

**TEKNOLOGI *MACHINE LEARNING* PADA SISTEM PENDUKUNG
PENELITIAN RSYS (*RESEARCH SUPPORT SYSTEM*)**

TESIS

diajukan untuk memenuhi sebagian syarat untuk memperoleh gelar
Magister Pendidikan Teknologi dan Kejuruan



oleh
Firdamdam Sasmita
NIM 1906671

**PROGRAM STUDI
PENDIDIKAN TEKNOLOGI DAN KEJURUAN
SEKOLAH PASCASARJANA
UNIVERSITAS PENDIDIKAN INDONESIA
2021**

TEKNOLOGI MACHINE LEARNING PADA SISTEM PENDUKUNG PENELITIAN RSYS (RESEARCH SUPPORT SYSTEM)

Oleh
Firdamdham Sasmita

S.Kom UNIKOM Bandung, 2014

Sebuah Tesis yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Magister Pendidikan (M.Pd.) pada Fakultas Pendidikan Teknologi dan Kejuruan

© Firdamdham Sasmita 2021
Universitas Pendidikan Indonesia
Mei 2021

Hak Cipta dilindungi undang-undang.
Tesis ini tidak boleh diperbanyak seluruhnya atau sebagian,
dengan dicetak ulang, difoto kopi, atau cara lainnya tanpa ijin dari penulis.

LEMBAR PENGESAHAN

FIRDAMDAM SASMITA

TEKNOLOGI *MACHINE LEARNING* PADA SISTEM PENDUKUNG
PENELITIAN RSYS (*RESEARCH SUPPORT SYSTEM*)

disetujui dan disahkan oleh:

Pembimbing & Penguji I



Dandhi Kuswardhana, M. T., Ph.D.

NIP. 19800623 200812 1 002

Ketua Program Studi

Pendidikan Teknologi dan Kejuruan



Prof. Dr. Ade Gafar Abdullah, M.Si

NIP. 19721113 199903 1 001

Mengetahui,

Penguji II



Iwan Kustiawan, S.Pd., M.T., Ph.D

NIP. 19770908 200312 1 002

Penguji III



Didin Wahyudin, S.Pd., MT., Ph.D

NIP. 19591231 19850 3 1022

Penguji IV



Prof. Dr. Ade Gafar Abdullah, M.Si

NIP. 19721113 199903 1 001

Firdamdham Sasmita, 2021

TEKNOLOGI *MACHINE LEARNING* PADA SISTEM PENDUKUNG PENELITIAN RSYS (*RESEARCH SUPPORT SYSTEM*)

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

ABSTRAK

Mahasiswa yang masih awam dalam merevisi berfokus pada tingkat lokal, yaitu tata bahasa, ejaan, tanda baca, dan tingkat kalimat. Sedangkan untuk mahasiswa yang sudah ahli berfokus pada tingkat *global*, yaitu berfokus pada penyempurnaan tujuan penulisan, ide, dan makna. Ketika melakukan revisi, mahasiswa menjadi terlalu fokus pada tingkat lokal daripada tingkat global. Komentar yang bersifat lokal tidak efektif untuk dijadikan sebagai pedoman dalam proses revisi. Maka dari itu, tujuan dari penelitian ini adalah untuk membangun perangkat lunak berbasis machine learning dengan metode ANN untuk mengklasifikasikan komentar global atau lokal. Penelitian ini menggunakan metodologi penelitian rancang bangun dengan model SDLC yang berupa *prototyping*. Hasil menunjukkan bahwa perangkat lunak RSYS berhasil dibangun dengan akurasi *machine learning* dalam mengklasifikasikan komentar yang berjumlah 19 komentar, diperoleh dari 2 dokumen, dengan rasio 95:0.5, yaitu sebesar 94.74%. Sedangkan pada pengujian *alpha* dinyatakan bahwa fungsionalitas sistem RSYS dan *machine learning* dinilai berfungsi dengan baik. Untuk pengujian *beta*, persentase terbesar yaitu 95% untuk kemudahan dalam pengoperasian dan kenyamanan dalam menggunakan aplikasi, 75% untuk tampilan website dan ketersediaan navigasi.

Kata Kunci: Revisi, *Machine Learning*, ANN

DAFTAR ISI

LEMBAR PENGESAHAN	ii
PERNYATAAN.....	iii
UCAPAN TERIMA KASIH.....	iv
ABSTRAK	v
ABSTRACT.....	vi
DAFTAR ISI.....	vii
DAFTAR TABEL.....	ix
DAFTAR GAMBAR	x
DAFTAR LAMPIRAN.....	xi
BAB I PENDAHULUAN.....	1
1.1 Latar Belakang Masalah.....	1
1.2 Rumusan Masalah	3
1.3 Tujuan Penelitian.....	3
1.4 Manfaat Penelitian.....	3
1.5 Struktur Organisasi Tesis	3
BAB II KAJIAN PUSTAKA.....	5
2.1 RSYS (<i>Research Support System</i>).....	5
2.2 <i>Machine Learning</i>	7
2.2.1 NLP (<i>Natural Language Processing</i>).....	8
2.2.2 <i>Comment Classification</i>	8
2.2.3 <i>Text Preprocessing</i>	8
2.2.4 <i>Command Prompt</i>	10
2.2.5 <i>Laravel Framework</i>	10
2.2.6 <i>WAMP Server</i>	11
2.2.7 Bahasa Pemrograman PHP (<i>Hypertext Preprocessor</i>).....	11
2.2.8 Bahasa Pemrograman <i>Python</i>	11
2.3 Blok Diagram	12
2.4 <i>Supervised Learning</i>	12
2.4.1 ANN (<i>Artificial Neural Network</i>).....	13
2.5 <i>Performance Measurement</i>	15
2.5.1 <i>Confusion Matrix</i>	15

2.5.2	<i>ROC & AUC</i>	17
2.5.3	<i>Fitting</i>	19
2.6	Hasil Penelitian yang Relevan.....	21
BAB III METODE PENELITIAN		25
3.1	Desain Penelitian	25
3.2	Partisipan Penelitian	26
3.3	Kebutuhan <i>Software</i> dan <i>Hardware</i>	26
3.4	Instrumen Penelitian.....	27
3.5	Prosedur Penelitian.....	28
3.5.1	Analisis Kebutuhan Perangkat Lunak <i>Machine Learning</i> RSYS.....	30
3.5.1.1	Desain Aplikasi.....	30
3.5.1.2	Implementasi Aplikasi	31
3.5.2	Pengujian/Tes Aplikasi.....	31
3.5.2.1	Pengujian <i>Alpha</i>	31
3.5.2.2	Pengujian <i>Beta</i>	31
3.6	Analisis Data	31
3.7	Aristektur Sistem RSYS.....	32
BAB IV TEMUAN DAN PEMBAHASAN.....		37
4.1	Performa <i>klasifikasi</i> (<i>Report</i> , kurva ROC, dan nilai AUC).....	37
4.2	Kinerja <i>preprocessing</i> yang kurang efektif	40
4.3	Terjadi <i>overfitting</i>	42
4.4	Persentase akurasi dua dokumen <i>testing</i> yang terpisah.....	46
4.5	Hasil klasifikasi komentar dalam bentuk perangkat lunak RSYS.....	47
4.6	Hasil Pengujian Alpha & Beta	53
4.6.1	Pengujian Alpha.....	53
4.6.2	Pengujian Beta	53
BAB V SIMPULAN, IMPLIKASI, DAN REKOMENDASI.....		58
5.1	Simpulan.....	58
5.2	Implikasi.....	58
5.3	Rekomendasi	58
DAFTAR PUSTAKA		59

DAFTAR PUSTAKA

- Achim Zielesny. (2011). Introduction. In *From Curve Fitting to Machine Learning*. Berlin Heidelberg: Springer.
- Afrizal. (2014). *Metode Penelitian Kualitatif*. Jakarta: Rajawali Press.
- Akhter, M. P., Jiangbin, Z., Naqvi, I. R., Abdelmajeed, M., Mehmood, A., & Sadiq, M. T. (2020). Document-Level Text Classification Using Single-Layer Multisize Filters Convolutional Neural Network. *IEEE Access*, 8(MI), 42689–42707. <https://doi.org/10.1109/ACCESS.2020.2976744>
- Algolytics. (2021). *How to assess quality and correctness of classification models? Part 4 – ROC Curve*. <https://algolytics.com/how-to-assess-quality-and-correctness-of-classification-models-part-4-roc-curve/>
- Alsmadi, I. M., & Gan, K. H. (2020). Short text classification using feature enrichment from credible texts. *International Journal of Web Engineering and Technology*, 15(1), 59–80. <https://doi.org/10.1504/IJWET.2020.107689>
- Altinmakas, D., & Bayyurt, Y. (2019). An exploratory study on factors influencing undergraduate students' academic writing practices in Turkey. *Journal of English for Academic Purposes*, 37, 88–103. <https://doi.org/https://doi.org/10.1016/j.jeap.2018.11.006>
- Anantharaman, A., Jadiya, A., Siri, C. T. S., Adikar Bharath, N. V. S., & Mohan, B. (2019). Performance evaluation of topic modeling algorithms for text classification. *Proceedings of the International Conference on Trends in Electronics and Informatics*, 704–708. <https://doi.org/10.1109/icoei.2019.8862599>
- Bangert-Drowns, R. L., Hurley, M. M., & Wilkinson, B. (2004). The effects of school-based writing-to-learn interventions on academic achievement: A meta-analysis. *Review of Educational Research*, 74(1), 29–58. <https://doi.org/10.3102/00346543074001029>
- Barkaoui, K. (2007). Revision in Second Language Writing: What Teachers Need
- Firdamdam Sasmita, 2021
TEKNOLOGI MACHINE LEARNING PADA SISTEM PENDUKUNG PENELITIAN RSYS (RESEARCH SUPPORT SYSTEM)
 Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

to Know. *TESL Canada Journal*, 25(1), 81.

<https://doi.org/10.18806/tesl.v25i1.109>

Bean, M. (2015). *Laravel 5 Essentials: An Introduction to Laravel*. English: Packt Publishing Ltd.

Boone, H. N., & Boone, D. A. (2012). Analyzing Likert Data. *Journal of Extension*, 50(2), 1–5.

Brunton, S. L., Noack, B. R., & Koumoutsakos, P. (2020). Machine Learning for Fluid Mechanics. *Annual Review of Fluid Mechanics*, 52(1), 477–508.
<https://doi.org/10.1146/annurev-fluid-010719-060214>

Bulut, I., Erdogan, M., Gonulal, B., Bas, R., & Kilic, O. (2019). Using Short Texts and Emojis to Predict the Gender of a Texter in Turkish. *UBMK 2019 - Proceedings, 4th International Conference on Computer Science and Engineering*, 435–438. <https://doi.org/10.1109/UBMK.2019.8907198>

Carson, J. G., & Nelson, G. L. (1996). Chinese Students' Perceptions of ESL Peer Response Group Interaction. *Journal of Second Language Writing*, 5(1), 1–19. [https://doi.org/10.1016/S1060-3743\(96\)90012-0](https://doi.org/10.1016/S1060-3743(96)90012-0)

Caruana, R., & Niculescu-Mizil, A. (2006). An empirical comparison of supervised learning algorithms. *ACM International Conference Proceeding Series*, 148, 161–168. <https://doi.org/10.1145/1143844.1143865>

Chen, L., Huang, W., Sui, A., Chen, D., & Sun, C. (2017). The online education platform using Proxmox and noVNC technology based on Laravel framework. *Proceedings - 16th IEEE/ACIS International Conference on Computer and Information Science*, 487–491.
<https://doi.org/10.1109/ICIS.2017.7960041>

Chen, Z., Tang, Y., Zhang, Z., Zhang, C., & Wang, L. (2019). Sentiment-aware short text classification based on convolutional neural network and attention. *Proceedings - International Conference on Tools with Artificial Intelligence*, 1172–1179. <https://doi.org/10.1109/ICTAI.2019.00162>

Chowdhury, G. G. (2010). *Introduction to Modern Information Retrieval: Basic Firdamdand Sasmita*, 2021

TEKNOLOGI MACHINE LEARNING PADA SISTEM PENDUKUNG PENELITIAN RSYS (RESEARCH SUPPORT SYSTEM)

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

Concepts Of Information Retrieval Systems. London: Facet.

- Clemmens, D. (2003). Adolescent mother hood:a meta-synthesis of qualitative Studies. *The American Journal of Maternal/Child Nursing*, 28(2), 93–99. <https://doi.org/10.1097/00005721-200303000-00010>
- Cooper, N. J., Sutton, A. J., & Abrams, K. R. (2002). Decision analytical economic modelling within a Bayesian framework: Application to prophylactic antibiotics use for caesarean section. *Statistical Methods in Medical Research*, 11(6), 491–512. <https://doi.org/10.1191/0962280202sm306ra>
- Czajkowski, M., & Kretowski, M. (2019). Decision tree underfitting in mining of gene expression data. An evolutionary multi-test tree approach. *Expert Systems with Applications*, 137, 392–404. <https://doi.org/10.1016/j.eswa.2019.07.019>
- Dataschool.io. (2015). *Simple guide to confusion matrix terminology*. <https://www.dataschool.io/simple-guide-to-confusion-matrix-terminology/>
- Dzisevic, R., & Sesok, D. (2019). Text Classification using Different Feature Extraction Approaches. *2019 Open Conference of Electrical Electronic and Information Sciences*, 1–4. <https://doi.org/10.1109/eStream.2019.8732167>
- Edwards, J. H., & Liu, J. (2015). *Peer Response in Second Language Writing Classrooms*. Ann Arbor: The University of Michigan Press.
- Fahrudin, T., Buliali, J. L., & Fatichah, C. (2019). Ina-BWR: Indonesian bigram word rule for multi-label student complaints. *Egyptian Informatics Journal*, 20(3), 151–161. <https://doi.org/10.1016/j.eij.2019.03.001>
- Faigley, L., & Witte, S. (1981). Analyzing Revision. *College Composition and Communication*, 32(4), 400. <https://doi.org/10.2307/356602>
- Farahani, A. A. K., Nemati, M., & Nazari Montazer, M. (2019). Assessing peer review pattern and the effect of face-to-face and mobile-mediated modes on students' academic writing development. *Language Testing in Asia*, 9(1), 24. <https://doi.org/10.1186/s40468-019-0094-7>

Firdamdah Sasmita, 2021

TEKNOLOGI MACHINE LEARNING PADA SISTEM PENDUKUNG PENELITIAN RSYS (RESEARCH SUPPORT SYSTEM)

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

- Fawcett, T. (2006). An introduction to ROC analysis. *Pattern Recognition Letters*, 27(8), 861–874. <https://doi.org/10.1016/j.patrec.2005.10.010>
- Gavrilov, A. D., Jordache, A., Vasdani, M., & Deng, J. (2019). Preventing Model Overfitting and Underfitting in Convolutional Neural Networks. *International Journal of Software Science and Computational Intelligence*, 10(4), 19–28. <https://doi.org/10.4018/ijssci.2018100102>
- Ge, J., Wang, H., & Fang, Y. (2020). Short Text Classification Method Combining Word Vector and WTTM. *Proceedings of 2020 IEEE 4th Information Technology, Networking, Electronic and Automation Control Conference*, 1994–1997. <https://doi.org/10.1109/ITNEC48623.2020.9085172>
- Ghoneim, S. (2019). *Accuracy, Recall, Precision, F-Score & Specificity, which to optimize on? Towards Data Science*. <https://towardsdatascience.com/accuracy-recall-precision-f-score-specificity-which-to-optimize-on-867d3f11124>
- Gonzalez Zelaya, C. V. (2019). Towards explaining the effects of data preprocessing on machine learning. *Proceedings - International Conference on Data Engineering*, 2086–2090. <https://doi.org/10.1109/ICDE.2019.00245>
- Gorunescu, F. (2011). *Data Mining: Concepts, Models and Techniques* (1st ed.). Verlag Berlin Heidelberg: Springer.
- Gu, Y., & Shen, J. (2019). Short Text Classification Based on Keywords Extension. *Proceedings - 2019 Chinese Automation Congress*, 2616–2621. <https://doi.org/10.1109/CAC48633.2019.8996664>
- Han, J., & Kamber, M. (2006). *Data Mining: Concepts and Technique*. San Francisco: Diane Cerra.
- Hart, K. L., Perlis, R. H., & McCoy, T. H. (2020). What do patients learn about psychotropic medications on the web? A natural language processing study. *Journal of Affective Disorders*, 260, 366–371. <https://doi.org/10.1016/j.jad.2019.09.043>
- Hasegawa, S., & Yamane, K. (2011). An Article/Presentation Revising Support Firdamdami Sasmita, 2021 **TEKNOLOGI MACHINE LEARNING PADA SISTEM PENDUKUNG PENELITIAN RSYS (RESEARCH SUPPORT SYSTEM)** Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

System for Transferring Laboratory Knowledge. *19th International Conference on Computers in Education*, 247–254.

https://doi.org/10.1007/978-3-319-40397-7_18

Hayes, J. R. (2004). What Triggers Revision? *Revision Cognitive and Instructional Processes*, 13(1), 9–20. https://doi.org/10.1007/978-94-007-1048-1_2

Hayes, J. R., Flower, L., Schriver, K. A., Stratman, J. F., & Carey, L. (1987). *Cognitive processes in revision*. English: Cambridge Press.

Herdiansyah, H. (2010). *Metodologi Penelitian Kualitatif*. Jakarta: Salemba Humanika.

Hey, T., Butler, K., Jackson, S., & Thiyagalingam, J. (2020). Machine learning and big scientific data. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 378(2166), 1–42. <https://doi.org/10.1098/rsta.2019.0054>

Huang, L., Shea, A. L., Qian, H., Masurkar, A., Deng, H., & Liu, D. (2019). Patient clustering improves efficiency of federated machine learning to predict mortality and hospital stay time using distributed electronic medical records. *Journal of Biomedical Informatics*, 99, 103291. <https://doi.org/10.1016/j.jbi.2019.103291>

Igual, L., & Segui, S. (2017). *Introduction to Data Science: Statistical Natural Language Processing for Sentiment Analysis*. Denmark: Springer.

InfoSci-OnDemand. (2020). *What is Case Folding*. IGI Global. <https://www.igi-global.com/dictionary/case-folding/36602>

Ipswich, D. (2011). *Setting Up A WAMP Server On Your Windows Desktop*. <http://online.pubhtml5.com/dcrk/osis/osis.pdf&usg=AOvVaw2UH89NL3kLKEYMuukLV49V>

Iqbal, S., Aftab, S., Abbas, G., & Gulzar, M. M. (2010). Concept Building through Block Diagram Using Matlab/Simulink. *Journal of the Institution of Electrical and Electronics Engineers Pakistan*, 66(67), 30–34.

Firdamdam Sasmita, 2021

TEKNOLOGI MACHINE LEARNING PADA SISTEM PENDUKUNG PENELITIAN RSYS (RESEARCH SUPPORT SYSTEM)

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

- Ira, M. (2015). Sistem Pendidikan di Indonesia: antara keinginan dan realita. *Jurnal Auladuna*, 2(2), 233.
- Jabbar, H. K., & Khan, R. Z. (2015). Methods to Avoid Over-Fitting and Under-Fitting in Supervised Machine Learning (Comparative Study). *Computer Science, Communication & Instrumentation Devices*, 163–172.
https://doi.org/10.3850/978-981-09-5247-1_017
- Joty, S., Barrón-Cedeno, A., Martino, G. D. S., Filice, S., Márquez, L. is, Moschitti, A., & Nakov, P. (2015). Global Thread-Level Inference for Comment Classification in Community Question Answering. *Proceedings of the 2015 Conference on Empirical Methods in Natural Language Processing*, 573–578.
- Julpan, Nababan, E. B., & Zarlis, M. (2015). Analisis Fungsi Aktivasi Sigmoid Biner Dan Sigmoid Bipolar Dalam Algoritma Backpropagation Pada Prediksi Kemampuan Siswa. *Jurnal Teknovasi*, 02(1), 103–116.
- Kata, J. (2021). *Arti kata konvergen menurut KBBI*. <https://jagokata.com/arti-kata/konvergen.html>
- Kolluri, J., Kotte, V. K., Phridviraj, M. S. B., & Razia, S. (2020). Reducing Overfitting Problem in Machine Learning Using Novel L1/4 Regularization Method. *Proceedings of the Fourth International Conference on Trends in Electronics and Informatics (ICOEI 2020)*, 934–938.
<https://doi.org/10.1109/ICOEI48184.2020.9142992>
- Learn, S. (2021). *sklearn.neural_network.MLPClassifier*. https://scikit-learn.org/stable/modules/generated/sklearn.neural_network.MLPClassifier.html
- Lever, J., Krzywinski, M., & Altman, N. (2016). Classification evaluation. *Nature Methods*, 13(8), 603–604. <https://doi.org/10.1038/nmeth.3945>
- Liebeskind, C., Liebeskind, S., & HaCohen-Kerner, Y. (2018). Comment relevance classification in facebook. *International Conference on Computational Linguistics and Intelligent Text Processing*, 241–254.

https://doi.org/10.1007/978-3-319-77116-8_18

Link, M. (2019). *Perceptrons and Multi-Layer Perceptrons: The Artificial Neuron at the Core of Deep Learning*. <https://missinglink.ai/guides/neural-network-concepts/perceptrons-and-multi-layer-perceptrons-the-artificial-neuron-at-the-core-of-deep-learning/>

Liu, I., & Sari, Y. A. (2019). Klasifikasi Hate Speech Berbahasa Indonesia di Twitter Menggunakan Naive Bayes dan Seleksi Fitur Information Gain dengan Normalisasi Kata. *Jurnal Pengembangan Teknologi Informasi Dan Ilmu Komputer*, 3(5), 4914–4922.

Liu, K., & Chen, L. (2019). Medical Social Media Text Classification Integrating Consumer Health Terminology. *IEEE Access*, 7, 78185–78193.
<https://doi.org/10.1109/ACCESS.2019.2921938>

Ludwig, S., Funk, B., & Mueller, B. (2020). Using Natural Language Processing Techniques to Tackle the Construct Identity Problem in Information Systems Research. *Proceedings of the 53rd Hawaii International Conference on System Sciences*, 10.

Mahajan, A., Shah, D., & Jafar, G. (2020). Explainable AI approach towards Toxic Comment Classification. *EasyChair Preprint*, 2773, 1–24.
<https://doi.org/https://doi.org/10.1016/j.jslw.2006.01.003>

Masripah, S., & Ramayanti, L. (2020). Penerapan Pengujian Alpha Dan Beta Pada Aplikasi. *Jurnal Swabumi*, 8(1), 100–105.

Mastery, M. L. (2019a). *How to use Learning Curves to Diagnose Machine Learning Model Performance*. <https://machinelearningmastery.com/learning-curves-for-diagnosing-machine-learning-model-performance/>

Mastery, M. L. (2019b). *How to use Learning Curves to Diagnose Machine Learning Model Performance*. <https://machinelearningmastery.com/learning-curves-for-diagnosing-machine-learning-model-performance/>

Min, H.-T. (2006). The effects of trained peer review on EFL students' revision types and writing quality. *Journal of Second Language Writing*, 15(2), 118–

Firdamdam Sasmita, 2021

TEKNOLOGI MACHINE LEARNING PADA SISTEM PENDUKUNG PENELITIAN RSYS (RESEARCH SUPPORT SYSTEM)

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

141.

Min, H. T. (2005). Training students to become successful peer reviewers. *System*, 33(2), 293–308. <https://doi.org/10.1016/j.system.2004.11.003>

Mitchell, T., & Hill, M. (1997). *Machine Learning*. English: McGraw-Hill Science/Engineering/Math.

Mohd, C. K. N. C. K., & Shahbodin, F. (2015). Personalized Learning Environment: Alpha Testing, Beta Testing & User Acceptance Test. *Procedia - Social and Behavioral Sciences*, 195, 837–843. <https://doi.org/10.1016/j.sbspro.2015.06.319>

Nebraska, U. of. (2020). *Vital Resources for Serious Progress*. [https://www.unmc.edu/vcr/cores/scheduling-billing/Billing Statement Handout.pdf](https://www.unmc.edu/vcr/cores/scheduling-billing/Billing%20Statement%20Handout.pdf)

Noé, F., De Fabritiis, G., & Clementi, C. (2020). Machine learning for protein folding and dynamics. *Current Opinion in Structural Biology*, 60, 77–84. <https://doi.org/10.1016/j.sbi.2019.12.005>

Noé, F., Tkatchenko, A., Müller, K.-R., & Clementi, C. (2020). Machine Learning for Molecular Simulation. *Annual Review of Physical Chemistry*, 71(1), 361–390. <https://doi.org/10.1146/annurev-physchem-042018-052331>

Nugroho, K. S. (2019). *Dasar Text Preprocessing dengan Python*. <https://medium.com/@ksnugroho/dasar-text-preprocessing-dengan-python-a4fa52608ffe>

Ocharo, H., & Hasegawa, S. (2016). An Adaptive Research Support System for Students in Higher Education: Beyond Logging and Tracking. *International Conference on Human Interface and the Management of Information*, 178–186.

Ocharo, H. N., & Hasegawa, S. (2018). Using machine learning to classify reviewer comments in research article drafts to enable students to focus on global revision. *Education and Information Technologies*, 23(5), 2093–2110. <https://doi.org/10.1007/s10639-018-9705-7>

Firdamdam Sasmita, 2021

TEKNOLOGI MACHINE LEARNING PADA SISTEM PENDUKUNG PENELITIAN RSYS (RESEARCH SUPPORT SYSTEM)

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

- Pham, V. P. H. (2019). The effects of lecturer's model e-comments on graduate students' peer e-comments and writing revision. *Computer Assisted Language Learning*, 1–34. <https://doi.org/10.1080/09588221.2019.1609521>
- Pressman, R. (2002). *Rekayasa Perangkat Lunak : Pendekatan Praktisi (Buku Satu)*. Yogyakarta: Andi.
- Prettyman, S. (2016). *An Introduction to PHP 7*. Berkeley: Apress.
- Purwaningsih, N. (2016). Penerapan multilayer perceptron untuk klasifikasi jenis kulit sapi tersamak. *Jurnal TEKNOIF*, 4(1), 1–7. <https://doi.org/http://dx.doi.org/10.21063%2Fjtif.2016.V4.1>.
- Qi, L. J., & Alias, N. (2018). Comparison of ANN and SVM for classification of eye movements in EOG signals. *Journal of Physics: Conference Series*, 971(1), 012012. <https://doi.org/10.1088/1742-6596/971/1/012012>
- Qi, P., Zhang, Y., Zhang, Y., Bolton, J., & Manning, C. D. (2020). *Stanza: A Python Natural Language Processing Toolkit for Many Human Languages*. Pennsylvania: Association for Computational Linguistics.
- Rakhmanov, O. (2020). A Comparative Study on Vectorization and Classification Techniques in Sentiment Analysis to Classify Student-Lecturer Comments. *9th International Young Scientist Conference on Computational Science (YSC 2020) A*, 178, 194–204. <https://doi.org/10.1016/j.procs.2020.11.021>
- Raza, M., Hussain, F. K., Hussain, O. K., Zhao, M., & Rehman, Z. ur. (2019). A comparative analysis of machine learning models for quality pillar assessment of SaaS services by multi-class text classification of users' reviews. *Future Generation Computer Systems*, 101, 341–371. <https://doi.org/10.1016/j.future.2019.06.022>
- Reynaldo, N., Goenawan, Chanrico, W., Suhartono, D., & Purnomo, F. (2019). Gender demography classification on instagram based on user's comments section. *Procedia Computer Science*, 157, 64–71. <https://doi.org/10.1016/j.procs.2019.08.142>
- Rigby, J., Cox, D., & Julian, K. (2018). Journal peer review: a bar or bridge? An Firdamdam Sasmita, 2021
TEKNOLOGI MACHINE LEARNING PADA SISTEM PENDUKUNG PENELITIAN RSYS (RESEARCH SUPPORT SYSTEM)
 Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

analysis of a paper's revision history and turnaround time, and the effect on citation. *Scientometrics*, 114(3), 1087–1105. <https://doi.org/10.1007/s11192-017-2630-5>

Rosid, M. A., Fitriani, A. S., Astutik, I. R. I., Mulloh, N. I., & Gozali, H. A. (2020a). Improving Text Preprocessing for Student Complaint Document Classification Using Sastrawi. *IOP Conference Series: Materials Science and Engineering*, 874(1). <https://doi.org/10.1088/1757-899X/874/1/012017>

Rosid, M. A., Fitriani, A. S., Astutik, I. R. I., Mulloh, N. I., & Gozali, H. A. (2020b). Improving Text Preprocessing for Student Complaint Document Classification Using Sastrawi. *IOP Conference Series: Materials Science and Engineering*, 874(1), 012017. <https://doi.org/10.1088/1757-899X/874/1/012017>

Rossum, G. van. (2007). *Python programming language*. Dutch: Usenix.

Ruiz, M. E., & Srinivasan, P. (2006). Automatic Text Categorization Using Neural Networks. *Advances In Classification Research*, 8, 59–72. <https://doi.org/10.1109/ICOSP.2006.345923>

Sangounpao, K., & Muenchaisri, P. (2019). Ontology-Based Naive Bayes Short Text Classification Method for a Small Dataset. *Proceedings - 20th IEEE/ACIS International Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing, SNPD 2019*, 53–58. <https://doi.org/10.1109/SNPD.2019.8935711>

Sarkar, R., Barman, D., & Chowdhury, N. (2019). *A Cooperative Co-evolutionary Genetic Algorithm for Multi-Robot Path*. Singapore:Springer. <https://doi.org/10.1007/978-981-13-9042-5>

Sasmita, F., & Mulyanti, B. (2020). Development of machine learning implementation in engineering education: A literature review. *IOP Conference Series: Materials Science and Engineering*, 830(3), 032061. <https://doi.org/10.1088/1757-899X/830/3/032061>

Scikit Learn. (2021). *sklearn.linear_model.Lasso*. <https://scikit->

learn.org/stable/modules/generated/sklearn.linear_model.Lasso.html

- Seema Suresh Kute, P., & Surabhi Deependra Thorat, P. (2017). A Review on Various Software Development Life Cycle (SDLC) Models. *International Journal of Research in Computer and Communication Technology*, 3(7), 776–781.
- Seki, H., & Toriyama, S. (2019). On Term Similarity Measures for Short Text Classification. *2019 IEEE 11th International Workshop on Computational Intelligence and Applications, IWCIA 2019 - Proceedings*, 53–58.
<https://doi.org/10.1109/IWCIA47330.2019.8955045>
- Shelton, W. (2015). Empirical Methods for Bioethics: A Primer Advances in Bioethics. *Emerald Group Publishing Limited*, 11, 39–62.
- Sofyan. (2019). *Artificial Neural Networks – Bagian 2 : Multilayer Perceptron*.
<http://sofyantandungan.com/artificial-neural-networks-bagian-2-multilayer-perceptron/>
- Stanek, W. R. (2019). Overview of the Windows Command Line. In *Windows Command-Line for Windows 8.1, Windows Server 2012, Windows Server 2012 R2: The Personal Trainer* (p. 342). Stanek & Associates.
- Suandi, A., Khasanah, F. N., & Retnoningsih, E. (2017). Pengujian Sistem Informasi E-commerce Usaha Gudang Cokelat Menggunakan Uji Alpha dan Beta. *Information System for Educators and Professionals*, 2(1), 61–70.
- Sun, X., & He, J. (2020). A novel approach to generate a large scale of supervised data for short text sentiment analysis. *Multimedia Tools and Applications*, 79(9–10), 5439–5459. <https://doi.org/10.1007/s11042-018-5748-4>
- Talabis, M. R. M., McPherson, R., Miyamoto, I., Martin, J. L., & Kaye, D. (2015). *Analytics Defined* (pp. 1–12). Amsterdam: Elsevier Science.
<https://doi.org/10.1016/b978-0-12-800207-0.00001-0>
- Tang, H., Wu, Y., Gouyin, J. T. Y., & Yao, W. Y. Y. (2003). CUPTRSS : A Web-based Research Support System. *The Workshop on Applications, Products and Services of Web-Based Support Services, Halifax, Canada*, 21–28.
- Firdamdani Sasmita, 2021
TEKNOLOGI MACHINE LEARNING PADA SISTEM PENDUKUNG PENELITIAN RSYS (RESEARCH SUPPORT SYSTEM)
Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

- Tangga, M. J., Rahman, S., & Hasniati. (2017). Analisis Perbandingan Algoritma Levenshtein Distance Dan Jaro Winkler Untuk Aplikasi Deteksi Plagiarisme Dokumen Teks. *JTRISTE*, 4(1), 44–54.
- Uysal, A. K., & Gunal, S. (2014). The impact of preprocessing on text classification. *Information Processing and Management*, 50(1), 104–112. <https://doi.org/10.1016/j.ipm.2013.08.006>
- Van Der Aalst, W. M. P., Rubin, V., Verbeek, H. M. W., Van Dongen, B. F., Kindler, E., & Günther, C. W. (2010). Process mining: A two-step approach to balance between underfitting and overfitting. *Software and Systems Modeling*, 9(1), 87–111. <https://doi.org/10.1007/s10270-008-0106-z>
- Varoquaux, G., Buitinck, L., Louppe, G., Grisel, O., Pedregosa, F., & Mueller, A. (2015). Scikit-learn. *GetMobile: Mobile Computing and Communications*, 19(1), 29–33. <https://doi.org/10.1145/2786984.2786995>
- Vercellis, C. (2009). *Business Intelligence: Data Mining and Optimization for Decision Making* (1st ed.). Wiley.
- Vincent, B. (2020). The expression of obligation in student academic writing. *Journal of English for Academic Purposes*, 44, 100840. <https://doi.org/10.1016/j.jeap.2020.100840>
- Wahyudi, D., Susyanto, T., & Nugroho, D. (2017). Implementasi Dan Analisis Algoritma Stemming Nazief & Adriani Dan Porter Pada Dokumen Berbahasa Indonesia. *Jurnal Ilmiah SINUS*, 15(2), 49–56. <https://doi.org/10.30646/sinus.v15i2.305>
- Wang, P., Yan, Y., Si, Y., Zhu, G., Zhan, X., Wang, J., & Pan, R. (2020). Classification of Proactive Personality: Text Mining Based on Weibo Text and Short-Answer Questions Text. *IEEE Access*, 8, 97370–97382. <https://doi.org/10.1109/ACCESS.2020.2995905>
- Wang, Z., He, Y., & Jiang, M. (2006). A Comparison among Three Neural Networks for Text Classification. *ICSP2006 Proceedings*, 1–4.
- Williams, J. (2004). Tutoring and revision: Second language writers in the writing
 Firdamdam Sasmita, 2021
TEKNOLOGI MACHINE LEARNING PADA SISTEM PENDUKUNG PENELITIAN RSYS (RESEARCH SUPPORT SYSTEM)
 Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

center. *Journal of Second Language Writing*, 13(3), 173–201.
<https://doi.org/10.1016/j.jslw.2004.04.009>

- Xu, J., Huang, Y., & Madey, G. (2003). A RESEARCH SUPPORT SYSTEM FRAMEWORK FOR WEB DATA MINING. *Applications, Products and Services of Web-Based Support Systems*, 37–41.
- Yağci, A., & Çevik, M. (2019). Prediction of academic achievements of vocational and technical high school (VTS) students in science courses through artificial neural networks (comparison of Turkey and Malaysia). *Education and Information Technologies*. <https://doi.org/10.1007/s10639-019-09885-4>
- Yang, X., Xu, S., Wu, H., & Bie, R. (2019). Sentiment Analysis of Weibo Comment Texts Based on Extended Vocabulary and Convolutional Neural Network. *Procedia Computer Science*, 147, 361–368.
<https://doi.org/10.1016/j.procs.2019.01.239>
- Yang, Y. F. (2016). Transforming and constructing academic knowledge through online peer feedback in summary writing. *Computer Assisted Language Learning*, 29(4), 683–702. <https://doi.org/10.1080/09588221.2015.1016440>
- Yang, Z., Cui, Y., Chen, Z., Che, W., Liu, T., Wang, S., & Hu, G. (2020). *TextBrewer: An Open-Source Knowledge Distillation Toolkit for Natural Language Processing*.
- Zaech, J. N., Dai, D., Hahner, M., & Gool, L. Van. (2019). Texture Underfitting for Domain Adaptation. *2019 IEEE Intelligent Transportation Systems Conference, ITSC 2019*, 547–552.
<https://doi.org/10.1109/ITSC.2019.8917059>
- Zaheri, S., Leath, J., Stroud, D., Zaheri, S., Leath, J., & Stroud, D. (2020). Toxic Comment Classification. *SMU Data Science Review*, 3(1), 13.
- Zeng, G. (2020). On the confusion matrix in credit scoring and its analytical properties. *Communications in Statistics - Theory and Methods*, 49(9), 2080–2093. <https://doi.org/10.1080/03610926.2019.1568485>

- Zhang, H., Zhang, L., & Jiang, Y. (2019). Overfitting and Underfitting Analysis for Deep Learning Based End-to-end Communication Systems. *2019 11th International Conference on Wireless Communications and Signal Processing*, 1–6. <https://doi.org/10.1109/WCSP.2019.8927876>
- Zou, J., Han, Y., & So, S. S. (2008). *Overview of artificial neural networks*. New Jersey: Humana Press.