0.011102218	-0.008715201	-0.008796548	0.001850256
110_2	1234567890ABCDEF1234567890ABCDEF	-0.007552597	-0.01579632	-0.01006662	-0.011138513	0.003449779
	12345678**8**0ABCDEF1234567890ABCDEF	0.005171437	-0.019408879	-0.019225326	-0.011154256	0.011544251
	1234567890ABCDEF1234567880ABCDEF	-0.007339181	0.005576856	-0.020251669	-0.007337998	0.010544451
110_3	1234567890ABCDEF1234567890ABCDEF	0.000869926	0.010963466	0.005797781	0.005877058	0.004121052
	12345678**8**0ABCDEF1234567890ABCDEF	-0.000725007	0.005258111	-0.006516107	-0.000661001	0.004807017
	1234567890ABCDEF1234567880ABCDEF	0.013318486	0.003859518	0.003028442	0.006735482	0.004667235
110_4	1234567890ABCDEF1234567890ABCDEF	-0.008814884	0.00809652	0.010312363	0.003198	0.008542425
	12345678**8**0ABCDEF1234567890ABCDEF	-0.012954739	-0.002291233	-0.008018237	-0.007754736	0.004357343
	1234567890ABCDEF1234567880ABCDEF	0.007714793	0.001666959	0.00106118	0.003480977	0.003003957
110_5	1234567890ABCDEF1234567890ABCDEF	0.002915237	0.00273362	0.011046972	0.005565277	0.003876853
	12345678**8**0ABCDEF1234567890ABCDEF	0.003176116	0.008523388	0.016131436	0.00927698	0.005315763
	1234567890ABCDEF1234567880ABCDEF	-0.001597837	0.012645972	0.000263781	0.003770639	0.006321659
110_6	1234567890ABCDEF1234567890ABCDEF	-0.005214816	0.016091419	-0.00341521	0.002487131	0.009647699
	12345678**8**0ABCDEF1234567890ABCDEF	-0.007495972	-0.014715683	0.007332981	-0.004959558	0.00917827
	1234567890ABCDEF1234567880ABCDEF	0.003908771	0.010006129	0.020017627	0.011310842	0.006640809
110_7	1234567890ABCDEF1234567890ABCDEF	0.024692884	-0.012936266	-0.000165311	0.003863769	0.015623985
	12345678**8**0ABCDEF1234567890ABCDEF	0.001887264	-0.007406267	0.01487361	0.003118202	0.009137273
	1234567890ABCDEF1234567880ABCDEF	0.017268645	-0.003346775	0.001292173	0.005071348	0.00883027
110_8	1234567890ABCDEF1234567890ABCDEF	0.00582516	-0.015351722	-0.008735681	-0.006087414	0.008845906
	12345678**8**0ABCDEF1234567890ABCDEF	-0.017979436	-0.015972809	-0.0253549	-0.019769048	0.004033852
	1234567890ABCDEF1234567880ABCDEF	-0.009192338	0.020999738	0.009434394	0.007080598	0.012437728
Datasheet (Encrypted image) DB4_B	**Secret Key**	**Diagonal Correlation**	**Vertical Correlation**	**Horizontal Correlation**	**Mean**	**Standard Deviation**
101_1	1234567890ABCDEF1234567890ABCDEF	0.005566476	-0.004640622	-0.002142337	-0.000405494	0.004344244
	12345678**8**0ABCDEF1234567890ABCDEF	-0.004956012	-0.003309367	0.011620277	0.001118299	0.007456385
	1234567890ABCDEF1234567880ABCDEF	0.005004783	0.009091706	0.001590353	0.005228948	0.003066514
101_2	1234567890ABCDEF1234567890ABCDEF	-0.005351969	0.000658652	0.006990068	0.000765584	0.005039183
	12345678**8**0ABCDEF1234567890ABCDEF	0.001141182	-0.00465658	-0.001521427	-0.001678942	0.002369545
	1234567890ABCDEF1234567880ABCDEF	-0.007809255	-0.000186369	-0.005725921	-0.004573848	0.003216888
101_3	1234567890ABCDEF1234567890ABCDEF	-0.007097557	0.000759706	-0.005809331	-0.004049061	0.003440742
	12345678**8**0ABCDEF1234567890ABCDEF	0.000951886	0.001971545	-0.006268052	-0.001114873	0.003667548
	1234567890ABCDEF1234567880ABCDEF	-0.007736794	-0.013779936	-0.001564465	-0.007693732	0.004987038

101_4	1234567890ABCDEF1234567890ABCDEF	0.000976322	-0.00044813	-0.012577134	-0.004016314	0.006081283
	12345678**8**0ABCDEF1234567890ABCDEF	0.00340323	-0.004477612	-0.003521085	-0.001531823	0.00351139
	1234567890ABCDEF12345678**8**0ABCDEF	-0.002546154	0.00410179	0.003413004	0.001656213	0.002984798
101_5	1234567890ABCDEF1234567890ABCDEF	-0.006529705	-0.00705984	-0.004814613	-0.006134719	0.000958218
	12345678**8**0ABCDEF1234567890ABCDEF	0.010787188	-0.00102884	-0.001576514	0.002727278	0.005703601
	1234567890ABCDEF12345678**8**0ABCDEF	0.002495093	-0.00241864	-0.012701693	-0.004208413	0.006331826
101_6	1234567890ABCDEF1234567890ABCDEF	-0.000770429	0.012682116	-0.003286698	0.002874996	0.007010354
	12345678**8**0ABCDEF1234567890ABCDEF	-0.000920234	-0.008802167	-0.001505467	-0.003742623	0.003585607
	1234567890ABCDEF12345678**8**0ABCDEF	-0.005247457	-0.007500619	-0.002722571	-0.005156882	0.001951681
101_7	1234567890ABCDEF1234567890ABCDEF	-0.003351593	-0.001343936	-0.002772134	-0.002489221	0.000843683
	12345678**8**0ABCDEF1234567890ABCDEF	-0.001758158	-0.009169062	-0.006151004	-0.005692742	0.003042792
	1234567890ABCDEF12345678**8**0ABCDEF	-0.005534436	0.004008736	-0.006306853	-0.002610851	0.004691365
101_8	1234567890ABCDEF1234567890ABCDEF	0.001207238	-0.011281051	-0.007613989	-0.005895934	0.005241064
	12345678**8**0ABCDEF1234567890ABCDEF	3.5875E-05	-0.001424706	-0.004387562	-0.001925464	0.001840248
	1234567890ABCDEF12345678**8**0ABCDEF	0.007260127	-0.000796028	-0.001499205	0.001654965	0.003973831
102_1	1234567890ABCDEF1234567890ABCDEF	-0.006881252	0.002918023	-0.016728806	-0.006897345	0.008020793
	12345678**8**0ABCDEF1234567890ABCDEF	0.007853308	0.013456726	-0.000140123	0.007056637	0.005579402
	1234567890ABCDEF12345678**8**0ABCDEF	0.003521938	0.013424109	-0.010623691	0.002107452	0.009868291
102_2	1234567890ABCDEF1234567890ABCDEF	0.006649327	-0.008778342	-0.010189158	-0.004106058	0.007626984
	12345678**8**0ABCDEF1234567890ABCDEF	0.002557159	0.001928751	-0.001544652	0.000980419	0.001803832
	1234567890ABCDEF12345678**8**0ABCDEF	0.008132409	-0.000178547	-0.009232251	-0.00042613	0.007091254
102_3	1234567890ABCDEF1234567890ABCDEF	-0.014949462	-0.002514355	-0.007911748	-0.008458522	0.005091312
	12345678**8**0ABCDEF1234567890ABCDEF	-0.001621226	-0.00575113	-0.017097296	-0.008156551	0.006543023
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000231301	0.00286207	0.002941984	0.001857585	0.001477425
102_4	1234567890ABCDEF1234567890ABCDEF	0.002916014	-0.000165455	-0.007557253	-0.001602232	0.004394737
	12345678**8**0ABCDEF1234567890ABCDEF	0.000681446	-0.004891153	-0.006879361	-0.003696356	0.003200219
	1234567890ABCDEF12345678**8**0ABCDEF	-0.017120972	0.000487347	0.014837408	-0.000598739	0.013069537
102_5	1234567890ABCDEF1234567890ABCDEF	-0.000783567	-0.013125445	0.002029099	-0.003959971	0.006581905
	12345678**8**0ABCDEF1234567890ABCDEF	-0.001711905	-0.002763616	0.006026408	0.000516962	0.003919355
	1234567890ABCDEF12345678**8**0ABCDEF	0.014050174	0.007451431	-0.010810518	0.003563695	0.010515048
102_6	1234567890ABCDEF1234567890ABCDEF	0.01582047	-0.003264225	0.008848453	0.007134899	0.007884948
	12345678**8**0ABCDEF1234567890ABCDEF	-0.001426503	0.004084449	-0.009342305	-0.00222812	0.005510679
	1234567890ABCDEF12345678**8**0ABCDEF	-0.003592137	-0.001180601	-0.000658157	-0.001810299	0.001277876
102_7	1234567890ABCDEF1234567890ABCDEF	0.008111666	-0.00288498	-0.001642328	0.001194786	0.004917212
	12345678**8**0ABCDEF1234567890ABCDEF	-0.007151355	0.002008139	-0.002211418	-0.002451545	0.003743201
	1234567890ABCDEF12345678**8**0ABCDEF	0.00146036	0.009142541	-0.003321295	0.002427202	0.005134062
102_8	1234567890ABCDEF1234567890ABCDEF	-0.008327419	-0.000652103	-0.012569167	-0.007182896	0.004931974
	12345678**8**0ABCDEF1234567890ABCDEF	0.004558088	0.00641419	-0.000188614	0.003594555	0.002780354
	1234567890ABCDEF12345678**8**0ABCDEF	-0.00287521	0.010068468	-0.016835345	-0.003214029	0.010986048
103_1	1234567890ABCDEF1234567890ABCDEF	-0.007383914	0.003127133	-0.014991022	-0.006415934	0.007428307
	12345678**8**0ABCDEF1234567890ABCDEF	-0.002439428	0.004487865	-0.006154224	-0.001368596	0.004410104
	1234567890ABCDEF12345678**8**0ABCDEF	-0.002542849	0.004406756	-0.010845093	-0.002993729	0.006234698
103_2	1234567890ABCDEF1234567890ABCDEF	-0.007859476	-0.016604144	0.00578599	-0.006225877	0.009213433
	12345678**8**0ABCDEF1234567890ABCDEF	-0.008399075	-0.003870496	-0.011689889	-0.007986487	0.003205558

	1234567890ABCDEF12345678**8**0ABCDEF	-0.007553184	-0.004953438	-0.001284842	-0.004597155	0.002571411
103_3	1234567890ABCDEF1234567890ABCDEF	-0.007829223	-0.007826442	0.007317167	-0.0027795	0.007139421
	12345678**8**0ABCDEF1234567890ABCDEF	0.008174729	-0.00037714	-0.010311311	-0.000837907	0.007553924
	1234567890ABCDEF12345678**8**0ABCDEF	0.008962808	0.002758841	0.007138754	0.006286801	0.002603417
103_4	1234567890ABCDEF1234567890ABCDEF	-0.013392696	0.007965053	0.006860077	0.000477478	0.009818063
	12345678**8**0ABCDEF1234567890ABCDEF	0.002893883	-0.00157941	0.004900535	0.002071669	0.00270856
	1234567890ABCDEF12345678**8**0ABCDEF	-0.008771319	0.008816943	0.009367191	0.003137605	0.008423877
103_5	1234567890ABCDEF1234567890ABCDEF	0.002809257	-0.001814958	-0.003834674	-0.000946792	0.002780976
	12345678**8**0ABCDEF1234567890ABCDEF	-0.006561808	0.005784747	-0.0058543	-0.002210454	0.005660834
	1234567890ABCDEF12345678**8**0ABCDEF	-0.006578021	0.002747932	0.002838217	-0.000330624	0.004417731
103_6	1234567890ABCDEF1234567890ABCDEF	0.01249816	0.005711216	0.002789374	0.006999584	0.004066944
	12345678**8**0ABCDEF1234567890ABCDEF	-0.009773912	-0.006938774	0.010651839	-0.002020283	0.009034987
	1234567890ABCDEF12345678**8**0ABCDEF	-0.005916404	0.006236218	0.001665187	0.000661667	0.005011776
103_7	1234567890ABCDEF1234567890ABCDEF	-0.000817289	0.001890704	-0.00631867	-0.001748418	0.003415524
	12345678**8**0ABCDEF1234567890ABCDEF	0.000690509	-0.000712795	-0.011048492	-0.003690259	0.005234501
	1234567890ABCDEF12345678**8**0ABCDEF	-0.013020888	0.001146084	0.013040618	0.000388605	0.010653039
103_8	1234567890ABCDEF1234567890ABCDEF	-0.005918618	-0.00555899	-0.006151584	-0.005876397	0.000243761
	12345678**8**0ABCDEF1234567890ABCDEF	4.09764E-05	0.003615579	0.009571977	0.004409511	0.003931305
	1234567890ABCDEF12345678**8**0ABCDEF	-0.005136429	-0.000834552	-0.007406285	-0.004459089	0.002725315
104_1	1234567890ABCDEF1234567890ABCDEF	-0.001185488	-0.001709092	-0.003484624	-0.002126401	0.00098391
	12345678**8**0ABCDEF1234567890ABCDEF	0.005872652	0.00822492	0.007312737	0.00713677	0.000968337
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000302848	0.001679789	-0.012646576	-0.003756545	0.006338096
104_2	1234567890ABCDEF1234567890ABCDEF	0.0161776	-0.003883341	0.013839596	0.008711285	0.008956748
	12345678**8**0ABCDEF1234567890ABCDEF	0.000105753	0.012016729	-0.013108032	-0.000328517	0.010261736
	1234567890ABCDEF12345678**8**0ABCDEF	-0.004686889	0.000989529	0.000388118	-0.001103081	0.002546002
104_3	1234567890ABCDEF1234567890ABCDEF	-0.003429354	-0.007098756	-0.001370686	-0.003966265	0.002369093
	12345678**8**0ABCDEF1234567890ABCDEF	-0.002288255	-0.015291976	-0.004760358	-0.007446863	0.00563839
	1234567890ABCDEF12345678**8**0ABCDEF	-0.008704772	0.000283572	-0.022260603	-0.010227268	0.009266371
104_4	1234567890ABCDEF1234567890ABCDEF	0.009232954	-0.004445756	-0.003388681	0.000466172	0.006214054
	12345678**8**0ABCDEF1234567890ABCDEF	0.00441662	-0.009662099	0.001453222	-0.001264086	0.006060275
	1234567890ABCDEF12345678**8**0ABCDEF	-0.004426779	-0.012367379	0.016405969	-0.000129396	0.012133343
104_5	1234567890ABCDEF1234567890ABCDEF	-0.017148004	0.002219566	-0.003411727	-0.006113389	0.008134286
	12345678**8**0ABCDEF1234567890ABCDEF	-0.00077199	-0.003993215	-0.017791813	-0.007519006	0.00738205
	1234567890ABCDEF12345678**8**0ABCDEF	0.00402385	0.011213555	0.005211041	0.006816149	0.003146982
104_6	1234567890ABCDEF1234567890ABCDEF	0.004750292	0.006888838	0.005210096	0.005616409	0.000919116
	12345678**8**0ABCDEF1234567890ABCDEF	-0.004812161	-0.011689084	-0.007274262	-0.007925169	0.002844969
	1234567890ABCDEF12345678**8**0ABCDEF	-0.003177513	-0.010340166	-4.28999E-05	-0.004520193	0.004309719
104_7	1234567890ABCDEF1234567890ABCDEF	0.016471411	0.006020526	-0.004322648	0.00605643	0.008489177
	12345678**8**0ABCDEF1234567890ABCDEF	-0.007518799	-0.010687875	-0.003362889	-0.007189854	0.002999445
	1234567890ABCDEF12345678**8**0ABCDEF	0.008445243	-0.003121317	-0.004870304	0.000151208	0.005908074
104_8	1234567890ABCDEF1234567890ABCDEF	-0.003936056	-0.005827292	-0.001216683	-0.00366001	0.001892367
	12345678**8**0ABCDEF1234567890ABCDEF	-0.00271329	-0.001993046	-0.010564686	-0.005090341	0.003882099
	1234567890ABCDEF12345678**8**0ABCDEF	0.00641963	-0.001838307	0.005430752	0.003337358	0.003681947
105_1	1234567890ABCDEF1234567890ABCDEF	-0.002397226	-0.001664289	-0.019827937	-0.007963151	0.008395005

	1234567880ABCDEF1234567890ABCDEF	-0.000214473	0.009868658	-0.002770128	0.002294685	0.005456289
	1234567890ABCDEF1234567880ABCDEF	-0.004148885	0.000826662	-0.008647406	-0.003989876	0.003869406
105_2	1234567890ABCDEF1234567890ABCDEF	-0.000766946	0.008910824	-0.003181683	0.001654065	0.005225141
	1234567880ABCDEF1234567890ABCDEF	-0.002423893	-0.008839986	-0.001444543	-0.004236141	0.003279871
	1234567890ABCDEF1234567880ABCDEF	0.00129787	-0.005729814	-0.003717242	-0.002716396	0.002955036
105_3	1234567890ABCDEF1234567890ABCDEF	-0.001271883	-0.006323576	0.003512173	-0.001361096	0.004015923
	1234567880ABCDEF1234567890ABCDEF	-0.000361549	-0.008925719	-0.002641979	-0.003976416	0.003621399
	1234567890ABCDEF1234567880ABCDEF	-0.009291462	-0.003361317	-0.016471894	-0.009708224	0.005360477
105_4	1234567890ABCDEF1234567890ABCDEF	-0.009545353	0.00700939	-0.007350573	-0.003295512	0.007341549
	1234567880ABCDEF1234567890ABCDEF	-0.002666087	-0.005327816	0.003586428	-0.001469159	0.003736345
	1234567890ABCDEF1234567880ABCDEF	0.000958464	-0.002258473	0.000136989	-0.000387674	0.001364704
105_5	1234567890ABCDEF1234567890ABCDEF	0.008050836	0.009634822	0.003395683	0.007027114	0.002647983
	1234567880ABCDEF1234567890ABCDEF	-0.01570988	-0.010263161	0.011563875	-0.004803055	0.011784849
	1234567890ABCDEF1234567880ABCDEF	-0.01223983	0.007333614	-0.003023269	-0.002643162	0.007995344
105_6	1234567890ABCDEF1234567890ABCDEF	-0.00392139	0.006169989	0.012156586	0.004801728	0.006634729
	1234567880ABCDEF1234567890ABCDEF	-0.00517	-0.005675937	0.000689263	-0.003385558	0.002888727
	1234567890ABCDEF1234567880ABCDEF	-0.008858935	0.007333411	0.008629627	0.002368034	0.007956284
105_7	1234567890ABCDEF1234567890ABCDEF	-0.004586038	-0.001775718	0.004169044	-0.000730904	0.003649803
	1234567880ABCDEF1234567890ABCDEF	-0.008887729	-0.000225737	0.000375115	-0.002912784	0.004232039
	1234567890ABCDEF1234567880ABCDEF	-0.008722357	0.001227637	0.00624083	-0.000417963	0.006218534
105_8	1234567890ABCDEF1234567890ABCDEF	-0.004176482	-0.007701103	-0.012826394	-0.00823466	0.003551409
	1234567880ABCDEF1234567890ABCDEF	0.005734812	0.004864918	-0.00774928	0.00095015	0.006161668
	1234567890ABCDEF1234567880ABCDEF	0.001927278	0.002420834	-0.012009893	-0.002553927	0.006689413
106_1	1234567890ABCDEF1234567890ABCDEF	0.000785838	-0.000833428	-0.000449702	-0.000165764	0.00069088
	1234567880ABCDEF1234567890ABCDEF	0.00684116	0.00882166	0.000679288	0.005447369	0.003467136
	1234567890ABCDEF1234567880ABCDEF	-0.007694316	0.002595442	0.003497684	-0.00053373	0.005076679
106_2	1234567890ABCDEF1234567890ABCDEF	0.012816816	-0.007429389	0.016349726	0.007245717	0.010476623
	1234567880ABCDEF1234567890ABCDEF	0.00684116	0.00882166	0.000679288	0.005447369	0.003467136
	1234567890ABCDEF1234567880ABCDEF	-0.000706865	-0.003310952	0.003224158	-0.000264553	0.002686217
106_3	1234567890ABCDEF1234567890ABCDEF	0.011142191	-0.001027976	-0.000347694	0.003255507	0.005583639
	1234567880ABCDEF1234567890ABCDEF	0.01131774	0.008621701	-0.01081308	0.00304212	0.009858738
	1234567890ABCDEF1234567880ABCDEF	0.002510247	0.000649637	0.003228156	0.002129347	0.001086586
106_4	1234567890ABCDEF1234567890ABCDEF	-0.004339457	0.001742065	-0.002007511	-0.001534968	0.002505155
	1234567880ABCDEF1234567890ABCDEF	0.00684116	0.00882166	0.000679288	0.005447369	0.003467136
	1234567890ABCDEF1234567880ABCDEF	-0.005646992	-0.004716454	-0.004323584	-0.004895677	0.000554943
106_5	1234567890ABCDEF1234567890ABCDEF	0.007288807	-0.005772426	-0.006103179	-0.001528933	0.006236546
	1234567880ABCDEF1234567890ABCDEF	0.002702242	-0.007651396	0.003580604	-0.000456183	0.005100405
	1234567890ABCDEF1234567880ABCDEF	0.010073977	0.001442533	0.00258797	0.004701493	0.003827592
106_6	1234567890ABCDEF1234567890ABCDEF	0.014205961	-0.007928183	-0.006006883	9.02985E-05	0.010012052
	1234567880ABCDEF1234567890ABCDEF	0.006487877	0.011267021	-0.007686984	0.003355971	0.008048611
	1234567890ABCDEF1234567880ABCDEF	0.004058063	0.002451127	0.00092112	0.00247677	0.00128078
106_7	1234567890ABCDEF1234567890ABCDEF	0.000143388	0.023527091	0.008810059	0.010826846	0.009652287
	1234567880ABCDEF1234567890ABCDEF	-0.015163997	-0.012668172	0.007378163	-0.006818002	0.010089784
	1234567890ABCDEF1234567880ABCDEF	-0.004748523	-0.006457834	0.002278088	-0.00297609	0.003780231

106_8	1234567890ABCDEF1234567890ABCDEF	-0.001636013	-0.012123787	0.005658399	-0.002700467	0.007298462
	12345678**8**0ABCDEF1234567890ABCDEF	-0.002093775	0.013610592	-0.003913365	0.002534484	0.00786714
	1234567890ABCDEF12345678**8**0ABCDEF	-0.012595029	5.97145E-05	-0.004543594	-0.00569297	0.005229814
107_1	1234567890ABCDEF1234567890ABCDEF	-0.007324757	0.010698135	0.000461274	0.001278217	0.007380457
	12345678**8**0ABCDEF1234567890ABCDEF	-0.003818468	-0.004584912	0.00288472	-0.001839553	0.003355188
	1234567890ABCDEF12345678**8**0ABCDEF	0.000506108	-0.004281057	0.000652491	-0.001040819	0.002291973
107_2	1234567890ABCDEF1234567890ABCDEF	0.017870276	0.009919393	-0.008938868	0.0062836	0.01124268
	12345678**8**0ABCDEF1234567890ABCDEF	-0.013485179	0.003855905	0.005121976	-0.001502433	0.008488832
	1234567890ABCDEF12345678**8**0ABCDEF	0.017190376	-0.012862592	0.000432639	0.001586808	0.012296187
107_3	1234567890ABCDEF1234567890ABCDEF	0.011616421	-0.005248188	-0.00190244	0.001488598	0.007290547
	12345678**8**0ABCDEF1234567890ABCDEF	0.013563425	0.010521355	-0.011899356	0.004061808	0.011354371
	1234567890ABCDEF12345678**8**0ABCDEF	0.008014385	0.004079072	0.002731361	0.004941606	0.002241362
107_4	1234567890ABCDEF1234567890ABCDEF	-0.015898838	-0.006960698	0.009445145	-0.004471464	0.010495287
	12345678**8**0ABCDEF1234567890ABCDEF	-0.008898966	-0.018512099	0.007512658	-0.006632803	0.010744723
	1234567890ABCDEF12345678**8**0ABCDEF	-0.010788974	0.009145583	-0.003128191	-0.001590527	0.00821056
107_5	1234567890ABCDEF1234567890ABCDEF	0.007911002	0.001312063	-0.006932435	0.000763543	0.006072208
	12345678**8**0ABCDEF1234567890ABCDEF	-1.47411E-05	-0.006428932	-0.006210483	-0.004218052	0.002973527
	1234567890ABCDEF12345678**8**0ABCDEF	-0.012919806	-0.003795761	0.020294003	0.001192812	0.014010797
107_6	1234567890ABCDEF1234567890ABCDEF	-0.001415168	0.00762613	-0.007233398	-0.000340812	0.006113759
	12345678**8**0ABCDEF1234567890ABCDEF	0.005502316	-0.000130758	-0.008183314	-0.000937252	0.005616164
	1234567890ABCDEF12345678**8**0ABCDEF	0.003369103	-0.009238322	0.010680253	0.001603678	0.008226986
107_7	1234567890ABCDEF1234567890ABCDEF	0.006563946	0.004305303	0.005137201	0.005335483	0.000932686
	12345678**8**0ABCDEF1234567890ABCDEF	0.003039308	0.01104579	-0.00136708	0.004239339	0.005138086
	1234567890ABCDEF12345678**8**0ABCDEF	0.001585255	0.001813407	-0.028619591	-0.008406976	0.01429278
107_8	1234567890ABCDEF1234567890ABCDEF	0.01033534	0.009094159	0.001698297	0.007042598	0.003812812
	12345678**8**0ABCDEF1234567890ABCDEF	-0.00689159	-0.006746805	0.019907359	0.002089655	0.012599158
	1234567890ABCDEF12345678**8**0ABCDEF	-0.004245903	0.003752354	-0.003535965	-0.001343171	0.003614719
108_1	1234567890ABCDEF1234567890ABCDEF	-0.005919828	0.004871178	-0.008737044	-0.003261898	0.005864831
	12345678**8**0ABCDEF1234567890ABCDEF	0.001950611	-0.003978895	-0.014853482	-0.005627255	0.006958554
	1234567890ABCDEF12345678**8**0ABCDEF	-0.00277381	0.007507803	0.00136008	0.002031358	0.004224204
108_2	1234567890ABCDEF1234567890ABCDEF	0.006685532	0.005735521	-0.001980393	0.00348022	0.003880666
	12345678**8**0ABCDEF1234567890ABCDEF	-0.001739011	0.004839478	-0.002790085	0.000103461	0.003376249
	1234567890ABCDEF12345678**8**0ABCDEF	-0.000589021	0.001325234	-0.01587762	-0.005047135	0.007698079
108_3	1234567890ABCDEF1234567890ABCDEF	-0.009589608	-0.000507779	0.000399496	-0.00323263	0.004510297
	12345678**8**0ABCDEF1234567890ABCDEF	0.004591779	0.001164839	0.001162334	0.002306317	0.001616066
	1234567890ABCDEF12345678**8**0ABCDEF	0.008633363	0.003914056	0.005336818	0.005961412	0.001976622
108_4	1234567890ABCDEF1234567890ABCDEF	-0.003548803	-0.001207034	-0.00453355	-0.003096462	0.001395203
	12345678**8**0ABCDEF1234567890ABCDEF	0.00207918	-0.002447998	-0.007307651	-0.002558823	0.003832959
	1234567890ABCDEF12345678**8**0ABCDEF	0.000388572	-0.008035429	0.000577557	-0.002356433	0.004016398
108_5	1234567890ABCDEF1234567890ABCDEF	-0.003304985	-0.000974285	-0.003467667	-0.002582312	0.001138985
	12345678**8**0ABCDEF1234567890ABCDEF	-0.000891698	-0.008738871	-0.008541135	-0.006057234	0.003653478
	1234567890ABCDEF12345678**8**0ABCDEF	-0.007766273	0.002367577	0.006147059	0.000249455	0.00587424
108_6	1234567890ABCDEF1234567890ABCDEF	0.002508473	-0.003155788	-0.002141284	-0.000929533	0.002466066
	12345678**8**0ABCDEF1234567890ABCDEF	0.000957719	0.000806804	-0.004695253	-0.00097691	0.002629987

	1234567890ABCDEF12345678**8**0ABCDEF	-0.013198181	-0.002383115	0.010067206	-0.00183803	0.009505872
108_7	1234567890ABCDEF1234567890ABCDEF	0.00059029	0.003318505	-0.000244541	0.001221418	0.001521527
	12345678**8**0ABCDEF1234567890ABCDEF	-0.002141435	-0.003757963	0.004434258	-0.00048838	0.003542839
	1234567890ABCDEF12345678**8**0ABCDEF	-0.001187518	-0.008501468	-0.001169659	-0.003619548	0.003452046
108_8	1234567890ABCDEF1234567890ABCDEF	0.004538085	-0.001175656	0.008165803	0.003842744	0.003845199
	12345678**8**0ABCDEF1234567890ABCDEF	-0.00939702	-0.007000238	-0.002319593	-0.00623895	0.002939066
	1234567890ABCDEF12345678**8**0ABCDEF	-0.002202781	-0.006994309	0.010395881	0.000399597	0.007334119
109_1	1234567890ABCDEF1234567890ABCDEF	0.00730787	0.012253455	0.00307283	0.007544718	0.003751714
	12345678**8**0ABCDEF1234567890ABCDEF	0.002489842	0.000416578	-0.003758719	-0.0002841	0.002598633
	1234567890ABCDEF12345678**8**0ABCDEF	0.006093838	0.011755488	0.005380349	0.007743225	0.002852012
109_2	1234567890ABCDEF1234567890ABCDEF	0.00285964	-0.015904797	-0.002133713	-0.005059623	0.007935017
	12345678**8**0ABCDEF1234567890ABCDEF	0.002065706	0.001630428	-0.012239536	-0.002847801	0.006643337
	1234567890ABCDEF12345678**8**0ABCDEF	0.008176627	0.013284542	-0.010989849	0.00349044	0.010449299
109_3	1234567890ABCDEF1234567890ABCDEF	-0.011205538	0.009368393	-0.003545131	-0.001794092	0.008490044
	12345678**8**0ABCDEF1234567890ABCDEF	0.001876042	-0.003528351	-0.015272642	-0.00564165	0.007158625
	1234567890ABCDEF12345678**8**0ABCDEF	0.009567196	0.012254393	0.004512382	0.008777991	0.00320955
109_4	1234567890ABCDEF1234567890ABCDEF	5.45915E-05	0.000126992	-0.003980468	-0.001266295	0.001919438
	12345678**8**0ABCDEF1234567890ABCDEF	-0.003074544	-0.015099754	-0.007435453	-0.008536584	0.004970633
	1234567890ABCDEF12345678**8**0ABCDEF	0.001888869	0.014853645	-0.011215847	0.001842222	0.010642877
109_5	1234567890ABCDEF1234567890ABCDEF	-0.00836102	-0.004116417	-0.002485445	-0.004987627	0.002476537
	12345678**8**0ABCDEF1234567890ABCDEF	-0.00347257	-0.015056129	-0.005895521	-0.008141407	0.004988501
	1234567890ABCDEF12345678**8**0ABCDEF	0.006832434	0.00651133	0.007936026	0.007093263	0.000610171
109_6	1234567890ABCDEF1234567890ABCDEF	0.002972638	-0.000904492	-0.000216066	0.00061736	0.001688981
	12345678**8**0ABCDEF1234567890ABCDEF	0.001178743	0.00481765	-0.013903026	-0.002635544	0.008104629
	1234567890ABCDEF12345678**8**0ABCDEF	-0.015718055	-0.001043316	-0.001044676	-0.005935349	0.006917418
109_7	1234567890ABCDEF1234567890ABCDEF	0.003663352	-0.000148677	-0.001541919	0.000657586	0.00220019
	12345678**8**0ABCDEF1234567890ABCDEF	0.001372381	0.005312534	-0.005998358	0.000228852	0.004687915
	1234567890ABCDEF12345678**8**0ABCDEF	-0.002775407	-0.006483731	-6.64946E-05	-0.003108544	0.002630395
109_8	1234567890ABCDEF1234567890ABCDEF	-0.010399969	0.009528682	-0.004280451	-0.001717246	0.008335278
	12345678**8**0ABCDEF1234567890ABCDEF	-0.001530625	-0.003906623	-0.018021552	-0.0078196	0.007278792
	1234567890ABCDEF12345678**8**0ABCDEF	0.006093838	0.011755488	0.005380349	0.007743225	0.002852012
110_1	1234567890ABCDEF1234567890ABCDEF	-0.00516689	-0.012041939	0.006104064	-0.003701588	0.007480182
	12345678**8**0ABCDEF1234567890ABCDEF	0.000453764	0.007197724	-0.001824774	0.001942238	0.003830843
	1234567890ABCDEF12345678**8**0ABCDEF	-0.013708447	-0.005188507	-0.00157235	-0.006823101	0.005087575
110_2	1234567890ABCDEF1234567890ABCDEF	-0.01351387	0.005733731	-0.002594597	-0.003458245	0.007881495
	12345678**8**0ABCDEF1234567890ABCDEF	0.001183271	-0.006140256	-0.015908435	-0.00695514	0.007001411
	1234567890ABCDEF12345678**8**0ABCDEF	0.002250357	0.009088409	0.005237223	0.00552533	0.002799047
110_3	1234567890ABCDEF1234567890ABCDEF	0.000799293	0.006502249	0.006350249	0.004550597	0.002653298
	12345678**8**0ABCDEF1234567890ABCDEF	0.000470617	0.002993334	-0.00540122	-0.000645756	0.003516803
	1234567890ABCDEF12345678**8**0ABCDEF	-0.016398014	0.009026331	0.002768447	-0.001534412	0.0108162
110_4	1234567890ABCDEF1234567890ABCDEF	0.01116127	0.00528369	0.00324586	0.006563607	0.003355798
	12345678**8**0ABCDEF1234567890ABCDEF	0.001127355	3.70334E-05	0.001214328	0.000792905	0.00053566
	1234567890ABCDEF12345678**8**0ABCDEF	0.007415791	-0.006514632	-0.005767954	-0.001622265	0.006398136
110_5	1234567890ABCDEF1234567890ABCDEF	0.01279282	0.000141116	0.011625216	0.008186384	0.005708799

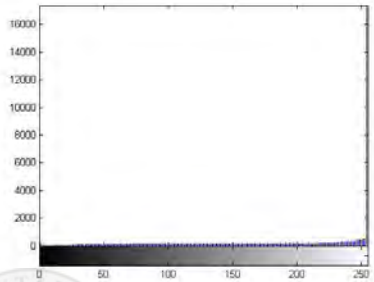
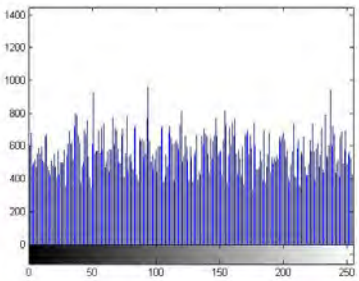
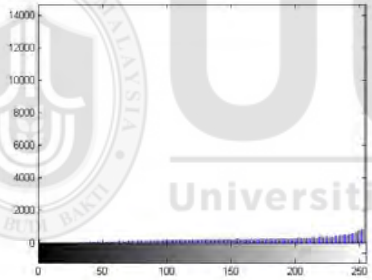
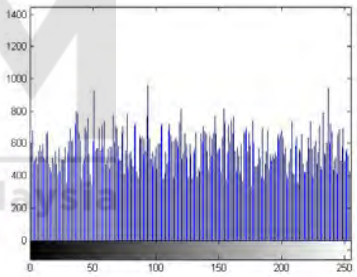
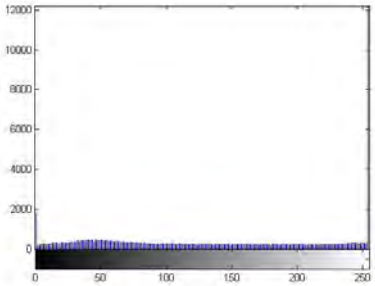
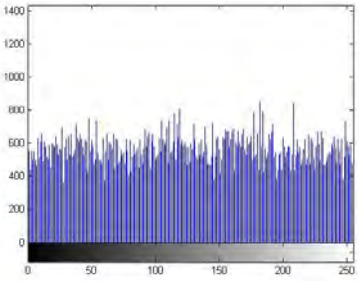
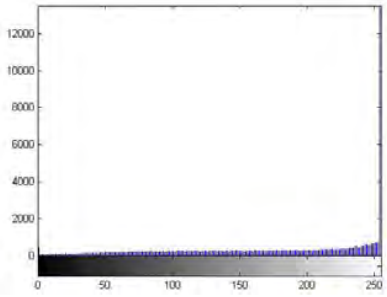
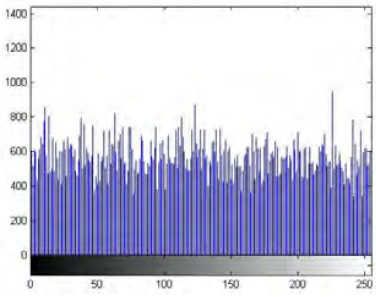
	1234567880ABCDEF1234567890ABCDEF	0.008708304	-0.002352358	-0.007492648	-0.0003789	0.006759616
	1234567890ABCDEF1234567880ABCDEF	-0.002558082	0.001665515	-0.000289591	-0.000394053	0.001725858
110_6	1234567890ABCDEF1234567890ABCDEF	0.006717892	-0.011776247	-0.002143915	-0.002400757	0.007552385
	1234567880ABCDEF1234567890ABCDEF	-0.005191125	-0.002479129	-0.000182184	-0.002617479	0.00204723
	1234567890ABCDEF1234567880ABCDEF	-0.001460598	0.014611787	-0.005712215	0.002479658	0.008752542
110_7	1234567890ABCDEF1234567890ABCDEF	0.010377808	0.002311326	0.008294093	0.006994409	0.003418958
	1234567880ABCDEF1234567890ABCDEF	-0.000721951	0.008170825	0.009942467	0.005797114	0.004666071
	1234567890ABCDEF1234567880ABCDEF	-0.004742616	0.009990549	-0.018957758	-0.004569942	0.011818728
110_8	1234567890ABCDEF1234567890ABCDEF	0.002205388	-0.013564888	-0.007877433	-0.006412311	0.006521009
	1234567880ABCDEF1234567890ABCDEF	-0.001225759	-0.000809991	-0.010706086	-0.004247279	0.004570219
	1234567890ABCDEF1234567880ABCDEF	-0.009416674	0.009479877	0.003567642	0.001210282	0.007892519

Appendix B

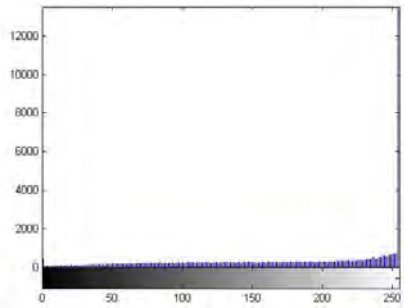
Histogram Analysis Result

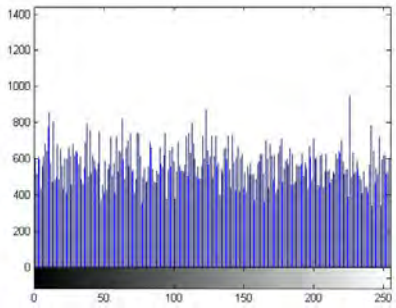
The results of the histogram analysis of the enhanced chaos-based encryption algorithm that embeds Henon and logistic maps for the entire files in the dataset FVC2002.

Table B-1: Histogram analysis of the enhanced chaos-based encryption algorithm for the entire files in the dataset FVC2002.

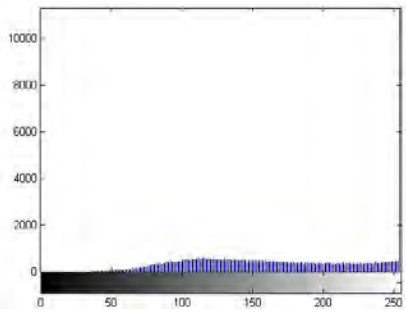
Datasheet	Histogram plain finger image	Histogram encrypted finger image
101_1 DB1_B		
102_1 DB1_B		
103_1 DB1_B		
104_1 DB1_B		

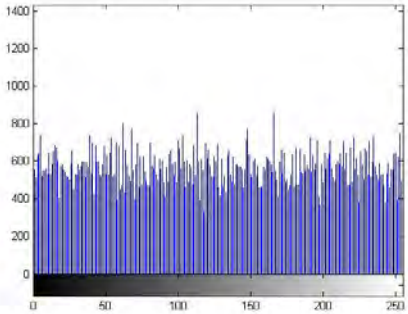
105_1
DB1_B



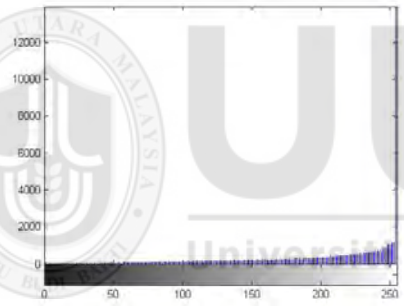


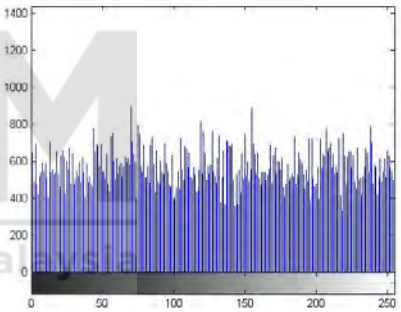
106_1
DB1_B



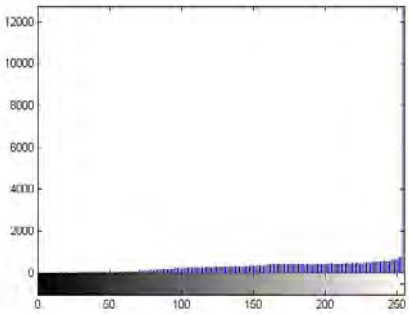


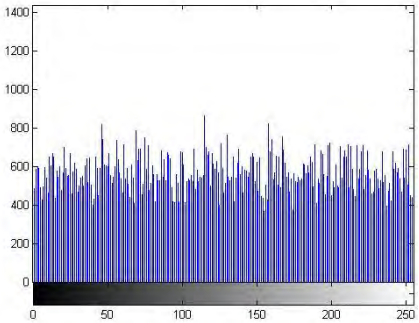
107_1
DB1_B



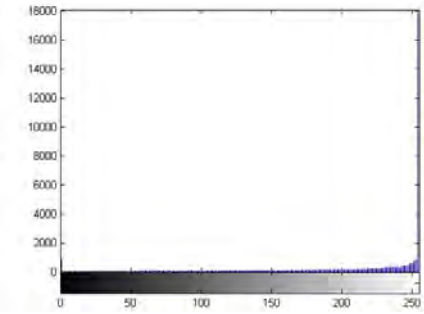


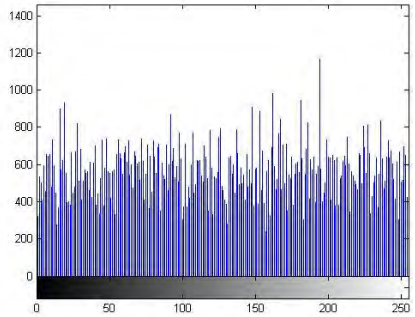
108_1
DB1_B



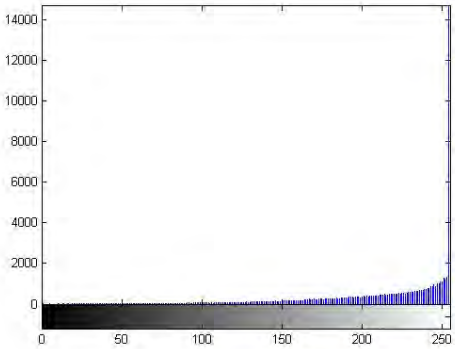


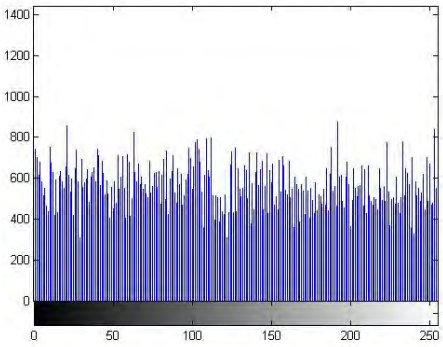
109_1
DB1_B



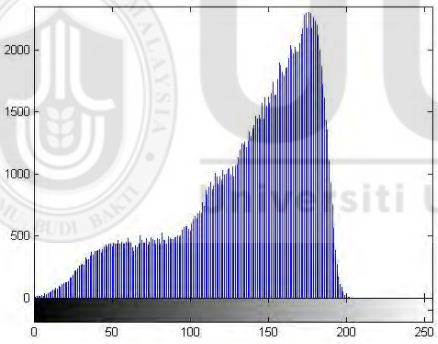


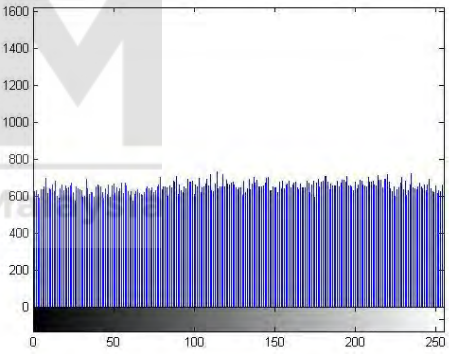
110_1
DB1_B



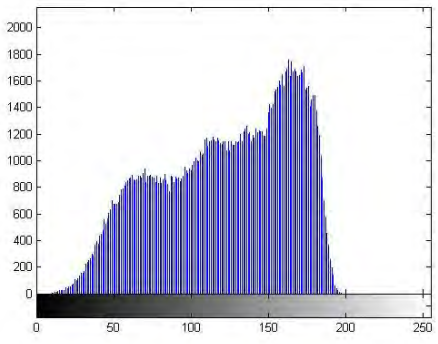


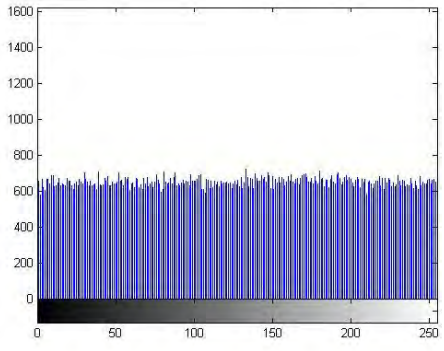
101_1
DB2_B





102_1
DB2_B





103_1
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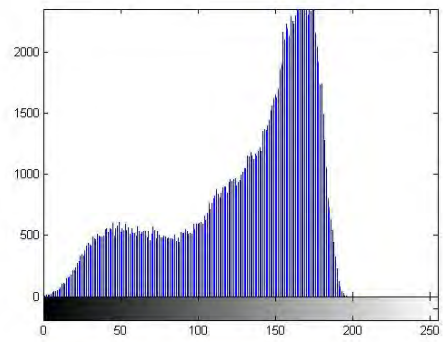

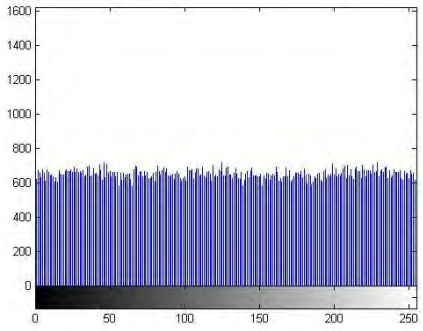

104_1
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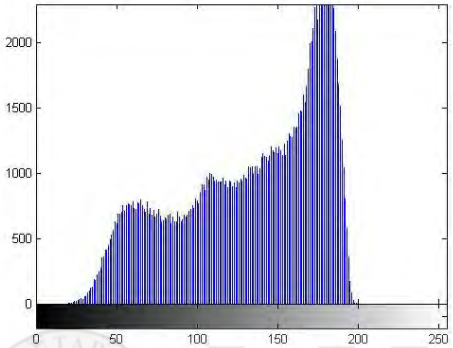

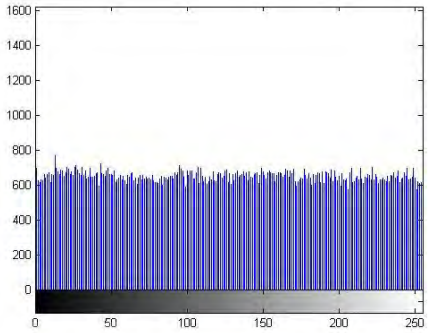

105_1
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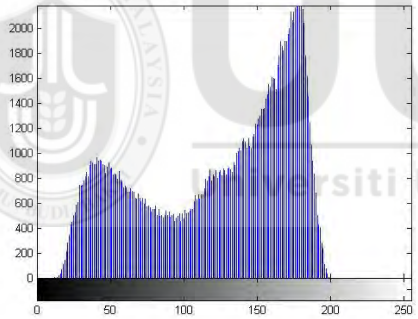

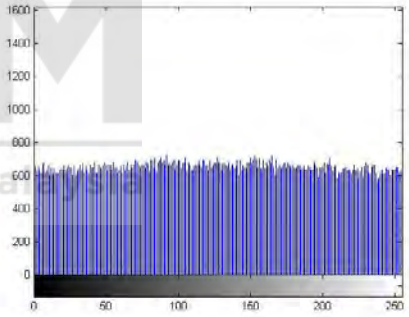

106_1
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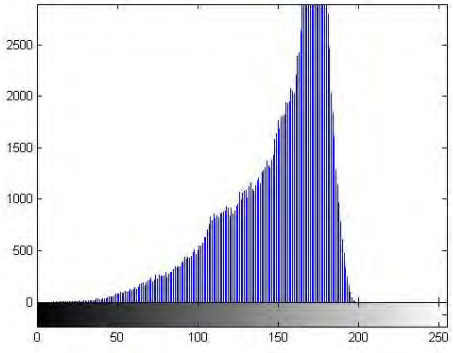

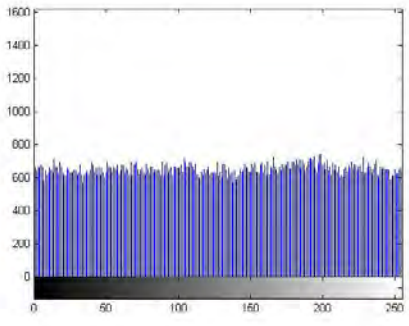

107_1
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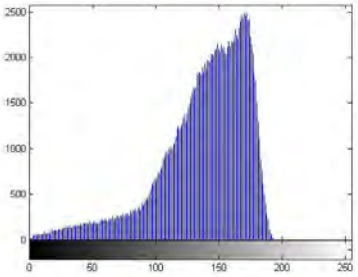

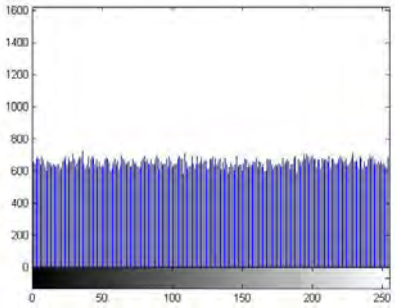

108_1
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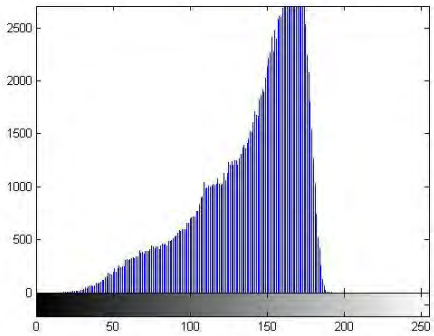
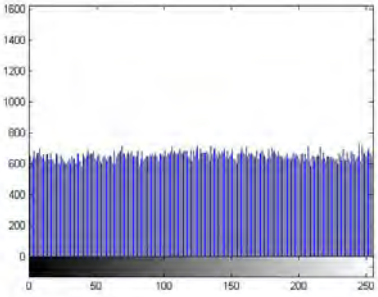
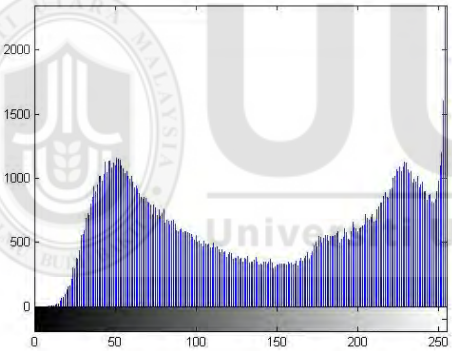
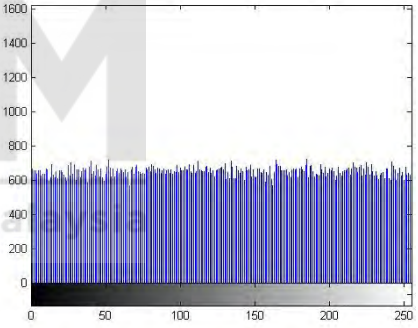




109_1
DB2_B





110_1
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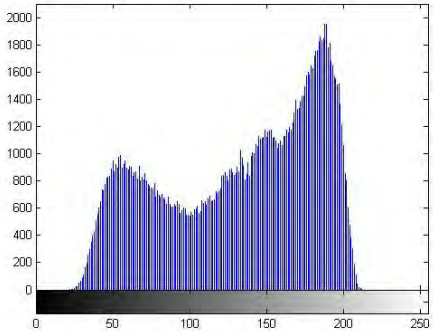

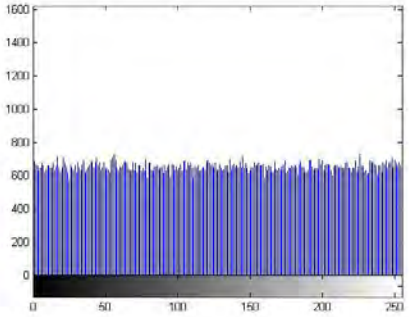

101_1
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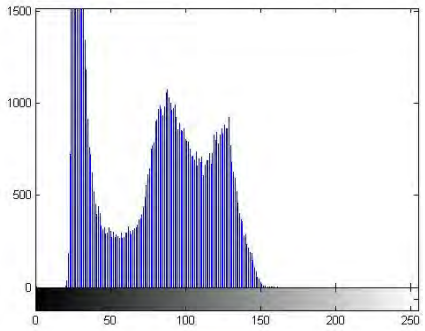

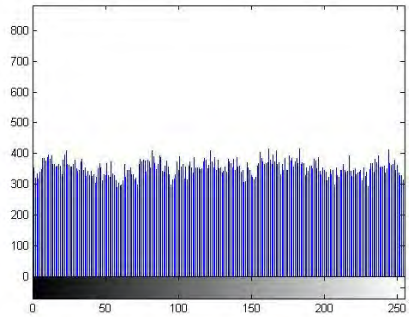

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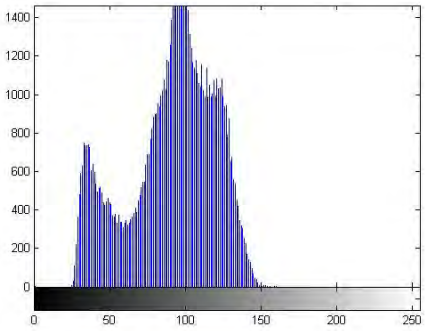

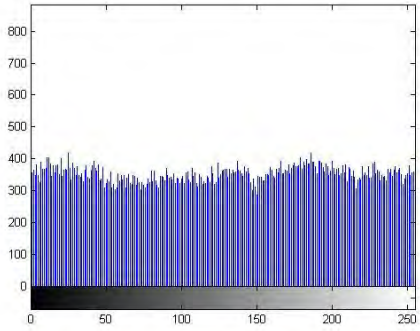

103_1
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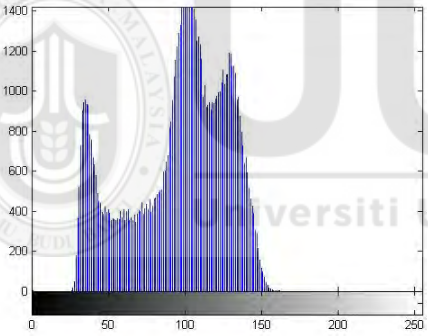

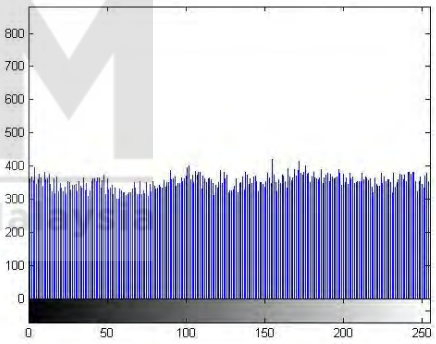

104_1
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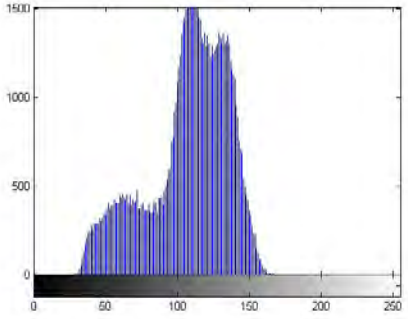

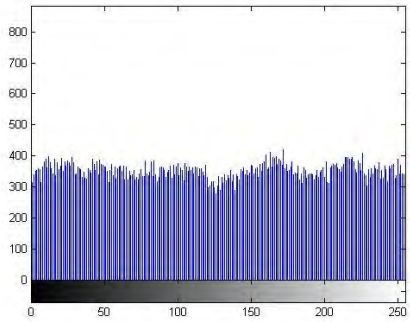

105_1
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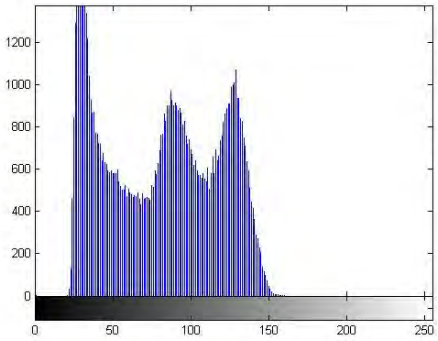

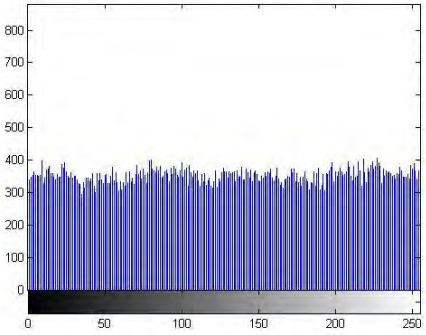

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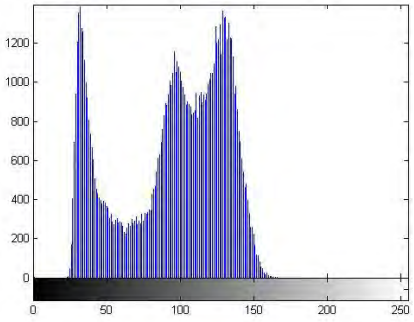

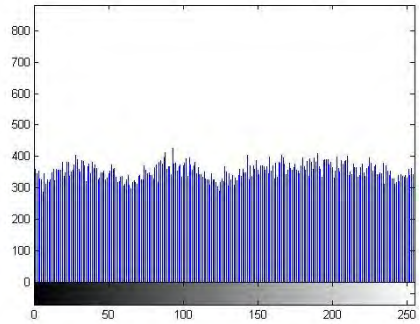

107_1
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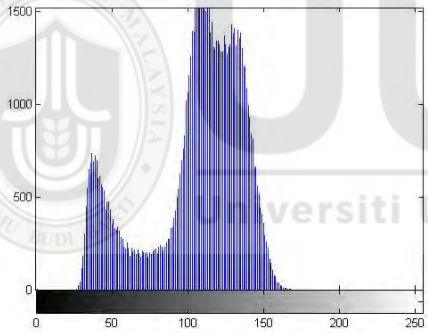
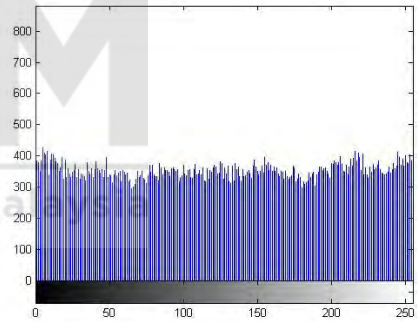
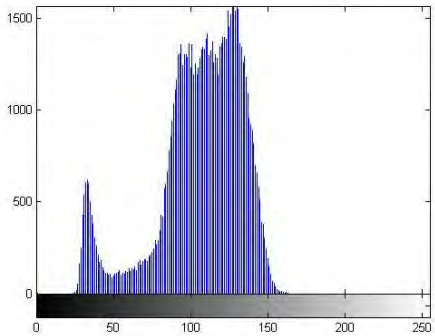
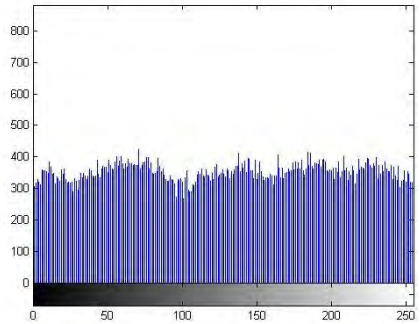


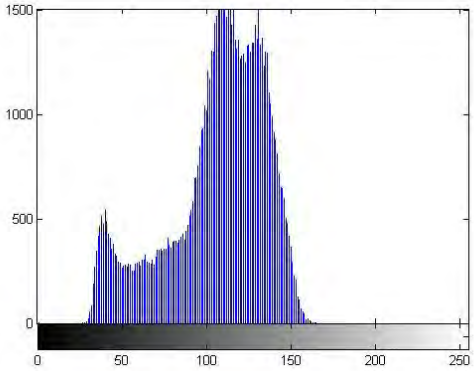


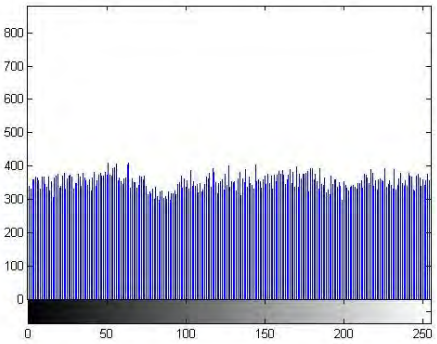
108_1
DB3_B





109_1
DB3_B





110_1
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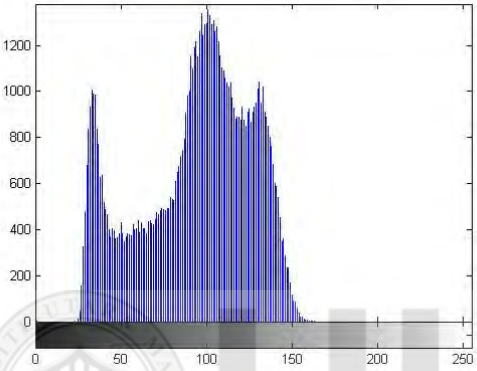
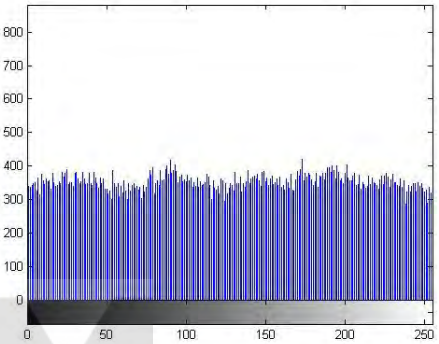
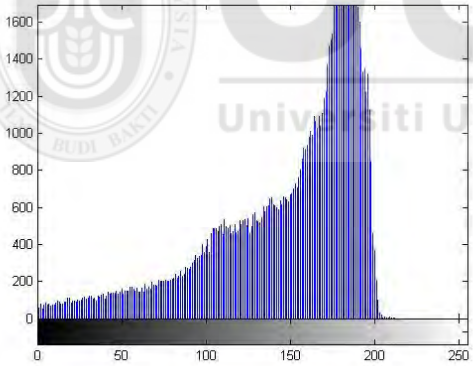
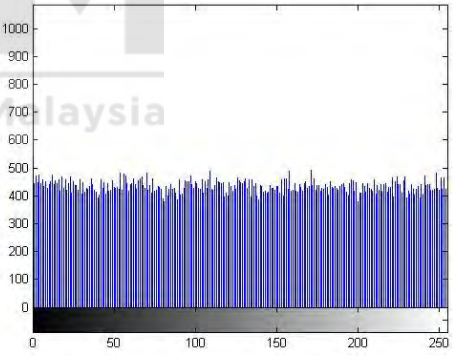


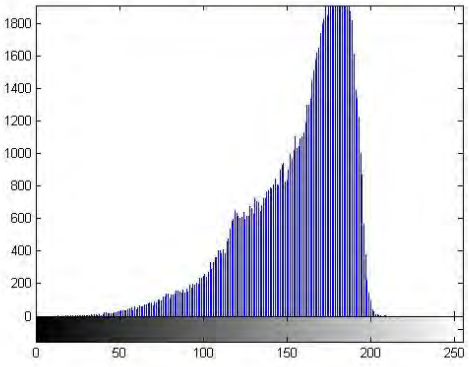


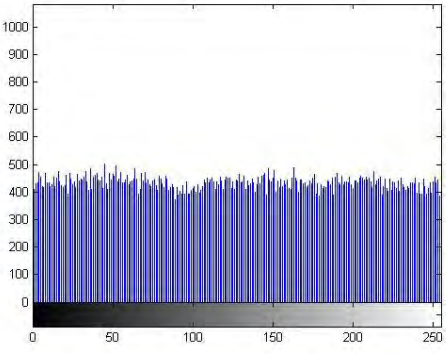
101_1
DB4_B



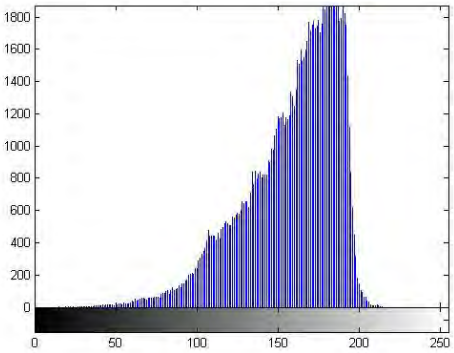
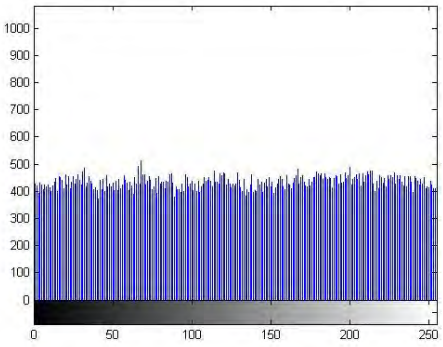


102_1
DB4_B

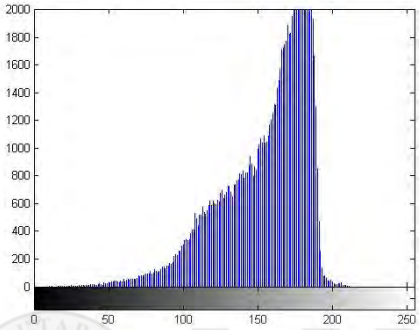
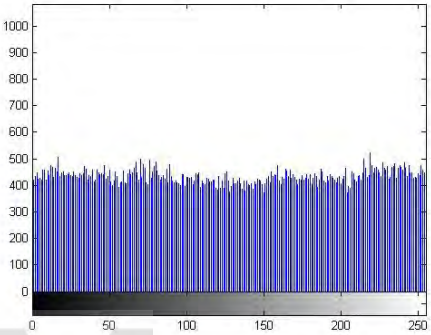




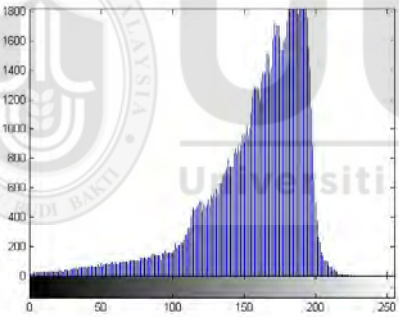
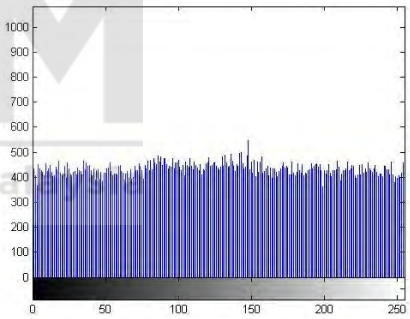
103_1
DB4_B

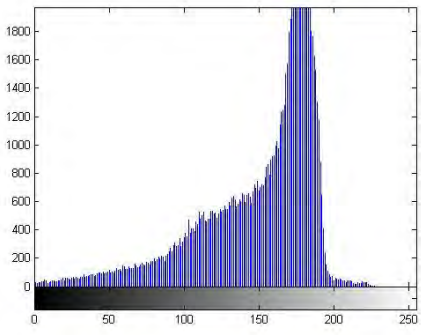
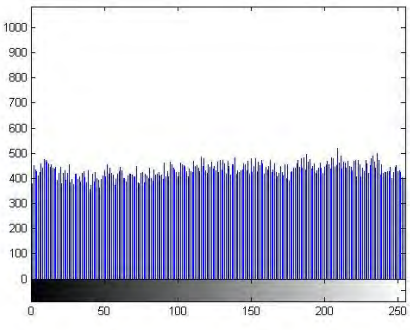
104_1
DB4_B

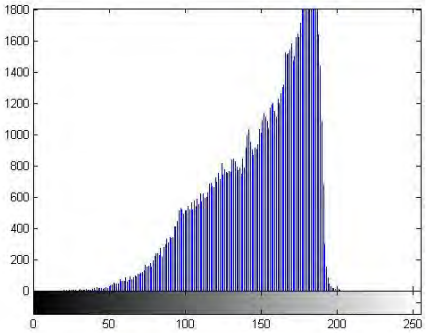
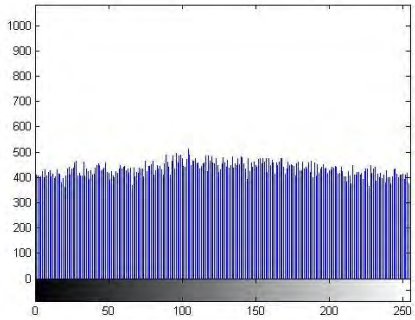
105_1
DB4_B

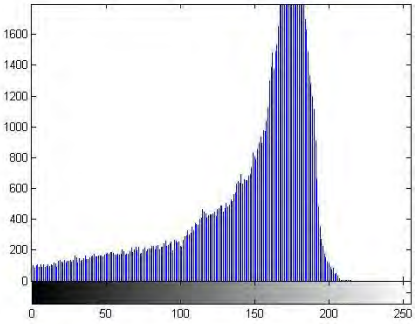
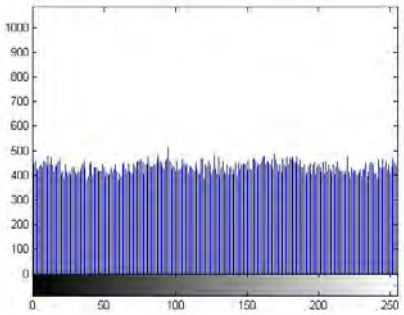
106_1
DB4_B

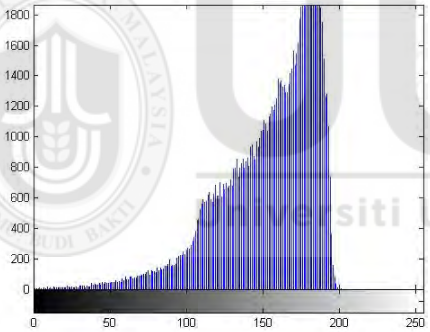
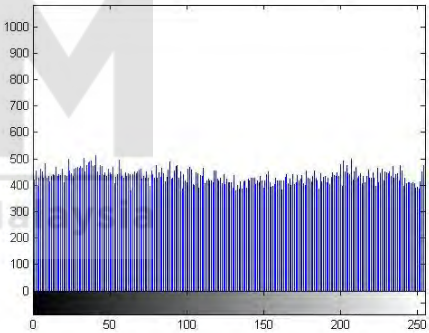
107_1
DB4_B

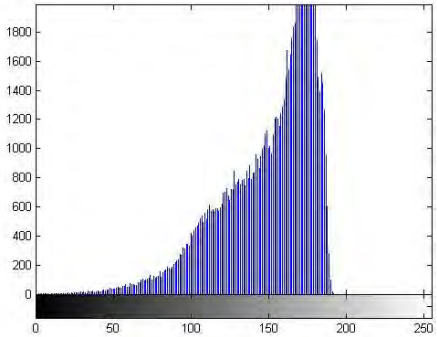
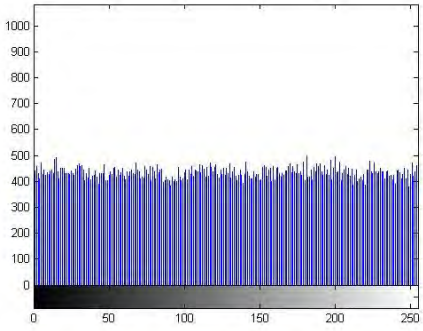
108_1
DB4_B

109_1
DB4_B

110_1
DB4_B

Appendix C

Correlation Coefficient Analysis Results

The results of correlation coefficient analysis of the proposed chaotic-based encryption algorithm that embeds Henon and logistic maps for the entire files in the dataset FVC2002.

Table C-1 Correlation coefficient analysis of the proposed chaos-based encryption algorithm

Correlation coefficient (DB1_B)	Diagonal	Vertical	Horizontal	MEAN	Standard deviation
101_1	0.922250316	0.910209641	0.936749897	0.923069951	0.0108505
101_1A	-0.001703388	0.009263742	0.002260312	0.003273555	0.00453428
101_2	0.92071848	0.91259221	0.91942878	0.917579823	0.00356586
101_2A	-0.012732328	0.00262222	0.017501177	0.00246369	0.01234329
101_3	0.905557206	0.880188225	0.917472301	0.901072577	0.01554798
101_3A	0.007807127	-0.00022989	-0.009334872	-0.000585878	0.00700272
101_4	0.727988862	0.843938977	0.829005851	0.80031123	0.05150174
101_4A	0.016285904	0.003365796	-0.003865516	0.005262061	0.00833534
101_5	0.781958214	0.901005479	0.812775574	0.831913089	0.05044962
101_5A	-0.010358666	-0.00428303	0.024130304	0.003162869	0.01503226
101_6	0.850183779	0.885208588	0.940969756	0.892120708	0.0373841
101_6A	-0.00578879	0.004605899	-0.01131728	-0.004166724	0.00660102
101_7	0.850465831	0.925125371	0.898961354	0.891517519	0.03093078
101_7A	-0.00466789	0.003752413	0.001449486	0.000178003	0.0035532
101_8	0.855503467	0.864082981	0.876386648	0.865324365	0.00857059
101_8A	-0.012272102	-0.00434362	0.012653652	-0.001320691	0.01039798
102_1	0.73808518	0.918246796	0.869625103	0.841985693	0.07610302
102_1A	-0.002809448	-0.00524591	0.012030713	0.001325118	0.00763507
102_2	0.727623227	0.916110516	0.87156827	0.838434005	0.08043745
102_2A	0.009977709	0.007360152	0.009977709	0.00910519	0.00123393
102_3	0.789940853	0.940336176	0.856060546	0.862112525	0.06154759
102_3A	0.011187624	-0.00460061	0.004850109	0.003812376	0.00648715
102_4	0.720086041	0.889383981	0.887345784	0.832271935	0.07933177
102_4A	-0.009501486	-0.01893632	0.006846671	-0.007197046	0.01065124
102_5	0.716491631	0.892675333	0.868735545	0.825967503	0.07802565
102_5A	0.01406336	0.005173953	-0.009155607	0.003360568	0.00956544
102_6	0.836225341	0.928856154	0.889890888	0.884990794	0.03797477
102_6A	-0.001204545	0.004070173	0.002022461	0.001629363	0.00217126
102_7	0.719181611	0.885128649	0.847114061	0.817141441	0.07098532
102_7A	0.020683798	0.00104527	-0.006961401	0.004922556	0.01161434
102_8	0.629867693	0.875942367	0.809577224	0.771795761	0.10395116

102_8A	-0.001674898	-0.01430346	0.008699742	-0.002426205	0.00940603
103_1	0.908540777	0.973671937	0.931147533	0.937786749	0.02700094
103_1A	0.005676257	0.004135057	-0.004154856	0.001885486	0.00431726
103_2	0.919890391	0.965688234	0.922509346	0.936029324	0.02099925
103_2A	0.001013389	-0.01345978	0.004991928	-0.00248482	0.00792862
103_3	0.860306402	0.962868295	0.908961617	0.910712105	0.04188901
103_3A	0.009760549	-0.00136096	-0.006858573	0.000513672	0.00691301
103_4	0.906664396	0.95778472	0.914701716	0.926383611	0.02244507
103_4A	0.005163207	0.002843783	-0.00219731	0.00193656	0.00307263
103_5	0.934902196	0.972930829	0.952448654	0.953427226	0.01554054
103_5A	0.006215143	0.000452539	-3.24469E-06	0.002221479	0.00283007
103_6	0.889821524	0.943925943	0.929367025	0.921038164	0.02285971
103_6A	0.008970218	-0.00228768	0.003396866	0.003359802	0.00459609
103_7	0.862524371	0.940276999	0.881286878	0.894696083	0.03312826
103_7A	0.013942264	-0.00302974	-0.002679994	0.002744176	0.00791953
103_8	0.824043363	0.928179481	0.864329928	0.872184257	0.04287463
103_8A	-0.006814422	0.001736935	-0.019740223	-0.00827257	0.00882843
104_1	0.827029263	0.940464661	0.923717876	0.8970706	0.04999637
104_1A	-0.002056875	-0.00024317	0.00217431	-4.19129E-05	0.00173323
104_2	0.854192154	0.944007206	0.915171809	0.904457057	0.03744142
104_2A	0.0004137	0.004316624	-0.00236581	0.000788171	0.00274091
104_3	0.83906478	0.945462969	0.912243032	0.898923594	0.04444622
104_3A	-0.003100281	-0.00101571	0.008413588	0.001432534	0.00500917
104_4	0.897952071	0.945383093	0.934171621	0.925835595	0.02024092
104_4A	-0.003429648	-0.00307012	0.002927444	-0.001190776	0.00291572
104_5	0.845398849	0.935663037	0.903492316	0.894851401	0.03735331
104_5A	-0.002980633	0.002753045	0.013486199	0.004419537	0.00682505
104_6	0.931382012	0.971553147	0.94346068	0.948798613	0.01682855
104_6A	-0.000501089	-0.00164851	-0.005541698	-0.002563767	0.00215719
104_7	0.898967615	0.959409583	0.915918922	0.924765373	0.02545588
104_7A	-0.001226033	0.005730566	0.000496377	0.00166697	0.00295818
104_8	0.692072089	0.879041922	0.845378019	0.805497344	0.08137273
104_8A	-0.001666047	0.007226072	-0.009037471	-0.001159149	0.00664923
105_1	0.753814098	0.93321737	0.879109433	0.855380301	0.07513848
105_1A	0.000924578	-0.00898987	0.008162567	3.24259E-05	0.00703081
105_2	0.725183708	0.917892034	0.844441938	0.82917256	0.07941029
105_2A	0.004808154	-0.01098475	0.000387627	-0.001929656	0.00665238
105_3	0.70547333	0.905218514	0.850603466	0.82043177	0.0842903
105_3A	0.008996346	0.007227667	0.004624345	0.006949453	0.00179567
105_4	0.764313902	0.931658993	0.839541854	0.845171583	0.06843423
105_4A	0.006418727	-0.01084464	-0.005940329	-0.003455415	0.00726347
105_5	0.693951053	0.895868679	0.874693632	0.821504455	0.09060721
105_5A	0.003561081	0.003416215	0.005332514	0.00410327	0.00087122

105_6	0.72038051	0.92974495	0.853712496	0.834612652	0.08653312
105_6A	-0.002757062	0.010873293	-0.000140662	0.002658523	0.00590611
105_7	0.779868254	0.935366042	0.876707282	0.863980526	0.0641164
105_7A	0.006619437	-0.00955687	0.010800642	0.002621068	0.00877866
105_8	0.675837175	0.890801581	0.778587684	0.781742147	0.08778719
105_8A	0.008540567	0.004171643	-0.00011687	0.004198447	0.00353443
106_1	0.931991537	0.943075446	0.943688897	0.939585293	0.00537543
106_1A	0.005204669	-0.00664848	-0.000926499	-0.000790105	0.00483999
106_2	0.917214654	0.935454129	0.927930886	0.926866556	0.00748417
106_2A	-0.000248303	0.009934632	-0.008643594	0.000347578	0.00759622
106_3	0.912984249	0.933798621	0.93606095	0.927614607	0.01038637
106_3A	-0.003332257	-0.00407004	0.002779884	-0.001540806	0.00307
106_4	0.91273827	0.93973768	0.935820255	0.929432069	0.01191214
106_4A	-0.000909381	-0.00704455	0.000326959	-0.002542324	0.00322332
106_5	0.924992689	0.941941435	0.928873064	0.931935729	0.00725028
106_5A	3.88008E-07	-0.00252318	-0.005250711	-0.002591166	0.00214429
106_6	0.904446692	0.92573251	0.912632056	0.91427042	0.00876678
106_6A	0.000618952	0.000798408	-0.003351366	-0.000644669	0.00191533
106_7	0.897084253	0.918034148	0.901472509	0.905530304	0.00902123
106_7A	-0.001160454	-0.0035123	-0.003089177	-0.002587312	0.00102362
106_8	0.852720317	0.902576491	0.862869823	0.87272221	0.02151297
106_8A	0.002060517	0.007255712	-0.008476759	0.000279823	0.00654501
107_1	0.888667179	0.941698082	0.912091409	0.914152223	0.02169876
107_1A	-0.004333645	0.006652801	-0.000417426	0.00063391	0.00454639
107_2	0.879479581	0.943440444	0.913615662	0.912178562	0.02613168
107_2A	0.000642905	-0.00246171	0.008277806	0.002152999	0.00451255
107_3	0.882230018	0.935914511	0.910457582	0.909534037	0.02192633
107_3A	0.017512135	-0.00036852	-0.001963622	0.005059999	0.00882904
107_4	0.804606709	0.933087486	0.853898681	0.863864292	0.05292329
107_4A	-0.002720463	-0.01244694	0.005574076	-0.003197774	0.00736478
107_5	0.881569797	0.929732818	0.892920466	0.901407694	0.02055795
107_5A	0.002754322	-0.00850566	-0.004338434	-0.003363256	0.0046483
107_6	0.879153349	0.92064312	0.934121345	0.911305938	0.0233917
107_6A	-0.00512209	0.007466489	-0.001801451	0.000180983	0.00532701
107_7	0.841445064	0.930864519	0.895009177	0.889106254	0.03674319
107_7A	-0.000446303	-0.00192789	0.001515801	-0.000286131	0.00141044
107_8	0.75747449	0.880577736	0.81252138	0.816857869	0.05035015
107_8A	-0.009056815	5.89987E-05	-0.000769405	-0.003255741	0.0041159
108_1	0.853093186	0.932496127	0.918231425	0.901273579	0.03456282
108_1A	-0.003827632	0.012364467	-0.006818339	0.000572832	0.00842686
108_2	0.849649356	0.94029196	0.927495999	0.905812438	0.0400554
108_2A	0.0008392	0.004832564	-0.005647214	8.18337E-06	0.00431852
108_3	0.838876978	0.930851987	0.912186013	0.893971659	0.03969612

108_3A	-0.003881046	0.026804478	0.006101427	0.009674953	0.01277962
108_4	0.899032989	0.94392565	0.931402223	0.924786954	0.01891488
108_4A	-0.001200025	-0.00418334	0.00063994	-0.00158114	0.00198745
108_5	0.773085384	0.900542079	0.893238848	0.855622104	0.05843838
108_5A	0.012149709	-0.00122494	0.001617565	0.004180779	0.00575313
108_6	0.83104419	0.927448859	0.897965316	0.885486122	0.04033413
108_6A	-0.002579573	0.000466847	0.000752863	-0.000453287	0.00150804
108_7	0.836187645	0.926545515	0.889659539	0.8841309	0.03709502
108_7A	-0.006494989	0.00664436	-0.010948414	-0.003599681	0.00746831
108_8	0.829452677	0.925455044	0.883070203	0.879325975	0.03928213
108_8A	-0.002282581	-0.00554084	0.00263059	-0.001730945	0.0033587
109_1	0.785471804	0.904444065	0.83564852	0.841854796	0.04876808
109_1A	0.005368604	0.012875786	0.016318266	0.011520885	0.00457169
109_2	0.812731538	0.905877518	0.839691277	0.852766777	0.03913455
109_2A	-0.010565414	0.000642001	0.017274765	0.002450451	0.01143742
109_3	0.7339268	0.888051499	0.805346844	0.809108381	0.06297734
109_3A	0.0030475	-0.00865639	-0.005586397	-0.003731761	0.0049548
109_4	0.796687166	0.900908428	0.83470053	0.844098708	0.043064
109_4A	0.02664191	0.009478188	0.015519354	0.017213151	0.00710868
109_5	0.729803485	0.912730488	0.819973287	0.820835753	0.07468213
109_5A	-0.001960424	0.000753555	-0.005326453	-0.002177774	0.00248691
109_6	0.671901011	0.888737783	0.800670258	0.787103017	0.08904156
109_6A	-0.008141068	0.027026803	-0.016243366	0.00088079	0.01878159
109_7	0.832004886	0.919936468	0.884970714	0.878970689	0.03614776
109_7A	-0.007001743	0.01105589	-0.016912423	-0.004286092	0.01157836
109_8	0.708637496	0.889463085	0.781678425	0.793259669	0.07427457
109_8A	-0.007429946	0.015056601	-0.022773095	-0.005048813	0.01553542
110_1	0.781821758	0.872592698	0.872679771	0.842364742	0.04281037
110_1A	-0.00433167	0.011009063	-0.01431455	-0.002545719	0.01041517
110_2	0.808823712	0.880960529	0.875053361	0.854945868	0.03270233
110_2A	0.00058731	0.000895334	0.007352708	0.002945117	0.00311917
110_3	0.759264511	0.861470991	0.846986674	0.822574059	0.04515546
110_3A	-0.004654721	0.001200883	0.013809026	0.003451729	0.00770399
110_4	0.763297459	0.869049241	0.855703565	0.829350088	0.04702297
110_4A	-0.007621003	0.005363142	-0.012694148	-0.004984003	0.00760402
110_5	0.770808898	0.893510935	0.857083581	0.840467805	0.05145231
110_5A	0.000449467	-0.0070713	-0.012435071	-0.006352303	0.0052846
110_6	0.805631999	0.880254478	0.880460954	0.855449144	0.03522614
110_6A	-0.008019422	-0.01708532	0.010681655	-0.004807696	0.01156107
110_7	0.833307674	0.883768111	0.916217987	0.877764591	0.03411316
110_7A	0.007094297	-0.00825384	0.010920613	0.003253689	0.00828564
110_8	0.72205001	0.851826457	0.831868107	0.801914858	0.05705774
110_8A	0.012314827	0.00068455	0.023111115	0.012036831	0.00915772

Correlation coefficient (DB2_B)	Diagonal	Vertical	Horizontal	MEAN	Standard deviation
101_1	0.80321849	0.92924865	0.870250383	0.86757251	0.05148643
101_1A	0.00114479	-0.0069332	0.00166696	-0.001373809	0.00393684
101_2	0.82849458	0.92631641	0.887060038	0.880623677	0.0401941
101_2A	0.00382717	-0.0004066	-0.00238541	0.000345041	0.00259137
101_3	0.86871369	0.95390004	0.93027761	0.917630447	0.03590861
101_3A	-0.0021862	0.0010494	-9.2809E-05	-0.000409868	0.00133982
101_4	0.84542429	0.93683479	0.924671381	0.902310155	0.04052973
101_4A	-0.00273907	-0.0057209	0.0011824	-0.002425863	0.00282696
101_5	0.87156317	0.93684553	0.922818296	0.910408997	0.02805874
101_5A	-9.5748E-05	0.00019142	-0.00580109	-0.001901805	0.0027597
101_6	0.81900503	0.92575001	0.90784896	0.884201332	0.04667641
101_6A	0.0003391	-0.0011814	0.00630077	0.00181948	0.00322898
101_7	0.84920013	0.93845314	0.897404254	0.895019177	0.0364764
101_7A	0.00308915	-0.0074408	-0.00795131	-0.004100989	0.00508846
101_8	0.84837878	0.94704641	0.897256204	0.897560465	0.04028147
101_8A	0.00319666	0.00897669	0.006384168	0.00618584	0.00236385
102_1	0.79284517	0.92992263	0.872106639	0.864958145	0.05618946
102_1A	-0.00315823	-0.0016118	0.001044116	-0.001241967	0.00173542
102_2	0.83383395	0.91852075	0.866741514	0.873032072	0.03485821
102_2A	-0.00647871	-0.0011109	0.004049472	-0.001180045	0.00429839
102_3	0.87785852	0.95252609	0.910570838	0.913651814	0.03056066
102_3A	-0.00293669	0.0098759	0.004076548	0.003671917	0.00523854
102_4	0.86988293	0.96341351	0.903791864	0.91236277	0.03866167
102_4A	-0.00185516	0.00014528	-0.00291552	-0.001541799	0.00126906
102_5	0.89877416	0.95255969	0.918797113	0.923376988	0.02219538
102_5A	-0.00594633	0.00037264	-0.00100472	-0.002192806	0.00271305
102_6	0.84117218	0.92337037	0.900958368	0.888500307	0.03469426
102_6A	0.00141305	0.00023649	-0.00984905	-0.002733172	0.00505456
102_7	0.84576403	0.93287999	0.887494099	0.888712704	0.03557538
102_7A	0.00469348	-0.0051102	-0.00346601	-0.001294259	0.00428685
102_8	0.84266084	0.93306199	0.874579944	0.883434255	0.03743342
102_8A	0.00759194	-0.0146987	-0.0050391	-0.004048623	0.00912703
103_1	0.83236145	0.91876613	0.91092851	0.887352032	0.03901564
103_1A	-0.0054084	0.00085759	-0.00527776	-0.003276191	0.00292351
103_2	0.80961874	0.92455066	0.89593019	0.876699864	0.04885141
103_2A	0.00568389	-0.0070432	0.007613437	0.002084714	0.00650229
103_3	0.87382532	0.97028484	0.927838204	0.923982788	0.03947368
103_3A	0.0068312	0.00184026	0.009166496	0.005945984	0.00305572
103_4	0.85097279	0.92693471	0.915176499	0.897694669	0.03338427
103_4A	0.00168374	-0.0066246	-0.00322371	-0.002721529	0.00341041
103_5	0.92534321	0.97287482	0.964402603	0.954206877	0.0207007

103_5A	0.00823754	0.01020825	-5.745E-05	0.006129448	0.00444816
103_6	0.88332794	0.93793397	0.935901116	0.919054343	0.02527601
103_6A	-0.00077974	0.00020906	0.003661026	0.001030114	0.00190363
103_7	0.83398171	0.9406136	0.920157144	0.898250816	0.0462061
103_7A	-0.00433805	-0.0018984	0.011504171	0.001755915	0.00696464
103_8	0.84280055	0.93855037	0.919476113	0.900275679	0.04138035
103_8A	0.01312003	-0.0136605	0.013136029	0.004198535	0.01262821
104_1	0.88914567	0.94521227	0.942933659	0.925763865	0.02590968
104_1A	-0.00681657	-0.0054692	0.001237844	-0.003682645	0.00352252
104_2	0.89433469	0.94685882	0.946798705	0.929330738	0.02474596
104_2A	0.00340994	-0.0044128	-0.00907634	-0.003359749	0.0051516
104_3	0.90486322	0.95130166	0.951900403	0.936021763	0.02203377
104_3A	0.00120847	-0.0001925	0.007064476	0.002693498	0.00314322
104_4	0.89460032	0.95034929	0.946398193	0.930449269	0.0254003
104_4A	0.00451313	0.00267287	0.004785822	0.003990608	0.00093841
104_5	0.9208343	0.96160723	0.955439296	0.945960277	0.0179443
104_5A	0.00390168	-0.0046446	-0.00348782	-0.001410244	0.00378567
104_6	0.87071653	0.93223213	0.954219206	0.919055955	0.03534009
104_6A	-0.00027183	0.00330813	0.000233623	0.001089973	0.00158199
104_7	0.90669708	0.94464276	0.968790331	0.940043393	0.02555724
104_7A	1.1583E-05	-0.0019386	0.005959035	0.001343994	0.00335905
104_8	0.86856729	0.93355968	0.929436457	0.910521144	0.02971357
104_8A	0.00071799	0.01311119	-0.00426661	0.003187523	0.00730621
105_1	0.88636905	0.94420554	0.932592575	0.921055722	0.02498118
105_1A	0.00541674	0.00030358	0.002469225	0.002729849	0.00209556
105_2	0.86427688	0.94277447	0.925473222	0.910841523	0.03367524
105_2A	0.00025216	-0.0024503	-0.00474551	-0.00231455	0.00204255
105_3	0.8985785	0.93643513	0.93287632	0.922629982	0.01706891
105_3A	-0.00620401	0.00154469	-0.00579445	-0.003484592	0.00356017
105_4	0.92863048	0.95619161	0.945235012	0.943352369	0.01133026
105_4A	-0.00188666	-0.0041615	0.005516407	-0.000177247	0.00413175
105_5	0.9541563	0.97587542	0.976931244	0.968987655	0.0104962
105_5A	-0.00479919	-0.0030691	-0.00344223	-0.003770164	0.00074341
105_6	0.93846273	0.95758059	0.961756262	0.95259986	0.01014077
105_6A	0.00051839	-0.0011086	0.000107181	-0.000161008	0.00069076
105_7	0.86614066	0.92317638	0.905103645	0.898140229	0.02379966
105_7A	0.00024553	-0.008874	-0.0013805	-0.003336339	0.00397162
105_8	0.84876261	0.92375553	0.903143029	0.891887058	0.03163339
105_8A	0.00040085	-0.0051903	0.003717525	-0.000357303	0.0036759
106_1	0.83059928	0.91351924	0.872089299	0.872069272	0.03385194
106_1A	0.00397675	-0.0063585	-0.00698577	-0.003122504	0.00502646
106_2	0.86804635	0.92049509	0.887950978	0.892164139	0.02161837
106_2A	-0.00024139	-0.0046815	-0.00818232	-0.004368397	0.00324942

106_3	0.87469908	0.92103091	0.878561426	0.891430474	0.02098998
106_3A	0.01302484	0.01627355	-0.00071545	0.009527645	0.00736339
106_4	0.85173005	0.91464127	0.903843834	0.890071719	0.02746766
106_4A	0.0007244	0.00749822	0.005403178	0.004541932	0.00283166
106_5	0.9444395	0.95120176	0.936278614	0.943973291	0.00610126
106_5A	0.00522133	-0.0077585	0.008230814	0.001897876	0.00693776
106_6	0.89494292	0.93207766	0.913800112	0.9136069	0.01516081
106_6A	0.00649403	0.01055527	-0.00236943	0.004893288	0.00539652
106_7	0.92972877	0.93860934	0.931276174	0.933204761	0.00387347
106_7A	-0.00157315	0.00385377	-0.00743074	-0.001716705	0.004608
106_8	0.84995143	0.91344547	0.879034938	0.880810614	0.02595172
106_8A	0.00125231	0.01129414	-0.00433905	0.002735804	0.00646785
107_1	0.8328387	0.94795905	0.913080974	0.897959575	0.04819866
107_1A	-0.00948732	0.00407031	-0.0110242	-0.005480401	0.00678246
107_2	0.85661663	0.95495925	0.920039289	0.910538389	0.04070641
107_2A	-0.00182612	-0.0013174	-0.00493861	-0.00269404	0.00160068
107_3	0.85219864	0.95551692	0.923487193	0.910400916	0.04318259
107_3A	0.00150979	0.00405923	-0.00516295	0.000135355	0.00388836
107_4	0.86551805	0.95400983	0.921160195	0.913562693	0.03652387
107_4A	-2.1281E-05	-0.00686	0.010030447	0.001049724	0.00693696
107_5	0.88037318	0.95442475	0.915357955	0.91671863	0.03024673
107_5A	0.00083486	-0.0023668	-0.01461245	-0.005381463	0.00665687
107_6	0.93816824	0.98310718	0.964089261	0.961788229	0.01841825
107_6A	0.00390027	-0.0054911	-0.00743084	-0.003007228	0.00494811
107_7	0.87051011	0.94701643	0.931219888	0.916248809	0.03297882
107_7A	0.00142397	-0.0061244	-0.00073804	-0.001812813	0.00317393
107_8	0.88409149	0.96283561	0.942009189	0.929645429	0.03331472
107_8A	-0.00408392	0.00252953	-0.00716806	-0.002907485	0.00404548
108_1	0.8451351	0.92551613	0.854968497	0.875206575	0.03580002
108_1A	0.00507166	0.0082071	-0.00307125	0.003402504	0.00475323
108_2	0.82491292	0.94257321	0.857988121	0.875158082	0.04954521
108_2A	0.00466137	-0.0074863	0.014954364	0.004043145	0.00917178
108_3	0.78341431	0.92871851	0.85996917	0.857367328	0.05934871
108_3A	0.00222727	0.01428459	0.015538097	0.01068332	0.00600119
108_4	0.86770748	0.95659913	0.899939195	0.908081934	0.03674379
108_4A	0.01052562	0.00423658	0.000145461	0.004969222	0.00426923
108_5	0.851977	0.92916228	0.911260973	0.89746675	0.03298588
108_5A	-0.00566699	0.00374713	0.000597695	-0.000440722	0.00391281
108_6	0.86875234	0.95362536	0.932216315	0.918198006	0.03603926
108_6A	-0.00600406	-0.0046742	0.011077738	0.000133162	0.007758
108_7	0.84684251	0.92972491	0.919709027	0.898758816	0.0369374
108_7A	0.00108688	-0.0025562	-0.0060443	-0.002504548	0.00291152
108_8	0.78437921	0.92549253	0.84694915	0.85227363	0.05773217

108_8A	-0.00049374	-0.0054234	-0.0068667	-0.004261274	0.00272843
109_1	0.92211004	0.97005911	0.966748269	0.952972474	0.02186485
109_1A	-0.00130849	-0.0007772	0.000284469	-0.000600419	0.00066223
109_2	0.89705369	0.96188072	0.952509805	0.93714807	0.02860796
109_2A	0.00550537	0.00031125	0.001496218	0.002437613	0.00222252
109_3	0.90373788	0.95936115	0.957548633	0.940215889	0.02580446
109_3A	-0.0007281	0.0002632	-0.00227398	-0.000912957	0.00104402
109_4	0.92321067	0.96679886	0.962262622	0.950757383	0.01956631
109_4A	0.00096844	-0.0011986	-0.00639785	-0.002209342	0.00309103
109_5	0.94982629	0.98298869	0.972488668	0.968434551	0.01383867
109_5A	-0.0018018	0.00699722	-0.0089834	-0.001262661	0.00653519
109_6	0.91827612	0.97101681	0.951253156	0.946848694	0.02175538
109_6A	0.00134227	0.00275408	-0.00330698	0.000263121	0.00258941
109_7	0.92006047	0.96630519	0.95526192	0.947209195	0.01971934
109_7A	-0.0042828	-0.0042294	-0.0077718	-0.005427996	0.00165746
109_8	0.91987869	0.96409179	0.945767852	0.943246109	0.01813779
109_8A	0.0041471	-0.0065643	-0.02354021	-0.008652472	0.01139933
110_1	0.89206733	0.95758014	0.924130892	0.924592788	0.02674748
110_1A	-0.00141998	0.00342286	-0.00222711	-7.47433E-05	0.00249503
110_2	0.90017528	0.95971436	0.923473774	0.927787802	0.0244974
110_2A	0.00206049	0.00134463	-0.00255462	0.000283499	0.00202802
110_3	0.88224598	0.95221208	0.913494049	0.915984037	0.02861775
110_3A	-0.00037023	0.00901567	-0.00660399	0.00068048	0.00641984
110_4	0.90499565	0.9481185	0.924675912	0.925930018	0.01762715
110_4A	-0.00099511	-0.0025952	0.012385377	0.002931691	0.00671661
110_5	0.9319644	0.97222689	0.947345605	0.950512298	0.01658891
110_5A	-0.004072	-0.005983	0.00530015	-0.001584957	0.00493062
110_6	0.91042014	0.96728434	0.938557585	0.938754022	0.02321512
110_6A	0.00468301	0.00918815	0.003820161	0.005897106	0.00235363
110_7	0.85900972	0.94406289	0.895758215	0.899610277	0.03482948
110_7A	-0.0058347	-0.0076189	0.000947409	-0.004168733	0.00369026
110_8	0.8513541	0.94714245	0.887411316	0.895302624	0.03950153
110_8A	-0.01129234	-0.0086471	-0.01025474	-0.010064742	0.00108822
Correlation coefficient (DB3_B)	Diagonal	Vertical	Horizontal	MEAN	STANDARD DEVIATION
101_1	0.87155123	0.90339901	0.923484376	0.899478205	0.02138212
101_1A	-0.00295943	0.00202181	0.007216912	0.002093099	0.00415478
101_2	0.89686739	0.91620732	0.927580846	0.91355185	0.01267853
101_2A	-0.00488319	-0.0021808	-0.01050059	-0.005854875	0.00346532
101_3	0.87931896	0.89961885	0.917905064	0.898947624	0.01575986
101_3A	-0.015856	-0.0091111	0.001444415	-0.007840907	0.00711975
101_4	0.86312963	0.91060701	0.926158597	0.899965078	0.02680921
101_4A	0.01040617	-0.0127281	0.010810892	0.00282966	0.01100222

101_5	0.89918651	0.91410682	0.95703182	0.923441716	0.0245204
101_5A	-0.00451241	0.01328206	0.000801217	0.003190289	0.0074584
101_6	0.90654035	0.92113675	0.952789534	0.926822211	0.01930441
101_6A	0.01351898	-0.0050572	-0.00121494	0.002415599	0.00800644
101_7	0.84083097	0.87320691	0.91551816	0.87651868	0.03058071
101_7A	0.00848224	0.00848224	0.013254293	0.010072925	0.00224957
101_8	0.84894959	0.88235547	0.913688883	0.881664647	0.02643422
101_8A	-0.01651856	-0.0038752	-0.00654436	-0.008979358	0.00544125
102_1	0.86785239	0.87680963	0.893188394	0.879283473	0.01049025
102_1A	0.00410401	0.00284983	0.01174359	0.006232478	0.00393044
102_2	0.86312452	0.87963773	0.905539263	0.882767168	0.01745657
102_2A	0.00410401	0.00284983	0.01174359	0.006232478	0.00393044
102_3	0.85406507	0.87552364	0.889027571	0.872872092	0.014396
102_3A	-0.00915346	0.0204749	-0.01023212	0.000363105	0.014228
102_4	0.83486605	0.87465415	0.904566647	0.871362281	0.0285502
102_4A	0.00278544	-0.0025642	-0.01260191	-0.004126893	0.00637831
102_5	0.81371986	0.84448763	0.913594381	0.857267291	0.04176298
102_5A	0.00026885	0.00256678	0.008352323	0.003729316	0.00340091
102_6	0.8718284	0.89425477	0.927716408	0.897933192	0.02296397
102_6A	-0.00543422	0.00742493	0.005063199	0.002351302	0.00558899
102_7	0.76169859	0.79830682	0.823080945	0.794362118	0.025214
102_7A	0.012023	-0.0084917	-0.00581055	-0.000759761	0.00910481
102_8	0.82047033	0.84103048	0.861773379	0.841091396	0.01686195
102_8A	-0.01013782	0.02106568	-0.0109782	-1.67817E-05	0.0149115
103_1	0.81224533	0.88886502	0.870216596	0.857108981	0.03262414
103_1A	0.00165946	0.00994872	0.011637149	0.007748444	0.00436039
103_2	0.80252671	0.88119533	0.851921624	0.845214554	0.03246461
103_2A	-0.01760995	-0.0056915	-0.00563398	-0.009645133	0.00563203
103_3	0.80124932	0.88666701	0.850045223	0.845987185	0.03498949
103_3A	-0.00224911	0.01034263	0.013483859	0.007192462	0.00679825
103_4	0.85098879	0.89238598	0.886910506	0.876761757	0.01836082
103_4A	-0.00819144	0.00038031	0.008413307	0.000200728	0.00678005
103_5	0.87897243	0.9303452	0.910349081	0.90655557	0.02114369
103_5A	-0.00779111	0.00464378	0.003293339	4.86696E-05	0.00557091
103_6	0.87774865	0.91608533	0.904750606	0.899528195	0.01608064
103_6A	-0.0074978	0.0165647	0.012535105	0.007200667	0.01052277
103_7	0.84534424	0.89046015	0.89168443	0.875829609	0.0215622
103_7A	0.01941802	-0.0147247	0.007515732	0.004069693	0.01415009
103_8	0.8252638	0.88978353	0.856469488	0.857172274	0.02634475
103_8A	0.00623218	0.0100408	-0.00979446	0.002159506	0.00859454
104_1	0.82395506	0.88152908	0.877399111	0.860961084	0.02622147
104_1A	-0.00171453	-0.0179362	-0.00352088	-0.00772386	0.00725876
104_2	0.82645308	0.87753812	0.888258355	0.864083184	0.02696602

104_2A	0.00170165	-0.008338	0.001866949	-0.001589803	0.00477218
104_3	0.82789723	0.87160894	0.887890335	0.862465503	0.02533107
104_3A	-0.00327476	0.00290282	-0.00307925	-0.001150399	0.00286717
104_4	0.78749117	0.86381418	0.85208286	0.834462734	0.03355743
104_4A	-0.00415001	-0.004057	0.006725172	-0.000493944	0.00510483
104_5	0.79195928	0.88074773	0.858507971	0.843738326	0.03772226
104_5A	0.00290715	-0.0131735	0.007087175	-0.001059727	0.00873407
104_6	0.8834298	0.89943889	0.915965106	0.899611267	0.01328304
104_6A	-0.00173656	-0.0037758	0.002794446	-0.00090598	0.00274585
104_7	0.86590177	0.89417618	0.902754042	0.887610662	0.01574488
104_7A	-0.0037537	0.00687167	-0.00941989	-0.002100639	0.00675294
104_8	0.81155485	0.8717581	0.876595993	0.85330298	0.02958638
104_8A	0.01530301	0.02558482	-0.00636256	0.011508423	0.0133156
105_1	0.91837389	0.94150224	0.932685769	0.930853964	0.00953054
105_1A	-0.01114866	0.00369877	-0.01008627	-0.005845388	0.00676266
105_2	0.86222496	0.90270121	0.887239254	0.88405514	0.01667704
105_2A	-0.00970639	0.00922698	0.003997644	0.001172743	0.00798345
105_3	0.84866323	0.89234152	0.873409161	0.871471304	0.01788416
105_3A	-0.01583463	-0.0174479	-0.00371832	-0.012333614	0.00612743
105_4	0.8296477	0.87868508	0.87718059	0.861837792	0.02277011
105_4A	0.01042901	0.00888598	0.002142446	0.00715248	0.0035982
105_5	0.8561714	0.90023792	0.9103824	0.888930573	0.02353154
105_5A	-0.00223657	0.00631027	-0.00118707	0.000962209	0.00380584
105_6	0.8692264	0.9186667	0.908986745	0.898959947	0.02139296
105_6A	0.00059542	-0.0192676	-0.00799626	-0.008889473	0.0081336
105_7	0.87848691	0.90374162	0.903977682	0.895402071	0.01196122
105_7A	-0.00087438	-0.0009903	0.007236405	0.001790581	0.00385107
105_8	0.8640177	0.88677014	0.899300637	0.883362827	0.01460431
105_8A	-0.01409004	-0.0021679	-0.00561323	-0.007290381	0.0050096
106_1	0.87862939	0.91092382	0.908747207	0.899433475	0.01473752
106_1A	-0.00186936	-0.0071009	-0.00495981	-0.004643372	0.00214748
106_2	0.84691218	0.88975219	0.888236034	0.874966804	0.01984727
106_2A	0.01493387	-0.0066257	-0.00507315	0.001078331	0.00981783
106_3	0.84272104	0.88200231	0.875785413	0.866836253	0.01723988
106_3A	-0.01514906	-0.0009961	0.01057802	-0.001855713	0.01052061
106_4	0.89235237	0.92056575	0.913459483	0.908792534	0.01198148
106_4A	-0.00652382	-0.0242556	-0.01226138	-0.014346927	0.00738765
106_5	0.6907402	0.75059484	0.782123699	0.741152911	0.03789985
106_5A	0.03228419	-0.0165699	-0.01133433	0.001459975	0.02190057
106_6	0.87945611	0.90277842	0.921086076	0.90110687	0.01703641
106_6A	-0.00964566	0.00499486	-0.01427897	-0.006309922	0.00821444
106_7	0.80527873	0.85619488	0.867996075	0.843156559	0.02721354
106_7A	0.00636536	-0.0115317	0.005649414	0.000161019	0.00827318

106_8	0.81903759	0.86197325	0.870186683	0.850399175	0.02242806
106_8A	-0.00279308	-0.006062	-0.0167643	-0.008539785	0.00596676
107_1	0.81228406	0.85744851	0.882473462	0.850735343	0.02904523
107_1A	-0.00561306	0.00511625	0.016364054	0.00528908	0.00897295
107_2	0.81113778	0.85691606	0.864165632	0.844073157	0.02347614
107_2A	-0.01057606	-0.0155343	-0.01581232	-0.013974224	0.00240554
107_3	0.78270478	0.83909955	0.849801183	0.823868501	0.02943321
107_3A	0.00069943	-0.0212924	-0.01228217	-0.010958366	0.00902678
107_4	0.85726777	0.88826023	0.90944942	0.884992472	0.02142802
107_4A	0.01818804	-0.0162553	0.012010268	0.004647666	0.01499426
107_5	0.79802882	0.85207543	0.86982419	0.839976145	0.03053346
107_5A	-0.02332754	0.00753564	0.011393201	-0.001466235	0.01553829
107_6	0.8267815	0.86813063	0.875233984	0.856715371	0.02136417
107_6A	0.00237106	-0.0060816	0.004961981	0.000417154	0.00471546
107_7	0.82431532	0.87375777	0.873091091	0.857054728	0.02315186
107_7A	0.0061062	0.01063812	-0.01399629	0.000916011	0.01070567
107_8	0.77695122	0.84004406	0.838797121	0.818597469	0.02945274
107_8A	-0.00292812	0.00066737	0.009538429	0.002425896	0.00523915
108_1	0.91445452	0.93930838	0.925485287	0.926416064	0.01016787
108_1A	-0.01322643	0.02297727	-0.01749905	-0.002582736	0.01815763
108_2	0.93437183	0.95217389	0.943888728	0.94347815	0.00727346
108_2A	0.01191868	-0.0055703	0.010385534	0.00557796	0.00790785
108_3	0.90968728	0.93276658	0.928168238	0.923540701	0.0099741
108_3A	0.01953511	-0.0088313	-0.01040217	0.000100551	0.01375726
108_4	0.88692399	0.92629853	0.916057207	0.909759909	0.01667994
108_4A	0.01421625	-0.0075685	-0.00828157	-0.000544599	0.01044155
108_5	0.93190017	0.95077862	0.958201285	0.946960025	0.01107169
108_5A	0.0047772	-0.0203744	-0.01247655	-0.009357902	0.01050221
108_6	0.93274292	0.94796327	0.952271581	0.944325925	0.00837715
108_6A	0.00715806	-0.0155669	0.006407059	-0.000667247	0.01054008
108_7	0.88680928	0.92708526	0.922780613	0.912225049	0.01805738
108_7A	2.9287E-05	0.0118849	-0.00532493	0.002196419	0.00719105
108_8	0.87067823	0.9112204	0.909338119	0.897078917	0.01868391
108_8A	-0.01129925	0.01923568	0.003122967	0.003686467	0.0124722
109_1	0.81179964	0.87870761	0.869222644	0.853243298	0.02955981
109_1A	-0.01032248	0.00225668	-0.01224054	-0.006768782	0.00642982
109_2	0.79379307	0.86217522	0.848937163	0.834968483	0.02961275
109_2A	0.00437441	-0.0128709	-0.00271715	-0.003737886	0.00707728
109_3	0.80535512	0.85985732	0.875916146	0.847042862	0.03019793
109_3A	-0.00533724	-0.0096208	-0.01268207	-0.00921336	0.00301232
109_4	0.8262832	0.89337741	0.869371668	0.863010761	0.02775793
109_4A	-0.00968383	0.02305684	-0.01011655	0.001085487	0.0155371
109_5	0.90812731	0.93025337	0.943517398	0.927299359	0.01459816

109_5A	-0.00203104	-0.0023273	-0.00458906	-0.002982455	0.00114246
109_6	0.89184852	0.92895337	0.930341717	0.917047868	0.01782764
109_6A	0.00887811	0.02140669	0.02527974	0.018521514	0.00699984
109_7	0.82854979	0.88624259	0.883005518	0.865932632	0.02646668
109_7A	0.01896967	-0.0004693	-0.0173904	0.00036999	0.0148558
109_8	0.81215199	0.86930062	0.881210509	0.85422104	0.03014205
109_8A	-0.01940938	0.00730066	0.015926036	0.00127244	0.01504222
110_1	0.79764577	0.86700727	0.884919015	0.849857355	0.03763637
110_1A	0.00452792	0.00059542	-0.00483412	9.64032E-05	0.00383829
110_2	0.81445982	0.88022211	0.890661853	0.86178126	0.03373165
110_2A	-0.0075526	-0.0157963	-0.01006662	-0.011138513	0.00344978
110_3	0.84267094	0.88761472	0.903642181	0.877975947	0.02580766
110_3A	0.00086993	0.01096347	0.005797781	0.005877058	0.00412105
110_4	0.87555588	0.93314323	0.919671152	0.909456756	0.02459439
110_4A	-0.00881488	0.00809652	0.010312363	0.003198	0.00854242
110_5	0.92135993	0.94159602	0.951650624	0.938202191	0.01259683
110_5A	0.00291524	0.00273362	0.011046972	0.005565277	0.00387685
110_6	0.90552252	0.93312761	0.9408439	0.926498009	0.01516275
110_6A	-0.00521482	0.01609142	-0.00341521	0.002487131	0.0096477
110_7	0.77481183	0.84831171	0.865323963	0.829482503	0.03927693
110_7A	0.02469288	-0.0129363	-0.00016531	0.003863769	0.01562398
110_8	0.79813406	0.86297284	0.877605649	0.846237518	0.03453488
110_8A	0.00582516	-0.0153517	-0.00873568	-0.006087414	0.00884591
Correlation coefficient (DB4_B)	Diagonal	Vertical	Horizontal	MEAN	STANDARD DEVIATION
101_1	0.82373612	0.90226231	0.880151809	0.868716745	0.03306217
101_1A	0.00556648	-0.0046406	-0.00214234	-0.000405494	0.00434424
101_2	0.82715701	0.86840948	0.871298332	0.855621608	0.02016204
101_2A	-0.00535197	0.00065865	0.006990068	0.000765584	0.00503918
101_3	0.81267522	0.85776825	0.875665723	0.848703066	0.02650263
101_3A	-0.00709756	0.00075971	-0.00580933	-0.004049061	0.00344074
101_4	0.7512918	0.88345367	0.836113408	0.823619626	0.05467334
101_4A	0.00097632	-0.0004481	-0.01257713	-0.004016314	0.00608128
101_5	0.77340141	0.88021834	0.856484679	0.836701475	0.04579662
101_5A	-0.00652971	-0.0070598	-0.00481461	-0.006134719	0.00095822
101_6	0.72940347	0.8558731	0.839536792	0.808271118	0.05616522
101_6A	-0.00077043	0.01268212	-0.0032867	0.002874996	0.00701035
101_7	0.78534332	0.89870047	0.861406299	0.848483362	0.04717141
101_7A	-0.00335159	-0.0013439	-0.00277213	-0.002489221	0.00084368
101_8	0.76457721	0.89707092	0.873037808	0.844895311	0.05763474
101_8A	0.00120724	-0.0112811	-0.00761399	-0.005895934	0.00524106
102_1	0.75805916	0.87057568	0.905016515	0.844550452	0.06275402
102_1A	-0.00688125	0.00291802	-0.01672881	-0.006897345	0.00802079

102_2	0.87736369	0.91890809	0.93130231	0.909191363	0.02306736
102_2A	0.00664933	-0.0087783	-0.01018916	-0.004106058	0.00762698
102_3	0.81682048	0.89228882	0.89924752	0.869452276	0.03732457
102_3A	-0.01494946	-0.0025144	-0.00791175	-0.008458522	0.00509131
102_4	0.83521853	0.89032029	0.910453054	0.878663958	0.03180106
102_4A	0.00291601	-0.0001655	-0.00755725	-0.001602232	0.00439474
102_5	0.84289595	0.909152	0.909190988	0.887079644	0.0312426
102_5A	-0.00078357	-0.0131254	0.002029099	-0.003959971	0.00658191
102_6	0.79717933	0.88977483	0.918199625	0.868384596	0.05166969
102_6A	0.01582047	-0.0032642	0.008848453	0.007134899	0.00788495
102_7	0.91192831	0.94754996	0.949712384	0.936396885	0.0173244
102_7A	0.00811167	-0.002885	-0.00164233	0.001194786	0.00491721
102_8	0.71399069	0.86137678	0.889304997	0.821557488	0.07691103
102_8A	-0.00832742	-0.0006521	-0.01256917	-0.007182896	0.00493197
103_1	0.80187545	0.89704186	0.822746292	0.840554534	0.04084125
103_1A	-0.00738391	0.00312713	-0.01499102	-0.006415934	0.00742831
103_2	0.80954084	0.90197265	0.837168994	0.849560827	0.03873911
103_2A	-0.00785948	-0.0166041	0.00578599	-0.006225877	0.00921343
103_3	0.72617003	0.91019616	0.812267428	0.816211206	0.07518009
103_3A	-0.00782922	-0.0078264	0.007317167	-0.0027795	0.00713942
103_4	0.83157081	0.92394821	0.866706944	0.87407532	0.03807113
103_4A	-0.0133927	0.00796505	0.006860077	0.000477478	0.00981806
103_5	0.86642914	0.88530784	0.864341883	0.872026288	0.00943005
103_5A	0.00280926	-0.001815	-0.00383467	-0.000946792	0.00278098
103_6	0.84075481	0.92113295	0.845777312	0.869221689	0.03676403
103_6A	0.01249816	0.00571122	0.002789374	0.006999584	0.00406694
103_7	0.79494872	0.89855908	0.820627984	0.838045261	0.04405525
103_7A	-0.00081729	0.0018907	-0.00631867	-0.001748418	0.00341552
103_8	0.75112918	0.90740076	0.842523522	0.833684487	0.06410303
103_8A	-0.00591862	-0.005559	-0.00615158	-0.005876397	0.00024376
104_1	0.84295749	0.90323306	0.925081566	0.890424041	0.03472889
104_1A	-0.00118549	-0.0017091	-0.00348462	-0.002126401	0.00098391
104_2	0.88279275	0.92689033	0.938902155	0.91619508	0.02412271
104_2A	0.0161776	-0.0038833	0.013839596	0.008711285	0.00895675
104_3	0.85862887	0.91574507	0.912817621	0.895730519	0.02626204
104_3A	-0.00342935	-0.0070988	-0.00137069	-0.003966265	0.00236909
104_4	0.82665929	0.89297981	0.928701843	0.882780317	0.04227839
104_4A	0.00923295	-0.0044458	-0.00338868	0.000466172	0.00621405
104_5	0.82752765	0.90277341	0.92158367	0.883961579	0.04063699
104_5A	-0.017148	0.00221957	-0.00341173	-0.006113389	0.00813429
104_6	0.79204377	0.8929991	0.901910023	0.862317632	0.04982411
104_6A	0.00475029	0.00688884	0.005210096	0.005616409	0.00091912
104_7	0.83139574	0.89873813	0.907215243	0.87911637	0.03392059

104_7A	0.01647141	0.00602053	-0.00432265	0.00605643	0.00848918
104_8	0.82056336	0.89428607	0.912349796	0.875733077	0.03970179
104_8A	-0.00393606	-0.0058273	-0.00121668	-0.00366001	0.00189237
105_1	0.74764707	0.849952	0.867252433	0.821617166	0.05277946
105_1A	-0.00239723	-0.0016643	-0.01982794	-0.007963151	0.008395
105_2	0.69747286	0.82118198	0.870459191	0.796371346	0.07276786
105_2A	-0.00076695	0.00891082	-0.00318168	0.001654065	0.00522514
105_3	0.68928056	0.81609072	0.89407586	0.799815716	0.08439564
105_3A	-0.00127188	-0.0063236	0.003512173	-0.001361096	0.00401592
105_4	0.6979552	0.81436125	0.890711102	0.801009185	0.07925662
105_4A	-0.00954535	0.00700939	-0.00735057	-0.003295512	0.00734155
105_5	0.61076984	0.80779936	0.860315667	0.759628288	0.10742011
105_5A	0.00805084	0.00963482	0.003395683	0.007027114	0.00264798
105_6	0.72552968	0.82446229	0.854254883	0.801415616	0.05502064
105_6A	-0.00392139	0.00616999	0.012156586	0.004801728	0.00663473
105_7	0.7449637	0.8485549	0.893651783	0.829056794	0.06224773
105_7A	-0.00458604	-0.0017757	0.004169044	-0.000730904	0.0036498
105_8	0.72156455	0.84508123	0.880934072	0.815859948	0.06826455
105_8A	-0.00417648	-0.0077011	-0.01282639	-0.00823466	0.00355141
106_1	0.85428037	0.92918384	0.903941615	0.895801943	0.03111616
106_1A	0.00078584	-0.0008334	-0.0004497	-0.000165764	0.00069088
106_2	0.80314761	0.89836527	0.844289915	0.848600933	0.03899179
106_2A	0.01281682	-0.0074294	0.016349726	0.007245717	0.01047662
106_3	0.79561467	0.86458516	0.857637796	0.839279207	0.03100549
106_3A	0.01114219	-0.001028	-0.00034769	0.003255507	0.00558364
106_4	0.79995175	0.90038889	0.853476156	0.851272264	0.0410329
106_4A	-0.00433946	0.00174206	-0.00200751	-0.001534968	0.00250515
106_5	0.71542274	0.88119532	0.849421737	0.815346599	0.07183766
106_5A	0.00728881	-0.0057724	-0.00610318	-0.001528933	0.00623655
106_6	0.85251397	0.90897689	0.876762996	0.879417954	0.02312721
106_6A	0.01420596	-0.0079282	-0.00600688	9.02985E-05	0.01001205
106_7	0.7840066	0.90225813	0.849593184	0.845285972	0.04837196
106_7A	0.00014339	0.02352709	0.008810059	0.010826846	0.00965229
106_8	0.72051524	0.85462855	0.855291418	0.810145068	0.06337844
106_8A	-0.00163601	-0.0121238	0.005658399	-0.002700467	0.00729846
107_1	0.80764898	0.89297192	0.913565766	0.871395556	0.04585299
107_1A	-0.00732476	0.01069814	0.000461274	0.001278217	0.00738046
107_2	0.85916104	0.92923331	0.925808051	0.904734135	0.03225537
107_2A	0.01787028	0.00991939	-0.00893887	0.0062836	0.01124268
107_3	0.80222447	0.90192998	0.90754634	0.870566927	0.04837978
107_3A	0.01161642	-0.0052482	-0.00190244	0.001488598	0.00729055
107_4	0.78629534	0.88357612	0.885087906	0.851653124	0.04621905
107_4A	-0.01589884	-0.0069607	0.009445145	-0.004471464	0.01049529

107_5	0.76432705	0.869694	0.886124404	0.840048486	0.05396166
107_5A	0.007911	0.00131206	-0.00693244	0.000763543	0.00607221
107_6	0.83116845	0.91902648	0.915425749	0.888540226	0.04059459
107_6A	-0.00141517	0.00762613	-0.0072334	-0.000340812	0.00611376
107_7	0.83971645	0.90960452	0.911217258	0.886846079	0.03333218
107_7A	0.00656395	0.0043053	0.005137201	0.005335483	0.00093269
107_8	0.80871977	0.89181733	0.921729713	0.874088936	0.04780888
107_8A	0.01033534	0.00909416	0.001698297	0.007042598	0.00381281
108_1	0.8008569	0.89207597	0.860996518	0.851309796	0.03786471
108_1A	-0.00591983	0.00487118	-0.00873704	-0.003261898	0.00586483
108_2	0.85891455	0.92531928	0.899327703	0.894520514	0.02732189
108_2A	0.00668553	0.00573552	-0.00198039	0.00348022	0.00388067
108_3	0.85203867	0.91439565	0.90618338	0.890872569	0.02766362
108_3A	-0.00958961	-0.0005078	0.000399496	-0.00323263	0.0045103
108_4	0.79085386	0.90086645	0.877527115	0.856415805	0.04732834
108_4A	-0.0035488	-0.001207	-0.00453355	-0.003096462	0.0013952
108_5	0.85653411	0.92201036	0.909220947	0.895921807	0.02833649
108_5A	-0.00330498	-0.0009743	-0.00346767	-0.002582312	0.00113899
108_6	0.8773895	0.92718645	0.917045544	0.907207162	0.02148689
108_6A	0.00250847	-0.0031558	-0.00214128	-0.000929533	0.00246607
108_7	0.87925751	0.90093919	0.892141904	0.890779536	0.00890378
108_7A	0.00059029	0.0033185	-0.00024454	0.001221418	0.00152153
108_8	0.82175115	0.91058679	0.88247389	0.87160394	0.03707254
108_8A	0.00453809	-0.0011757	0.008165803	0.003842744	0.0038452
109_1	0.73826032	0.8675603	0.895249927	0.83369018	0.06841941
109_1A	0.00730787	0.01225345	0.00307283	0.007544718	0.00375171
109_2	0.81865105	0.88114311	0.883864098	0.86121942	0.03012087
109_2A	0.00285964	-0.0159048	-0.00213371	-0.005059623	0.00793502
109_3	0.79042054	0.91076489	0.895667142	0.865617524	0.05352835
109_3A	-0.01120554	0.00936839	-0.00354513	-0.001794092	0.00849004
109_4	0.86391814	0.92940962	0.921068063	0.904798608	0.02910676
109_4A	5.4592E-05	0.00012699	-0.00398047	-0.001266295	0.00191944
109_5	0.80014787	0.91467186	0.892748694	0.869189475	0.04963341
109_5A	-0.00836102	-0.0041164	-0.00248544	-0.004987627	0.00247654
109_6	0.80266193	0.899984	0.913825899	0.872157275	0.04946448
109_6A	0.00297264	-0.0009045	-0.00021607	0.00061736	0.00168898
109_7	0.84149278	0.92165576	0.927854403	0.897000981	0.03933172
109_7A	0.00366335	-0.0001487	-0.00154192	0.000657586	0.00220019
109_8	0.78406086	0.90921406	0.897710638	0.863661851	0.05648198
109_8A	-0.01039997	0.00952868	-0.00428045	-0.001717246	0.00833528
110_1	0.91003082	0.94325479	0.946681637	0.933322416	0.01652896
110_1A	-0.00516689	-0.0120419	0.006104064	-0.003701588	0.00748018
110_2	0.88876522	0.93261306	0.941965207	0.921114497	0.02319084

110_2A	-0.01351387	0.00573373	-0.0025946	-0.003458245	0.0078815
110_3	0.89691782	0.9323192	0.940166921	0.923134648	0.01881291
110_3A	0.00079929	0.00650225	0.006350249	0.004550597	0.0026533
110_4	0.93110131	0.95599169	0.956578687	0.947890564	0.01187421
110_4A	0.01116127	0.00528369	0.00324586	0.006563607	0.0033558
110_5	0.8799279	0.93221744	0.931929684	0.914691675	0.02458198
110_5A	0.01279282	0.00014112	0.011625216	0.008186384	0.0057088
110_6	0.88556432	0.93677876	0.930500098	0.917614396	0.02280732
110_6A	0.00671789	-0.0117762	-0.00214392	-0.002400757	0.00755238
110_7	0.86489165	0.90951913	0.905640791	0.893350525	0.02018565
110_7A	0.01037781	0.00231133	0.008294093	0.006994409	0.00341896
110_8	0.79496435	0.89940095	0.882671125	0.859012142	0.04580074
110_8A	0.00220539	-0.0135649	-0.00787743	-0.006412311	0.00652101

Appendix D

NPCR and UACI Matlab Code

NPCR means the change rate of the number of pixels of the encrypted image when only one pixel of the plain-image is modified. The unified average changing intensity (UACI) index measures the average intensity of differences between two images. NPCR concentrates on the absolute number of pixels which changes value in differential attacks, while the UACI focuses on the averaged difference between two paired encrypted images.

Matlab code for calculate NPCR and UACI

```
function results = NPCR_and_UACI( img_a, img_b, need_display,
largest_allowed_val )
    %%1. input_check
    [ height_a, width_a, depth_a ] = size( img_a );
    [ height_b, width_b, depth_b ] = size( img_b );
    if ( ( height_a ~= height_b ) ...
      || (  width_a ~=  width_b ) ...
      || (  depth_a ~=  depth_b ) )
        error( 'input images have to be of same dimensions' );
    end
    class_a = class( img_a );
    class_b = class( img_b );
    if ( ~strcmp( class_a, class_b) )
        error( 'input images have to be of same data type');
    end

    %%2. measure preparations
    if ( ~exist( 'largest_allowed_val', 'var') )
        switch  class_a
            case 'uint16'
                largest_allowed_val = 65535;
            case 'uint8'
                largest_allowed_val = 255;
            case 'logical'
                largest_allowed_val = 2;
            otherwise
                largest_allowed_val = max ( max( img_a(:), img_b(:) )
);
        end
    end
    if ( ~exist( 'need_display', 'var' ) )
        need_display = 1;
    end
```

```
    img_a = double( img_a );
    img_b = double( img_b );
    num_of_pix = numel( img_a );

    %%3. NCPR score and p_value
    results.npcr_score = sum( double( img_a(:) ~= img_b(:) ) ) /
num_of_pix;
    npcr_mu  = ( largest_allowed_val ) / ( largest_allowed_val+ 1 );
    npcr_var =  ( ( largest_allowed_val) / ( largest_allowed_val+ 1
)^2 ) / num_of_pix;
    results.npcr_pVal = normcdf( results.npcr_score, npcr_mu, sqrt(
npcr_var ) );
    results.npcr_dist = [ npcr_mu, npcr_var ];

    %%4. UACI score and p_value
    results.uaci_score = sum( abs( img_a(:) - img_b(:) ) ) /
num_of_pix / largest_allowed_val;
    uaci_mu  = ( largest_allowed_val+2 ) / ( largest_allowed_val*3+3
);
    uaci_var = ( ( largest_allowed_val+2 ) * ( largest_allowed_val^2
+ 2*largest_allowed_val+ 3 ) /18 / ( largest_allowed_val+ 1 )^2 /
largest_allowed_val) / num_of_pix;
    p_vals = normcdf( results.uaci_score, uaci_mu, sqrt( uaci_var )
);
    p_vals( p_vals > 0.5 ) = 1 - p_vals( p_vals > 0.5 );
    results.uaci_pVal = 2 * p_vals;
    results.uaci_dist = [ uaci_mu, uaci_var ];

    %%5. optional output
    if ( need_display )
       format long;
       display( results );
    end
    end
```


MATLAB code for Fingerprint Image Encryption

```
clear all;
format long;
tic
%Secret Password:
KEY = '1234567890ABCDEF1234567890ABCDEF';
SIZEKEY = size(KEY,2);
P = imread ('102_8.tif');
[ROW COL MAT]=size(P)
%Separate into 4 sections:
SA1 = KEY(1:8);
SA2 = KEY(9:16);
SX1 = KEY(17:24);
SX2 = KEY(25:32);

%Convert hexadecimal to decimal
decSA1 = hex2dec(SA1);
decSA2 = hex2dec(SA2);
decSX1 = hex2dec(SX1);
```

```
decSX2 = hex2dec(SX2);

%Determine the value to be added in the C.I. and P.C .
A = decSA1 / (4294967296 + 1);
B = decSA2 / (4294967296 + 1);
C = decSX1 / (4294967296 + 1);
D = decSX2 / (4294967296 + 1);

%%Iteration with henon map:
PCL2 = mod(A + B,1)*0.001;
x2 = mod(C + D,1);

a2 = 1.4 + PCL2 *0.3; %Control parameter henon map
LOG2(1) = x2; %initial condition henon map

R=1000; %Iterasi dengan henon map
for n=1:R
    LOG2(n+1)=(1-LOG2(n)^2) + LOG2(n);
end

LOG2=mod(LOG2*1000,1); %Optimization of chaotic sequences.

%%Sum of plain image pixels with 96 chaotic henon map:
assume32k=im2double(P); %Transform 0-255 to 0-1

if(MAT == 1)
sumvec32k=0;
for k=1:ROW
sumvec32k =sumvec32k + assume32k(k,:,1);
end
else
sumvec32k=0;
for k=1:ROW
sumvec32k   =sumvec32k   +   assume32k(k,:,1)   +   assume32k(k,:,2)
+assume32k(k,:,3);
end
end
S=0;
for j=1:size(sumvec32k,2)
S=S+sumvec32k(j);
end

F=0;
for n=1:95
F = F + LOG2(1001-n);
end

v1 = mod((S*1000) + F,1); %Value between 0-1.
v2 = 1 + round(v1*253); %Value between 1-254.
Z = v2 / 255; %Value Z.


%%iteration with logistic map :
PCL1 = mod(A + B + Z,1)*0.001;
x1 = mod(C + D + Z,1);
a1 = 3.999 + PCL1; %control parameter logistic map
LOG1(1) = x1; %initial condition logistic map
```

```
T=3000;
for n=1:T
LOG1(n+1)=a1*LOG1(n)*(1-LOG1(n));

end
if(MAT == 1)
 I = round((LOG2(R-10)*(ROW-1))+1);
J = round((LOG2(R-100)*(COL-1))+1);
K = 1;
else %Image color.
I = round((LOG2(R-10)*(ROW-1))+1);
J = round((LOG2(R-100)*(COL-1))+1);
K = round((LOG2(R-200)*(MAT-1))+1);
end
 %% Sub-sequence for row confusion:
  % Selection of the latest chaotic data.
 RE(1:ROW)=round((LOG1((T+1)-ROW:T).*(ROW-1))+1);

 %Clean variables
valuer32k = 0;
 vectr32k = 0;
 numnoest32k = 0;

 %Find repeating positions and put them in a vector
 bus32k(1)=RE(1);
 s=1;
 for b=2:ROW

 en=1;
 bus32k(b)=RE(b);
 for j=1:b-1
 if(bus32k(b) == bus32k(j) && en == 1)
valuer32k(s)=bus32k(j);
 vectr32k(s)=b;
 s=s+1;
 en=0;
 end
 end
 end

 %Find numbers not in RE
 tamv32k=size(valuer32k,2);
 pregnum=1;
 saltar=0;
 no=1;
 for v=1:ROW
 for vv=1:tamv32k
 if(saltar == 0 && pregnum ==valuer32k(vv))
 saltar=1;
  end
 end

 for vvv=1:ROW
 if(pregnum == RE(vvv))
 saltar=1;
 end
 end
```

```
 if(saltar == 0)
 numnoest32k(no)=pregnum;
 no=no+1;
 end
 saltar=0;
 pregnum=pregnum+1;
 end

 tamvect32k=size(vectr32k,2);

 endos=round(tamvect32k/2);
 cambio=1;
 S=1;
 for s=1:tamvect32k
 if(cambio == 1)
 RE(vectr32k(s))=numnoest32k(S);
 cambio=0;
 else
 RE(vectr32k(s))=numnoest32k(S+endos);
 S=S+1;
 cambio=1;
 end
 end

CO = round((LOG1((T+1)-COL-ROW:T-ROW).*(COL-1))+1);

valuere32k = 0;
 vectre32k = 0;
 numnoesta32k = 0;

 busq32k(1)=CO(1);
 s=1;
for b=2:COL
 en=1;
 busq32k(b)=CO(b);
 for j=1:b-1
 if(busq32k(b) == busq32k(j) && en == 1)

valuere32k(s)=busq32k(j);
 vectre32k(s)=b;
 s=s+1;
 en=0;
 end
 end
 end

 tamve32k=size(valorre32k,2);
 pregnume=1;
 salta=0;
 no=1;
 for v=1:COL
 for vv=1:tamve32k
 if(salta == 0 && pregnume ==valuere32k(vv))
 salta=1;

 end
 end
```

```
for vvv=1:COL
if(pregnume == CO(vvv))
salta=1;
end
end

if(salta == 0)
numnoesta32k(no)=pregnume;
no=no+1;
end
salta=0;
pregnume=pregnume+1;
end

tamvecto32k=size(vectre32k,2);

endos=round(tamvecto32k/2);
cambio=1;
S=1;
for s=1:tamvecto32k
if(cambio == 1)
CO(vectre32k(s))=numnoesta32k(S);
cambio=0;
else
CO(vectre32k(s))=numnoesta32k(S+endos);
S=S+1;
cambio=1;
end
end
M = mod((LOG1((T+1)-3000:T).*(1000)) + Z,1);

inc=1;
for k=1:ROW
for kk=1:COL
MATRIX(k,kk)=M(inc);
inc=inc+1;
if (inc == 3001)
inc=1;
end
end
end

 PDOUBLE=im2double(P);

if(MAT == 1)
EDOUBLE(:,:,1)=PDOUBLE(RE(:),CO(:),1) + MATRIX(:,:);

else
EDOUBLE(:,:,1)=PDOUBLE(RE(:),CO(:),1) + MATRIX(:,:);
EDOUBLE(:,:,2)=PDOUBLE(RE(:),CO(:),2) + MATRIX(:,:);
EDOUBLE(:,:,3)=PDOUBLE(RE(:),CO(:),3) + MATRIX(:,:);
end


EDOUBLE(I,J,K)= Z;
EDOUBLE = mod(EDOUBLE,1);
E = im2uint8(EDOUBLE);
```

```
 toc

  imwrite(E, '101_8A.png');
  figure;subplot(1,2,1);imshow(P)
 title('Finger plain image')
 subplot(1,2,2);imshow(E)
 title('Encrypted finger image')

 %Histogram
 figure;
 if(MAT == 1)
 matrixgr=E(:,:,1);
 subplot(2,1,1);imshow(matrixgr)
 title('Gray Scale Image')
 subplot(2,1,2);imhist(matrixgr)
 title('Histogram Image')
 else
 matrixred=E(:,:,1);
 matrixgreen=E(:,:,2);
 matrixblue=E(:,:,3);

 subplot(3,2,1);imshow(matrixred)
 title('RED Image')
 subplot(3,2,3);imshow(matrixgreen)
 title('GREEN Image')
 subplot(3,2,5);imshow(matrixblue)
 title('Blue Image')
 %Histogram Graphicsics
 subplot(3,2,2);imhist(matrixred)
 title('RED Image Histogram')
 subplot(3,2,4);imhist(matrixgreen)
 title('GREEN Image Histogram')
 subplot(3,2,6);imhist(matrixblue)
title('BLUE Image Histogram')
end
```

Appendix E

Information Entropy Values FVC2002 data set

The results of the entropy values for all data in FVC2002 data set. Together with the values for Bhatngar and Hsiao.

Table E-1 Information entropy values for all data in FVC2002 data set

Encrypted Datasheet	DB1_B	DB2_B	DB3_B	DB4_B	Mean	Standard deviation
101_1A	7.969904	7.996843	7.994277	7.996503	7.98938	0.011288461
101_2A	7.965357	7.996949	7.993859	7.996378	7.98814	0.013202613
101_3A	7.969849	7.997078	7.994821	7.996199	7.98949	0.011366306
101_4A	7.958262	7.997221	7.993428	7.995987	7.98622	0.016201988
101_5A	7.949346	7.997342	7.994251	7.996098	7.98426	0.020187177
101_6A	7.973442	7.997014	7.994553	7.995645	7.99016	0.00969344
101_7A	7.980089	7.996503	7.995173	7.996816	7.99215	0.006987945
101_8A	7.962346	7.997361	7.995519	7.995628	7.98771	0.014664235
102_1A	7.969365	7.997324	7.995125	7.996514	7.98958	0.011698788
102_2A	7.974712	7.996588	7.995875	7.996055	7.99081	0.009296368
102_3A	7.968359	7.996787	7.995016	7.996767	7.98923	0.012072554
102_4A	7.968284	7.996648	7.995012	7.996853	7.98920	0.012096568
102_5A	7.959828	7.997329	7.995667	7.996069	7.98722	0.015828547
102_6A	7.975942	7.996816	7.995476	7.996498	7.99118	0.008813246
102_7A	7.95812	7.99749	7.994765	7.996368	7.98669	0.016520826
102_8A	7.950274	7.996505	7.99556	7.996746	7.98477	0.019921886
103_1A	7.982031	7.99706	7.995916	7.995511	7.99263	0.006145311
103_2A	7.97203	7.996772	7.995158	7.99578	7.98994	0.010353521
103_3A	7.975543	7.996738	7.995594	7.996506	7.99110	0.008989305
103_4A	7.966567	7.99679	7.994727	7.996122	7.98855	0.012714515
103_5A	7.984615	7.996747	7.994443	7.995384	7.99280	0.004794468
103_6A	7.985657	7.99688	7.995467	7.995866	7.99347	0.00453877
103_7A	7.976455	7.997034	7.994266	7.9965	7.99106	0.008498046
103_8A	7.96164	7.997234	7.995939	7.995765	7.98764	0.015024459
104_1A	7.980049	7.996951	7.99479	7.995823	7.99190	0.006886631
104_2A	7.981093	7.996966	7.994435	7.996427	7.99223	0.006498882
104_3A	7.977455	7.996859	7.993739	7.996635	7.99117	0.008014561
104_4A	7.977882	7.997198	7.993976	7.996147	7.99130	0.007833975
104_5A	7.966443	7.996954	7.995571	7.995742	7.98868	0.012848276
104_6A	7.983797	7.997017	7.995375	7.99674	7.99323	0.00548286
104_7A	7.986776	7.996964	7.994543	7.99577	7.99351	0.003982868

104_8A	7.97284	7.99646	7.995376	7.996066	7.99019	0.010021927
105_1A	7.975484	7.996775	7.99583	7.996083	7.99104	0.008989692
105_2A	7.970378	7.997096	7.995869	7.996581	7.98998	0.011326086
105_3A	7.969187	7.997289	7.995059	7.996419	7.98949	0.011748069
105_4A	7.962207	7.996765	7.994895	7.994905	7.98719	0.014445761
105_5A	7.976186	7.996579	7.993959	7.99602	7.99069	0.008428147
105_6A	7.966862	7.997023	7.995142	7.995459	7.98862	0.012582916
105_7A	7.981443	7.996542	7.995501	7.995694	7.99229	0.006277552
105_8A	7.962052	7.997148	7.995493	7.995595	7.98757	0.014748515
106_1A	7.980948	7.996569	7.994461	7.995004	7.99175	0.006281808
106_2A	7.982685	7.997007	7.994847	7.996264	7.99270	0.005834387
106_3A	7.987271	7.997279	7.995377	7.996064	7.99400	0.003943002
106_4A	7.977162	7.997209	7.993554	7.995529	7.99086	0.008015635
106_5A	7.985428	7.996809	7.995173	7.996712	7.99353	0.004722871
106_6A	7.979489	7.996377	7.994567	7.996043	7.99162	0.007036302
106_7A	7.979487	7.996844	7.994583	7.995986	7.99173	0.007111614
106_8A	7.969164	7.996511	7.994416	7.996212	7.98908	0.011523898
107_1A	7.976717	7.997243	7.995343	7.995469	7.99119	0.008391418
107_2A	7.972776	7.996557	7.995259	7.996592	7.99030	0.010129452
107_3A	7.977444	7.996778	7.994227	7.996382	7.99121	0.00800562
107_4A	7.96918	7.997159	7.993963	7.996493	7.98920	0.011619069
107_5A	7.970464	7.996878	7.995615	7.996629	7.98990	0.011229384
107_6A	7.985291	7.996652	7.995105	7.996028	7.99327	0.00463878
107_7A	7.98322	7.99703	7.994023	7.995507	7.99244	0.005431126
107_8A	7.968827	7.997098	7.995092	7.99636	7.98934	0.011867339
108_1A	7.979847	7.996882	7.993701	7.996362	7.99170	0.006947666
108_2A	7.973357	7.996207	7.994498	7.995572	7.98991	0.009575503
108_3A	7.97494	7.996935	7.994648	7.996145	7.99067	0.009117018
108_4A	7.980032	7.99689	7.993921	7.99627	7.99178	0.006871546
108_5A	7.972589	7.996818	7.992477	7.996592	7.98962	0.009983034
108_6A	7.982164	7.997281	7.994765	7.996261	7.99262	0.006101391
108_7A	7.980973	7.997021	7.994272	7.996434	7.99217	0.006547984
108_8A	7.97976	7.99647	7.994623	7.996142	7.99175	0.006956717
109_1A	7.954559	7.996937	7.995221	7.995595	7.98558	0.017920147
109_2A	7.965462	7.996953	7.994202	7.996316	7.98823	0.013186343
109_3A	7.966483	7.997054	7.994289	7.995822	7.98841	0.012698528
109_4A	7.957838	7.997195	7.993538	7.996139	7.98618	0.016415852
109_5A	7.959833	7.996609	7.995522	7.996472	7.98711	0.015753339
109_6A	7.957145	7.996898	7.995615	7.996016	7.98642	0.01690749
109_7A	7.966473	7.996779	7.9956	7.996461	7.98883	0.012913884
109_8A	7.958494	7.995968	7.995349	7.996129	7.98649	0.016163234
110_1A	7.972462	7.997346	7.994214	7.996667	7.99017	0.010291165
110_2A	7.975404	7.996746	7.994371	7.996234	7.99069	0.00886881
110_3A	7.972962	7.996087	7.995338	7.99557	7.98999	0.009834438

110_4A	7.964604	7.997213	7.994371	7.996088	7.98807	0.013585287
110_5A	7.967545	7.996557	7.994672	7.996608	7.98885	0.012322546
110_6A	7.962901	7.996611	7.993547	7.996481	7.98738	0.014188788
110_7A	7.982605	7.997315	7.995042	7.996031	7.99275	0.005911379
110_8A	7.973793	7.996865	7.994207	7.996419	7.99032	0.009595337

Hsiao & Lee, 2015

Img1	7.9947				7.990151347	0.003386031
Img2	7.9954					
Img3	7.9955					
Img4	7.9947					

Bhatnagar & Wu, 2014

Fig. 3(j)	7.907202				7.905972	0.002163931
Fig. 3(k)	7.903675					
Fig. 3(l)	7.904882					
Fig. 4(i)	7.91052					
Fig. 4(j)	7.905734					
Fig. 4(k)	7.904701					
Fig. 4(l)	7.904386					

Appendix F

Genuine, Imposter and Pseudo Imposter Score

Table F-1 Genuine, imposter and pseudo impostor score

Genuine		Imposter		Pseudo imposter
0.678710937500000		0.538085937500000		0.538086
0.742187500000000		0.520507812500000		0.520508
0.768554687500000		0.524414062500000		0.524414
0.724609375000000		0.541992187500000		0.541992
0.720703125000000		0.529296875000000		0.529297
0.753906250000000		0.497070312500000		0.49707
0.729492187500000		0.519531250000000		0.519531
0.685546875000000		0.500976562500000		0.500977
0.768554687500000		0.497070312500000		0.49707
0.678710937500000		0.509765625000000		0.509766
0.717773437500000		0.527343750000000		0.527344
0.714843750000000		0.521484375000000		0.521484
0.741210937500000		0.494140625000000		0.494141
0.686523437500000		0.485351562500000		0.485352
0.700195312500000		0.515625000000000		0.515625
0.722656250000000		0.539062500000000		0.539063
0.672851562500000		0.516601562500000		0.516602
0.716796875000000		0.532226562500000		0.532227
0.742187500000000		0.531250000000000		0.53125
0.717773437500000		0.520507812500000		0.520508
0.733398437500000		0.517578125000000		0.517578
0.708984375000000		0.500976562500000		0.500977
0.673828125000000		0.540039062500000		0.540039
0.703125000000000		0.528320312500000		0.52832
0.758789062500000		0.548828125000000		0.548828
0.681640625000000		0.530273437500000		0.530273
0.696289062500000		0.536132812500000		0.536133
0.768554687500000		0.519531250000000		0.519531
0.714843750000000		0.529296875000000		0.529297
0.733398437500000		0.514648437500000		0.514648
0.766601562500000		0.500000000000000		0.5
0.749023437500000		0.504882812500000		0.504883
0.776367187500000		0.514648437500000		0.514648
0.730468750000000		0.549804687500000		0.549805
0.733398437500000		0.508789062500000		0.508789
0.765625000000000		0.504882812500000		0.504883

Appendix G

Chaos-based Encryption Code

The original chaos-based encryption code:

```
clear all;
format long;
tic
 P = imread('101_1db4.jpg');
[ROW COL MAT]=size(P)
 PCL2 = 3.7;
 x2 = 0.4;
 a2 = 3.999 + PCL2;
LOG2(1) = x2;

R=100;
for n=1:R
    LOG2(n+1)=a2*LOG2(n)*(1-LOG2(n));
end

LOG2=mod(LOG2*1000,1);

 add32k=im2double(P);

if(MAT == 1)
sumvec32k=0;
for k=1:ROW
sumvec32k =sumvec32k + add32k(k,:,1);
end
else
sumvec32k=0;
for k=1:ROW
sumvec32k =sumvec32k + add32k(k,:,1) + add32k(k,:,2) +add32k(k,:,3);
end
end
S=0;
for j=1:size(sumvec32k,2)
S=S+sumvec32k(j);
end

PCL1 = 3.7;
x1 = 0.4;
a1 = 3.999 + PCL1;
LOG1(1) = x1;

T=5000;
for n=1:T
LOG1(n+1)=a1*LOG1(n)*(1-LOG1(n));
end
if(MAT == 1)
end

 RE(1:ROW)=round((LOG1((T+1)-ROW:T).*(ROW-1))+1);

 valuer32k = 0;
```

```
vectr32k = 0;
numnoest32k = 0;
bus32k(1)=RE(1);
s=1;
for b=2:ROW

en=1;
bus32k(b)=RE(b);
for j=1:b-1
if(bus32k(b) == bus32k(j) && en == 1)
valuer32k(s)=bus32k(j);
vectr32k(s)=b;
s=s+1;
en=0;
end
end
end

 tamv32k=size(valuer32k,2);
pregnum=1;
saltar=0;
no=1;
for v=1:ROW
for vv=1:tamv32k
if(saltar == 0 && pregnum == valuer32k(vv))
saltar=1;

end
end

for vvv=1:ROW
if(pregnum == RE(vvv))
saltar=1;
end
end

if(saltar == 0)
numnoest32k(no)=pregnum;
no=no+1;
end
saltar=0;
pregnum=pregnum+1;
end

tamvect32k=size(vectr32k,2);

 endos=round(tamvect32k/2);
cambio=1;
S=1;
for s=1:tamvect32k
if(cambio == 1)
RE(vectr32k(s))=numnoest32k(S);
cambio=0;
else
RE(vectr32k(s))=numnoest32k(S+endos);
S=S+1;
```

```
 cambio=1;
 end
 end

CO = round((LOG1((T+1)-COL-ROW:T-ROW).*(COL-1))+1);

 valuere32k = 0;
 vectre32k = 0;
 numnoesta32k = 0;

  busq32k(1)=CO(1);
 s=1;
for b=2:COL
 en=1;
 busq32k(b)=CO(b);
 for j=1:b-1
 if(busq32k(b) == busq32k(j) && en == 1)

 valuere32k(s)=busq32k(j);
 vectre32k(s)=b;
 s=s+1;
 en=0;
 end
 end
 end

 tamve32k=size(valuere32k,2);
 pregnume=1;
 salta=0;
 no=1;
 for v=1:COL
 for vv=1:tamve32k
 if(salta == 0 && pregnume == valuere32k(vv))
 salta=1;
  end
 end
  for vvv=1:COL
 if(pregnume == CO(vvv))
 salta=1;
 end
 end

 if(salta == 0)
 numnoesta32k(no)=pregnume;
 no=no+1;
 end
 salta=0;
 pregnume=pregnume+1;
 end

 tamvecto32k=size(vectre32k,2);

  endos=round(tamvecto32k/2);
 cambio=1;
 S=1;
 for s=1:tamvecto32k
```

```
if(cambio == 1)
CO(vectre32k(s))=numnoesta32k(S);
cambio=0;
else
CO(vectre32k(s))=numnoesta32k(S+endos);
S=S+1;
cambio=1;
end
end


 inc=1;
for k=1:ROW
for kk=1:COL

inc=inc+1;
if (inc == 5001)
inc=1;
end
end
end

 PDOUBLE=im2double(P);

figure;
if(MAT == 1)
end
```

The two logistic maps with 5000 and 2172 :

```
clear all;
format long;
tic

KEY = '1234567890ABCDEF1234567890ABCDEF';
SIZEKEY = size(KEY,2);

P = imread('101_1db4.jpg');
[ROW COL MAT]=size(P)

SA1 = KEY(1:8);
SA2 = KEY(9:16);
SX1 = KEY(17:24);
SX2 = KEY(25:32);

decSA1 = hex2dec(SA1);
decSA2 = hex2dec(SA2);
decSX1 = hex2dec(SX1);
decSX2 = hex2dec(SX2);

A = decSA1 / (4294967296 + 1);
B = decSA2 / (4294967296 + 1);
C = decSX1 / (4294967296 + 1);
D = decSX2 / (4294967296 + 1);

PCL2 = mod(A + B,1)*0.001;
x2 = mod(C + D,1);

a2 = 3.999 + PCL2;
LOG2(1) = x2;

R=2172;
for n=1:R
    LOG2(n+1)=a2*LOG2(n)*(1-LOG2(n));
end

LOG2=mod(LOG2*1000,1);

add32k=im2double(P);

if(MAT == 1)
sumvec32k=0;
for k=1:ROW
sumvec32k =sumvec32k + add32k(k,:,1);
end
else
sumvec32k=0;
for k=1:ROW
sumvec32k =sumvec32k + add32k(k,:,1) + add32k(k,:,2) +add32k(k,:,3);
end
end
```

```
S=0;
for j=1:size(sumvec32k,2)
S=S+sumvec32k(j);
end

F=0;
for n=1:50
F = F + LOG2(1001-n);
end

v1 = mod((S*1000) + F,1);
v2 = 1 + round(v1*253);
Z = v2 / 255;


PCL1 = mod(A + B + Z,1)*0.001;
x1 = mod(C + D + Z,1);
a1 = 3.999 + PCL1;
LOG1(1) = x1;

T=5000;
for n=1:T
LOG1(n+1)=a1*LOG1(n)*(1-LOG1(n));
end
if(MAT == 1)
 I = round((LOG2(R-10)*(ROW-1))+1);
J = round((LOG2(R-100)*(COL-1))+1);
K = 1;
else
I = round((LOG2(R-10)*(ROW-1))+1);
J = round((LOG2(R-100)*(COL-1))+1);
K = round((LOG2(R-200)*(MAT-1))+1);
end

 RE(1:ROW)=round((LOG1((T+1)-ROW:T).*(ROW-1))+1);

 valuer32k = 0;
 vectr32k = 0;
 numnoest32k = 0;
 bus32k(1)=RE(1);
 s=1;
 for b=2:ROW

 en=1;
 bus32k(b)=RE(b);
 for j=1:b-1
 if(bus32k(b) == bus32k(j) && en == 1)
 valuer32k(s)=bus32k(j);
 vectr32k(s)=b;
 s=s+1;
 en=0;
 end
 end
 end

  tamv32k=size(valuer32k,2);
```

```
 pregnum=1;
 saltar=0;
 no=1;
 for v=1:ROW
 for vv=1:tamv32k
 if(saltar == 0 && pregnum == valuer32k(vv))
 saltar=1;

 end
 end

 for vvv=1:ROW
 if(pregnum == RE(vvv))
 saltar=1;
 end
 end

 if(saltar == 0)
 numnoest32k(no)=pregnum;
 no=no+1;
 end
 saltar=0;
 pregnum=pregnum+1;
 end

 tamvect32k=size(vectr32k,2);

  endos=round(tamvect32k/2);
 cambio=1;
 S=1;
 for s=1:tamvect32k
 if(cambio == 1)
 RE(vectr32k(s))=numnoest32k(S);
 cambio=0;
 else
 RE(vectr32k(s))=numnoest32k(S+endos);
 S=S+1;
 cambio=1;
 end
 end

CO = round((LOG1((T+1)-COL-ROW:T-ROW).*(COL-1))+1);

 valuere32k = 0;
 vectre32k = 0;
 numnoesta32k = 0;

 busq32k(1)=CO(1);
 s=1;
for b=2:COL
 en=1;
 busq32k(b)=CO(b);
 for j=1:b-1
 if(busq32k(b) == busq32k(j) && en == 1)

 valuere32k(s)=busq32k(j);
```

```
 vectre32k(s)=b;
 s=s+1;
 en=0;
 end
 end
 end

 tamve32k=size(valuere32k,2);
 pregnume=1;
 salta=0;
 no=1;
 for v=1:COL
 for vv=1:tamve32k
 if(salta == 0 && pregnume == valuere32k(vv))
 salta=1;

 end
 end

 for vvv=1:COL
 if(pregnume == CO(vvv))
 salta=1;
 end
 end

 if(salta == 0)
 numnoesta32k(no)=pregnume;
 no=no+1;
 end
 salta=0;
 pregnume=pregnume+1;
 end

 tamvecto32k=size(vectre32k,2);

 endos=round(tamvecto32k/2);
 cambio=1;
 S=1;
 for s=1:tamvecto32k
 if(cambio == 1)
 CO(vectre32k(s))=numnoesta32k(S);
 cambio=0;
 else
 CO(vectre32k(s))=numnoesta32k(S+endos);
 S=S+1;
 cambio=1;
 end
 end
M = mod((LOG1((T+1)-5000:T).*(1000)) + Z,1);

 inc=1;
 for k=1:ROW
 for kk=1:COL
 MATRIZM(k,kk)=M(inc);
 inc=inc+1;
 if (inc == 5001)
```

```
inc=1;
end
end
end

PDOUBLE=im2double(P);

if(MAT == 1)
EDOUBLE(:,:,1)=PDOUBLE(RE(:),CO(:),1) + MATRIZM(:,:);

end

EDOUBLE(I,J,K)= Z;
EDOUBLE = mod(EDOUBLE,1);
E = im2uint8(EDOUBLE);

toc
imwrite(E, 'E.png');
figure;subplot(1,2,1);imshow(P)
title('Plain Fingerprint')
subplot(1,2,2);imshow(E)
title('Cipher Fingerprint')

figure;
if(MAT == 1)
matrizroj=E(:,:,1);
subplot(2,1,1);imshow(matrizroj)
title('Cipher Fingerprint')
subplot(2,1,2);imhist(matrizroj)
title('Histogram Cipher Fingerprint')
end
```

Appendix H

The Dataset used in Section 5.8

Table I-1 The fingerprint images dataset used in section 5.8

FVC2002 dataset	Fingerprint image
101_1db1.tif	
101_1db2.tif	
101_1db3.tif	

101_1db4.tif

Appendix I

Genuine Score and Imposter Score in Diversity Evaluation

Table J-1 shows the pseudo-genuine and pseudo-imposter the matching scores between the hashed digests generated from different FTs of the same person using other permutations.

Table J-1 Genuine Score and Imposter Score in Diversity Evaluation

Genuine score	Imposter score
0.672852	0.526367
0.745117	0.509766
0.792969	0.522461
0.736328	0.505859
0.734375	0.505859
0.760742	0.513672
0.744141	0.5
0.69043	0.517578
0.769531	0.509766
0.672852	0.52832
0.714844	0.53125
0.69043	0.504883
0.737305	0.501953
0.678711	0.498047
0.699219	0.515625
0.702148	0.540039
0.699219	0.520508
0.704102	0.527344
0.745117	0.524414
0.714844	0.494141
0.737305	0.524414
0.729492	0.498047
0.71582	0.525391
0.707031	0.519531
0.764648	0.540039
0.705078	0.519531
0.725586	0.523438
0.792969	0.512695
0.69043	0.541992
0.737305	0.530273
0.75	0.509766

0.744141		0.50293
0.762695		0.535156
0.744141		0.543945
0.741211		0.527344
0.769531		0.511719
0.736328		0.514648
0.737305		0.515625
0.729492		0.50293
0.75		0.541016
0.728516		0.538086
0.737305		0.522461
0.75		0.543945
0.698242		0.542969
0.732422		0.513672
0.734375		0.551758
0.678711		0.546875
0.71582		0.536133
0.744141		0.548828
0.728516		0.532227
0.795898		0.509766
0.726563		0.529297
0.764648		0.486328
0.804688		0.486328
0.760742		0.518555
0.699219		0.522461
0.707031		0.514648
0.762695		0.515625
0.737305		0.50293
0.795898		0.513672
0.717773		0.522461
0.732422		0.541992
0.889648		0.536133
0.744141		0.511719
0.702148		0.530273
0.764648		0.533203
0.744141		0.541016
0.75		0.527344
…		…
0.692383		0.539063