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JSC-13817

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FINAL DESIGN SPECIFICATION

FOR

EOD-LARSYS PROCEDURE 1 FOLLOW-ON

Job Order 71-695

(E80-10213) FINAL DESIGN SPECIFICATION (FORM 77-0054)
EOD-LARSYS PROCEDURE 1 FOLLOW-ON (Lockheed
Electronics Co.) 44 P HC A03/MF A01

N80-29791

CSSL 05B

63/43

Jacobs
00213

Prepared By

Lockheed Electronics Company, Inc.

Systems and Services Division

Houston, Texas

Contract NAS 9-15200

For

EARTH OBSERVATIONS DIVISION

SPACE AND LIFE SCIENCES DIRECTORATE



National Aeronautics and Space Administration
LYNDON B. JOHNSON SPACE CENTER
Houston, Texas

December 1977

LEC-11618

JSC-13817

FINAL DESIGN SPECIFICATION
FOR
EOD-LARSYS PROCEDURE 1 FOLLOW-ON
Job Order 71-695

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1. SCOPE

This document contains a design specification for implementing two Procedure 1 follow-on features. These features are:

- On option, determine the best k of N passes in feature selection.
- On option, include a-priori weighting based on pixel population in clusters in feature selection.

These additions will be made to the SELECT processor of the EOD-LARSYS system.

EOD-LARSYS is operational on the UNIVAC 1108 EXEC II computer system located in Building 12. The system is batch oriented, and operated and maintained according to IDSD procedures. This system is currently being converted to the Purdue-LARS 370/148 system.

This document assumes the reader is familiar with both Procedure 1 and the EOD-LARSYS system.

2. APPLICABLE DOCUMENTS

- Final Design Specification for EOD-LARSYS Procedure 1, Houston, Texas, August 1977, JSC-12742, LEC-10417.
- Job Order: 63-1347-1695

3. SYSTEM DESCRIPTION

3.1 HARDWARE DESCRIPTION

N/A

3.2 SOFTWARE DESCRIPTION

Two new features have been added to the SELECT processor of the EOD-LARSYS system in support of Procedure 1 follow-on requirements.

The first is the selection of the best k of N passes based on the overall separability criterion selected, where N is the total number of passes accounted for in the CHANNELS input and k is any number less than N. The number of channels per pass can be specified.

The second is the modification of intersubclass weights by a multiplier based on the number of pixels in each subclass:

$$\text{FACTOR } (i,j) = \sqrt{\frac{N(i) * N(j)}{\text{TOTSUB} \left(\sum_{k=1}^{\text{TOTSUB}} N(k) \right)^2}}$$

where TOTSUB is the number of subclasses and N(i) is the number of pixels in subclass i.

The following example illustrates the best k of N selection, together with a-priori weighting.

Control cards:

SUBCLA	1, 2, 3, 4, 5
STATFI	UNIT=1, FILE=1
CHANNEL	1, 2, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15

~~31~~
3

PROCEED	6
BSPASS	2
APRIOR	
NCPASS	5
END	

Here the number of channels per pass is 5, 3 passes are included (deduced from channels included), and the best 2 passes are to be determined.

Each combination of 2 of 3 passes is considered. These are

- (1) 1, 2, 4, 5, 6, 7, 9, 10
- (2) 1, 2, 4, 5, 11, 12, 14, 15
- (3) 6, 7, 9, 10, 11, 12, 14, 15

For each, the overall separability measure is computed, and the optimum set of features (channels) is selected and output, through the INFORM labeled common block, this set is made available to the CLASSIFY processor.

3.2.1 SOFTWARE COMPONENT NO. 1 (SELECT)

The SELECT subprogram is the main driver for the SELECT processor.

3.2.1.1 Linkages

Subprogram SELECT is invoked from the MONTOR monitor routine upon reading the \$SELECT control card. It calls subprograms SETUP4, ORDER, PRELIM, EXSRCH, WHRPLC, USERIN, GENRPT, PLOT, EVLFET.

3.2.1.2 Interfaces

SELECT interfaces with other routines through a calling sequence, and common blocks FSL, GLOBAL, INFORM, and BESTKN. BESTKN is newly incorporated for these options, it is coded as

~~3~~
2
4

COMMON /BESTKN/ KPPPTS(60), IPRIOR, KBEST, NCPASS

3.2.1.3 Inputs

Calling Sequence:

Subr. SELECT(ARRAY, TOP)

<u>Parameter</u>	<u>Dimension</u>	<u>In/Out</u>	<u>Description</u>
ARRAY	TOP (presently set = 10500)	In/out	Utility storage for various arrays
TOP	1	In	Dimension of vector ARRAY

3.2.1.4 Outputs

N/A

3.2.1.5 Storage

Code: 1602₈ Data: 30337₈

3.2.1.6 Description

The changes to subprogram SELECT involve computation of features (channels) to exhaust all combinations of k of N passes. Data vectors INDPER and PERM have been added to assist. Common block BESTKN has been added. For each combination of channels, subprograms EVLFET and GENRPT are invoked for separability measure computation and results printout.

3.2.1.7 Flowchart

N/A

3.2.1.8 Listing

33
5


```

00277 113  ARRAY(MH$14),SUBRAY(51),SUBRAY(SBASE),SLEFT)
00278 114  IF (PRCKEY.EQ.0) GO TO 12
00279 115  IF (PRCKEY.EQ.1) GO TO 12
00280 116  IF (PRCKEY.EQ.2) GO TO 12
00281 117  IF (PRCKEY.EQ.3) GO TO 12
00282 118  IF (PRCKEY.EQ.4) GO TO 12
00283 119  M$SAVE=NOFET4
00284 120  NOFET4=BESTVC(JBEST)
00285 121  IF (NOFET4.LE.0) GO TO 60
00286 122  IF (NOFET4.LE.0) GO TO 60
00287 123  * WITHOUT REPLACEMENT, IF FIRST GUESS B-MATRIX WAS NOT INPUT.
00288 124  *
00289 125  12 IF (PRCKEY.NE.3) GO TO 15
00290 126  *
00291 127  SET ADDRESSES FOR RANDOM ACCESS GRUM FILE
00292 128  *
00293 129  ADRESF=ADRESF+DIVSIZ*2
00294 130  ADRESF=ADRESF+NOFET4*NOFET2*2
00295 131  ADRESH1=ADRESF+NOFET4*NOFET2*2
00296 132  ADRESH2=ADRESH1+(NOFET4*NOFET2*2)*2
00297 133  *
00298 134  * WAS FIRST GUESS B-MATRIX INPUT?
00299 135  *
00300 136  IF (PRCKEY.EQ.1) GO TO 15
00301 137  IF (PRCKEY.EQ.2)
00302 138  PRCKEY=2
00303 139  *
00304 140  * COMPUTE BASES FOR ARRAYS OF 'BEST' SET OF FEATURES
00305 141  * TRANSFORMED COVARIANCES AND MEANS STORED IN DOUBLE PRECISION
00306 142  *
00307 143  15  VARSZ4=NOFET4*(NOFET4+1)/2
00308 144  COVAR4=COVAR4
00309 145  AVAR4=COVAR4 + NOCLS2*VARSZ4*2
00310 146  CORBSS = AVAR4 + NOCLS2 * NOFET4 * 2
00311 147  IF (CORBSS .LL. TOP) GO TO 20
00312 148  WRITE (6,200) CORBSS
00313 149  CALL CHERR
00314 150  *
00315 151  * SUBRAY STORAGE - STORE '5' ARRAYS ONLY IF CRKEY=1, STORE PARTIALS
00316 152  * ONLY IF PRCKEY=3, STORE B-MATRIX IF PRCKEY=3 OR 4.
00317 153  *
00318 154  20  S2=S1 + NOCLS2*VARSZ2
00319 155  IF (CRKEY.NE.1) BI=1
00320 156  BI=BI + NOFET4*NOFET2*2
00321 157  IF (PRCKEY.NE.3) BI=BI + NOFET4*NOFET2*2
00322 158  IF (PRCKEY.NE.3) BI=BI + NOFET4*NOFET2*2
00323 159  SLETSUBS1=SUBS1
00324 160  SLETSUBS2=SUBS2
00325 161  WRITE (6,21) SUBS1, SUBS2, BI
00326 162  *
00327 163  *
00328 164  *
00329 165  *
00330 166  *
00331 167  *
00332 168  *
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171 00320
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173 00321
174 00321
175 00322
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178 00322
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180 00323
181 00323
182 00324
183 00324
184 00325
185 00325
186 0-326
187 00326
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204 00333
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207 00340
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209 00342
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213 00351
214 00352
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216 00352
217 00352
218 00357
219 00357
220 00364
221 00365
222 00370
223 00370
224 00370
225 00370
226 00371
227 00372
228 00373

C* 30 CALL EASRCH(ARRAY(COVAR2),ARRAY(IVAR2),ARRAY(OTAB4),ARRAY(LGHS14),
* ARRAY(COVAR3),ARRAY(IVAR3),ARRAY(OTAB4),SUBRAY(S2),SUBRAY(S2),
* SUBRAY(SBASE),SLEFT)
C* GO TO 50
C* WITHOUT REPLACEMENT PROCEDURE
C* 35 CALL MKPLC(ARRAY(COVAR2),ARRAY(IVAR2),ARRAY(OTAB4),ARRAY(LGHS14),
* ARRAY(COVAR3),ARRAY(IVAR3),ARRAY(OTAB4),SUBRAY(S1),SUBRAY(S2),
* SUBRAY(SBASE),SLEFT)
C* GO TO 50
C* 40 CONTINUE
C* 45 CALL USERIN(ARRAY(COVAR2),ARRAY(IVAR2),ARRAY(OTAB4),ARRAY(LGHS14),
* ARRAY(COVAR3),ARRAY(IVAR3),ARRAY(OTAB4),SUBRAY(S1),SUBRAY(S2),
* SUBRAY(SBASE),SLEFT)
C* GENERATE REPORTS
C* 50 CALL GENRPT(ARRAY(COVAR2),ARRAY(LGHS14),ARRAY(OTAB4),
* ARRAY(SBASE),SLEFT,FETVEC)
* CALL PLOT(SUBRAY(SBASE),ARRAY(OTAB4),DIVSI4,MAXX,ILABLX,ILABLY,
* ICODE,IOP)
C*
C* IF(SAVPRC=NE-3)GO TO 11
C* SAVPRC=0
C* PRKEY=3
C* GO TO 20
C* PERFORM EVALUATE REQUEST
C* 60 IV=1
C* ISAVE=PRKEY
C* PRKEY=5
C* NOFET=EVALLB(FIV)
C* IF(NOFET>GT-DIG) TO 75
C* PRKEY=ISAVE
C* GO TO 10
C* DO 80 I=1,NOFET4
C* IV=IV+1
C* FETVEC(I) = EVALB(FIV)
C*
C* RENUMBERING CHANNELS IN REFERENCE TO SUBSET OF CHANNELS
C* 80 82 I=1,NOFET4
C* 82 I=1,NOFET4
C* 82 FETVEC(I) = FETVEC(I) + I
C* FETVEC(I) = I
C* 82 CONTINUE
C* CALL ORDER(FETVEC4,NOFET4)
C*
C* GO COMPUTE BASE ADDRESSES FOR REDUCED ARRAYS
C* GO TO 15
C* 85 CONTINUE
C* CALL EVLFET(ARRAY(COVAR2),ARRAY(IVAR2),ARRAY(OTAB4),ARRAY(LGHS14)

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*--B

```


3.2.2 SOFTWARE COMPONENT NO.2 (SETUP4)

Subprogram SETUP4 reads the control cards and initializes data and option switches for the SLECT processor.

3.2.2.1 Linkages

SETUP4 is called by routine SELECT and calls subprograms NUMBER, ORDER, NXTCHR, FIND, WGTSLN, CRDSTA, GRPSCN, BMFIL, REDSAV, BSTCHK, PRFLD, and WGTCHK.

3.2.2.2 Interfaces

SETUP4 interfaces with other routines through a calling sequence and common blocks INFORM, GLOBAL, FSL, and BESTKN.

3.2.2.3 Inputs

Calling sequence:

Subr. SETUP4 (ARRAY, TOP, STOPFG, JTIME, SUBRAY, SUBSIZ)

<u>Parameter</u>	<u>Dimension</u>	<u>In/Out</u>	<u>Description</u>
ARRAY	TOP	In/Out	Utility storage for various arrays
TOP	1	In	Dimension of ARRAY vector
STOPFG	1	Out	Stop switch, set equal to 1 when \$END* control board is read
JTIME	1	Out	Counter for number of times SELECT processor is invoked

<u>Parameter</u>	<u>Dimension</u>	<u>In/Out</u>	<u>Description</u>
SUBRAY	SUBSIZ (= 12000)	Out	Utility storage vector
SUBSIZ	1	In	Dimension of vector SUBRAY

New Control Cards:

APRIOR	(Default- omit card)		This card sets the switch to modify inter-subclass weights
BSPASS	N (no default)		N is the number of passes to be included in the best set
NCPASS	N (default 4)		N = number of channels per pass (acquisition)

Revised Control Cards:

PROCD	N (no default)		Set N = 6 to invoke the best k of N option
-------	-------------------	--	--

SETUP4 inputs a statistics file (SAVTAP) (or cards) and a feature reduction file (BMFIL).

3.2.2.4 Outputs

N/A

3.2.2.5 Storage

Code: 1772₈ Data: 1460₈

3.2.2.6 Description

Subprogram has been modified to handle three additional control cards and an expanded option list for existing control card

PROCED and print these options as part of the ordinary user input summary. Control card data or switches are passed through variables IPRIOR, KBEST and NCPASS of common block BESTKN.

3.2.2.7 Flowchart

N/A

3.2.2.8 Listing

```

00100 //SETUP4
00101 SUBROUTINE SETUP4(ARRAY, TOP, STOPFG, JTIME, SUBMAY, SUBSIZ)
00102 IMPLICIT INTEGER (A-H, O-Z)
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00103 ISET40060
00104 ISET40170
00105 ISET40180
00106 ISET40190
00107 ISET40200
00108 ISET40210
00109 ISET40220
00110 ISET40230
00111 ISET40250
00112 ISET40260
00113 ISET40280
00114 ISET40290
00115 ISET40300

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00107 INCLUDE COMBK1, LIST
00108 COMMON/INFORM/ MOC12, MUSUB2, MOCFIZ, VAR5Z2, TOTVIZ, NOFLDZ,
00109 SVAR2, COVAR2, CLSDZ, SUBNO2, SUBDSZ, FLDSV2,
00110 FETV2(30), SUBVC2(75), SUBTR(75), CLSV2(60),
00111 KEPTS(60), NUGRP, GRPNAM(60), GRPDE(161),
00112 GRPCNK(61), GROUPS(124)
00113
00114 END
00115 INCLUDE COMBK4, LIST
00116 DIMENSION HED1(10), HED2(10), DATE(2), COMENT(10)
00117 EQUIVALENCE (HED1(1), PEAD(3)), (DATE(1), HEAD(15)),
00118 (HED2(1), HED(20)), (COMENT(1), HEAD(32))
00119
00120 END
00121 DIMENSION COUVEC(23)
00122 DIMENSION HGBUF(400), NUHVEC(30), COMVEC(2)
00123 DIMENSION EQUVEC(2)
00124 DATA EQUVEC/1, 1, 1, 1/
00125 DATA COUVEC/23, 23/
00126 DATA WSIZE/400, BESIZ/100, BLANK/1H /, COMVEC/1, 1, 1/
00127 DATA STRMAY/60/
00128
00129 INCLUDE COMBK6, LIST
00130 COMMON/GLOBAL/ HEAD(42), MAPIP, DATAP, SAVTAP, HMFIL, HMFIL, BKKEY,
00131 DRUNAD, DRHMDS, PAGES17, DATFIL, STATIL, ASAY, ASAVFL,
00132 , NHSTUN, NHSTFI, SCTRUN, MAPFIL
00133
00134 END
00135 INCLUDE COMBK7, LIST
00136 COMMON/FSL/ PRCKEY, CRKEY, INCFET, INCVEC(30), ICOUNT, SETMGT,
00137 EVALBF(100), CFAC, TOTMSR, FETVCH(30), SLPMSR,
00138 , MOFET4, VAR5Z4, CORBAS, DTAB4, MGHSH14, BESTVC(10), DIVSIZ
00139 , STATKY, ADRESU, ADRESF, ADRESH, ADMSH2
00140 DOUBLE PRECISION CFAC, TOTMSR, SLPMSR
00141
00142 END
00143 INCLUDE COMBK17, LIST
00144 COMMON/BESTK/ KPPFIS(60), IPRION, KBEST, MCPASS
00145 DIMENSION PRUC(2,6), CRIT(2,3)
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00147 40. DATA CRI/AVIANCE .,THANS, DIV. ,BHATT. DIST./
00151 41. DATA PROC/EX. SEARCH ., WITHOUT RELEV.
00152 42. DATA VISION ,EVL B MATRIX, EVALUATE
00153 43. DIMENSION ARRAY(1) CARU(62)
00154 44. DIMENSION SUBRAY(1)
00155 45. -----
00156 46. SET40510
00157 47. SET40530
00158 48. SET40540
00159 49. SET40550
00160 50. SET40560
00161 51. SET40660
00162 52. -----
00163 53. NOGRP=0
00164 54. INCE=0
00165 55. NOCL=0
00166 56. NOCL2=0
00167 57. WATR=0
00168 58. EPTR=0
00169 59. GRPR=0
00170 60. ICOUNT=300
00171 61. STOPFG=0
00172 62. NOCLS2=0
00173 63. NOSUB2=0
00174 64. DAIW=0
00175 65. SETMGT=0
00176 66. WTKY = 0
00177 67. NOGRP=0
00178 68. IPRIOR = 0
00179 69. NCP=55
00180 70. DUNCHK(1)=61
00181 71. COLTIME=0
00182 72. 2 00 5 1 1 10
00183 73. 5 BESTVCI=0
00184 74. CRKEY=1
00185 75. NOFET2=0
00186 76. IFJTIME.EQ.1)GO TO 10
00187 77. WRITE(6,HEAD)
00188 78. WRITE(6,1000)
00189 79. WRITE(6,2000)CODE,CARU
00190 80. READ(5,2000)CODE,CARU
00191 81. WRITE(6,3000)CODE,CARU
00192 82. COL=0
00193 83. DO 20 IF(COUMAX
00194 84. IF(COUMAX)ENCODE)GO TO(30,40,50,60,70,80,90,120,130,140,
00195 85. 150,160,170,180,190,200,210,220,250,215,205,207,208),I
00196 86. WRITE(6,8000)
00197 87. GO TO 10
00198 88.
00199 89. CHANNELS CARD - IF B-MATRIX IS INPUT IGNORE THIS CARD
00200 90. FEATURES CARD - IF B-MATRIX IS INPUT IGNORE THIS CARD
00201 91. IF(BMSMT.EQ.1)GO TO 10
00202 92. NOFET=NUMER(CARD,COL,FET1,C2,NOFET2)
00203 93. CALL ORDER(FET1,C2,NOFET2)
00204 94. GO TO 10
00205 95. SUBCLASSES CARD
00206 96.
00207 97.

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*NE*
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SET40510
SET40530
SET40540
SET40550
SET40560
SET40660
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SET40670

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*NE*
*NE*

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INITIATE GROUP ARRAY

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*NE*
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00335 156 4=USER INPUT
00336 157 5=EVALUATE FEATURE CHANNELS
00337 158 J=NUMBER(CARD,COL,NUMVEC,0)
00338 159 PRCKEY=NUMVEC(I)
00339 160 GO TO 10
00340 161
00341 162 CRITERIA CARD 1=AVERAGE WEIGHTED DIVERGENCE
00342 163 2=TRANSFORMED DIVERGENCE
00343 164 3=BHATTACHARYYA
00344 165
00345 166 J=NUMBER(CARD,COL,NUMVEC,0)
00346 167 CRIKEY=NUMVEC(I)
00347 168 IF (CRIKEY .LT. 1 .OR. CRIKEY .GT. 3) CRIKEY = 1
00348 169 GO TO 10
00349 170
00350 171 B-MATRIX = CARDS OR FILE
00351 172 BMSWT=1 MEANS B-MATRIX INPUT AND ON FILE, NOT IN CORE
00352 173
00353 174 J=NTXTR(CARD,COL)
00354 175 BMSWT=1
00355 176 BKKEY=1
00356 177 IF (J.NE.'C') GO TO 10
00357 178 CALL BMFIL (ARKAY,NOFETZ,FETVC2,1)
00358 179 SET DATSMT BACK TO ZERO TO INDICATE STATS MAY HAVE BEEN OVERRITTEN
00359 180 DATSMT=0
00360 181 GO TO 10
00361 182
00362 183 C INCLUDE CARD - FEATURES TO BE INCLUDED IN 'BEST' SET.
00363 184 WITHOUT REPLACEMENT PROCEDURE
00364 185
00365 186 J=NUMBER(CARD,COL,NUMVEC,0)
00366 187 INCFT=NUMBER(CARD,COL,INVEC,INCFET)
00367 188 GO TO 10
00368 189
00369 190 I=COUNT CARD - NO. OF ITERATIONS FOR DAVIDON PROCEDURE
00370 191 I=COUNT(NUMVEC(I))
00371 192 GO TO 10
00372 193
00373 194 C DATE CARD
00374 195 READ(30,6000)DATE
00375 196 GO TO 10
00376 197
00377 198 C HED1 CARD
00378 199 READ(30,6000)HED1
00379 200 GO TO 10
00380 201
00381 202 C HED2 CARD
00382 203 READ(30,6000)HED2
00383 204 GO TO 10
00384 205 C APRIORI CARD
00385 206 IPRIOK = 1
00386 207 J = NUMBER(CARD,COL,NUMVEC,0)
00387 208 KREST = NUMVEC(I)
00388 209 GO TO 10
00389 210 J=NUMBER(CARD,COL,NUMVEC,0)
00390 211 NCPASS=NUMVEC(I)
00391 212
00392 213

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00504      WRITE(6,9310) (SETV2(I), I=1, NOLST)
00514      WRITE(6,9320) (SETV2(I), I=1, NOLST)
00524      IF (IMCET-0) WRITE(6,9330) (INCVEL(I), I=1, IMCFET)
00531      IF (SETMGT-0) WRITE(6,9340)
00534      IF (ATKEY-0) WRITE(6,9360)
00537      IF (SETMGT-NE-Z) AND (ATKEY-NE-1) WRITE(6,9350)
00542      IF ((PIPIOR-NE-0) .AND. WRITE(6,9370)
00545      WRITE(6,9380) MCPASS
00545
00545      PRINT OUT SAVED TRAINING FIELDS AND REDUCED COVARIANCES.
00545
00545      CALL PRFLDIARRK(COVARZ), ARRAY(AVARZ), ARRAY(FLVSU2),
00550      ARRAY(VECTZ), ARRAY(CLSIDZ), ARRAY(SUBSZ))
00550
00550      IF CLSWT OPTION IS INPUT, SET UP WEIGHT ARRAY FOR INTERCLASS
00550      SUBCLASS WEIGHTS.
00550
00550      IF (I + 1) * NTH * 4 CALL INTRG(SUBRAY(1), ARRAY(SUBHDZ), NUSUBZ, NOLLSZ)
00552      STORE FOR FIELD INFORMATION NO LONGER NEEDED.
00552      MOVE CLASS TO INFORMATION
00552      AND MEANS AND COVARIANCES.
00552
00552      ---REUSAV STORES INTO ARRAY IN THE FOLLOWING ORDER
00552      1. CLASS DESCRIPTIONS
00552      2. NO. OF SUBCLASSES IN EACH CLASS
00552      3. SUBCLASS DESCRIPTIONS
00552      4. TRAINING FIELD INFO.
00552      5. TRAINING FIELD VECTICES
00552      6. COVARIANCE MATRICES
00552      7. MEAN VECTORS
00552
00552      ITEMS 1,2,4,5 ARE NOT NEEDED AFTER PRINTING, SO THE STORAGE
00552      IS REASSIGNED AS FOLLOWS, ADDING STORAGE FOR OTHER ARRAYS.
00552      1. SUBCLASS DESCRIPTIONS
00552      2. COVARIANCE MATRICES
00552      3. MEAN VECTORS
00552      4. INTERSUBCLASS WEIGHTS
00552      5. INFORMATION CLS
00552      IN SELECT DRIVER * ARRAY IS ALSO USED TO STORE ADDITIONAL INFO.
00552
00552      CALL MOVE(ARRK(CLSIDZ), ARRAY(SUBSZ), NUSUBZ)
00552      SUBSZ=CLSIDZ
00552      NUSUBZ = NUSUBZ
00552      IARDS = (IARDSZ+NYJFETZ) * NUSUBZ
00552      CALL MOVE(ARRK(IARDS), ARRAY(COVARZ), IARDS)
00552      COVARZ=IARDS
00552      AVARZ=COVARZ + NUSUBZ * VARSZ
00552
00552      FROM HERE ON THROUGH SELECT SUBCLASSES ARE REFERRED TO AS CLASSES
00552      NOLLSZ=NUSUBZ
00552
00552      COMPUTE BASES FOR OTHER ARRAYS.
00552
00552      DIVSIZ=NOLLSZ * INCLSZ-11/2
00552      NMSI4=AVARZ + NOLLSZ * NOLLSZ
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00647 C* ROUTINE BREAKS DOWN CLASS PAIRS INTO INTERSUBCLASS PAIRS AND ASSIGNS
00648 C* CLASS(I),CLASS(J) WEIGHT = 1.0 (I=NE-J)
00649 C* CLASS(I),CLASS(J) WEIGHT = 0.0 (I=EQ-J)
00650 C*
00651 SUBROUTINE INTWGT(SUBWGT,CLSUB,NOSUB2,NOCLS2)
00652 REAL SUBWGT(NOSUB2,NOSUB2)
00653 DIMENSION CLSUB(NOCLS2)
00654 IMPLICIT INTEGER(A-H,U-Z)
00655 C*
00656 C* INITIALIZE ALL SUBCLASS WEIGHT PAIRS TO U.U IN WORKING ARRAY
00657 C*
00658 DO 100 IK=1,NOSUB2
00659 DO 100 JK=1,NOSUB2
00660 SUBWGT(IK,JK) = 0.0
00661 100 SUBWGT(IK,JK) = 0.0
00662 C*
00663 C* REPLACE INTERCLASS SUBCLASS PAIRS WITH WEIGHT = 1.0
00664 C*
00665 ENDI = 0
00666 NK = NOCLS2 - 1
00667 DO 200 KI = 1,NK
00668 JJI = CLSUB(KI)
00669 STARTI = ENDI + 1
00670 ENDI = STARTI + JJI - 1
00671 DO 300 I = STARTI,ENDI
00672 EN2 = ENDI
00673 D = KI + 1
00674 DO 400 K2 = D,NOCLS2
00675 JJ2 = CLSUB(K2)
00676 START2 = EN2 + 1
00677 EN2 = START2 + JJ2 - 1
00678 DO 500 N = START2,END2
00679 SUBWGT(I,N) = 1.0
00680 SUBWGT(N,I) = 1.0
00681 500 CONTINUE
00682 300 CONTINUE
00683 200 CONTINUE
00684 RETURN
00685 END

```

SETUP4

END OF COMPILATION: NO DIAGNOSTICS.
 SETUP4 CODE RELOCATABLE

20 JUN 77 01:59:42 0 03102540 14 410 (DELETC)
 20 JUN 77 01:59:42 0 0174276 14 123 (DELETC)

3.2.3 SOFTWARE COMPONENT NO. 3 (PRELIM)

Subprogram PRELIM sets up the separability measures for the full set of channels specified by the user. This measure is either average divergence, transformed divergence, or Bhattacharriya distance. It also computes, an option, the inter-subclass weighting factors based on number of pixels per cluster and multiplies the weights by these factors.

3.2.3.1 Linkages

Subprogram PRELIM is called by routine SELECT and calls DIVERG, AVEDIV, TRNDIV, BHTCHR, RWRITE, and ARITHMETIC routines SQRT and DEXP.

3.2.3.2 Interfaces

PRELIM interfaces with other routines through a calling sequence and common blocks LNFORM, FSL, and BESTKN.

3.2.3.2 Inputs

Calling Sequence:

Subr. PRELIM (COVMTX, AVEMTX, DIVTAB, WEIGHT, S, WRKRY, WRKSIZ)

<u>Parameter</u>	<u>Dimension</u>	<u>In/Out</u>	<u>Description</u>
COVMTX	(VARSZ2, NOCLS2)	In/Out	Subclass covariance matrices (lower triangular)
AVEMTX	(NOFET2, NOCLS2)	In/Out	Subclass mean vectors
DIVTAB	(DIVSTI2)	In/Out	Double Precision Inter-subclass divergences or distances
WEIGHT	(DIVSI2)	In/Out	Inter-subclass weights

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2, 2

<u>Parameter</u>	<u>Dimension</u>	<u>In/Out</u>	<u>Description</u>
S	(VAR SZ2, NOCLS2)	Out	"S" matrices computed if CRIKEY = 1
WRKRY	(WRKSIZ)	In/Out	Double Precision storage for feature subset covariance matrices and mean vectors
WRKSIZ	1	In	Computed as 12000 - SBASE in SELECT. SBASE = 1 if CRIKEY #1 = 2+ NOCLS2*VAR SZ2 if CRIKEY=1

3.2.3.4 Outputs

N/A

3.2.3.5 Storage

Code: 671₈ Data: 1664₈

3.2.3.6 Description

The changes to subprogram PRELIM involve the computation of the weighting factors and subsequent multiplication of the weights. These factors are computed from the KPPPTS array in newly-added labeled common /BESTKN/ which holds the number of pixels per cluster.

3.2.3.7 Flowchart

N/A

3.2.3.8 Listing

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6 IF (IPKIDREX.N) GO TO 9
7 DO 7 I=1, DIVSZ
8 WEGHT(I) = WEIGHT(I)*APR*HT(I)
9 CONTINUE
C* SET IPART 50 PARTIALS WILL NOT BE COMPUTED.
IPART=1
IFULL=1
GO TO(10,70,80,90),CKREY
C* CRITERIA - WEIGHTED AVERAGE DIVERGENCE
--COMPUTE INTERCLASS DIVERGENCES
--SET WEIGHTS, IF SETWGT=0
--COMPUTE S-MATRICES
--COMPUTE WEIGHTED AVERAGE DIVERGENCE FOR ALL FEATURES
10 CALL DIVERG((COVHTX,VARXZ2,AVEMTX,DIVTAB,NOCLS2,HOFETZ,
* PRKRY,WRKSIZ)
IF (SETWGT.NE.0) GO TO 25
WEGHT(K) = DIVTAB(DIVTAB(K)/I*)
WEGHT(I) = IPART*WEGHT(I)
11 COMPUTE S-MATRICES
CONTINUE
DO 30 J=1,NOCLS2
DO 30 I=1,VARXZ2
S(I,J)=0
NC=NOCLS2-I
DO 60 N=1,NOCLS2
SELECT ALL WEIGHTS FOR CLASS N
C*
C*
C*
KTED
K=0
MN=0
DO 35 J=1,NC
DO 35 I=J,NOCLS2
K=K+1
IF (J.NE.M.AND.I.NE.N) GO TO 35
KT=KI+1
TWIK(I)=WEIGHT(K)
35 CONTINUE
DO 50 N=1,NOCLS2
IF (M.EQ.N) GO TO 50
MN=MN+1
DO 40 I=1,HOFETZ
DO 40 J=1,HOFETZ
DO 45 I=1,HOFETZ
DO 45 K=1,I
S(J,N)=S(J,N)+I*(MN)*((COVHTX(J,M)+I(I))*T(K))
50 CONTINUE
60 CONTINUE
CFAC=0
C*
DO 65 I=1, DIVSZ
65 CFAC = CFAC + WEIGHT(I)

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00321 98* CFAC=L/CFAC
00321 99* COMPUTE AVERAGE WEIGHTED DIVERGENCE
00322 100* CALL AVEWGT(DTMSR,COVRTX,S,DUM,DUM,WRKRY,WRKSIZ,
00322 101* IPART,DUM,DUM,IFULL)
00323 102* TOTMSR=ABS(TOTMSR)
00324 103* GO TO 85
00324 104* C* CRITERIA - WEIGHTED AVERAGE TRANSFORMED DIVERGENCE
00324 105* C*
00324 106* C*
00324 107* C*
00324 108* C*
00325 109* 70 CALL TRMDIV(TOTMSR,COVRTX,AVENTX,DUM,DUM,WEIGHT,DIVTAB,
00325 110* WRKRY,WRKSIZ,IPART,DUM,DUM,IFULL)
00326 111* GO TO 85
00326 112* C* CRITERIA - BHATTACHARYA DISTANCE
00326 113* C*
00327 114* 80 CALL BHCHRT(DTMSR,COVRTX,AVENTX,WEIGHT,DIVTAB,DUM,DUM,
00327 115* WRKRY,WRKSIZ,IPART,DUM,DUM,IFULL)
00327 116* C* SAVE INTERCLASS WEIGHTS ON DRUM
00327 117* 85 IQ=DIVSIZ*2
00330 118* CALL RNITE(ADRFS,DIVTAB,IO,ISTAT)
00331 119* 86 IF(ISTAT.EQ.1)GO TO 80
00334 120* 90 RETURN
00335 121* END

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END OF COMPILATION: NO DIAGNOSTICS.
PRELIM CODE SYMBOLIC RELOCATABLE

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20 JUN 77 01:57:38 0 02672142 14 104 (DELETED)
20 JUN 77 01:57:38 1 01662354 36 1 (DELETED)
0 01662420 14 57

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3:17:50.511

18 NOV 77

* FOR DIVERG, DIVERG
UNIVAC 1108 FORTHAN V EXLC II LEVEL 25A --TELECR LEVEL E12U10U10A1
THIS COMPILATION WAS DONE ON 18 NOV 77 AT 03:17:50

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3.2.4 SOFTWARE COMPONENT NO. 4 (GTSTAT)

Subprogram GTSTAT acquires the reduced feature covariance matrices and mean vectors for each subclass.

3.2.4.1 Linkages

Subprogram GTSTAT is called by EXSRCH, WHRPLC, FINT, USERIN, EVLFET, and calls subprogram TRNSFR.

3.2.4.2 Interfaces

GTSTAT interfaces with other routines through a calling sequence and common blocks INFORM and FSL.

3.2.4.3 Inputs

Calling Sequence:

Subr GTSTAT (COVMTX, AVEMTX, S, COVMT2, AVEMT2, S2, VEC, BMAT, WRKRY, IWRKSZ)

<u>Parameter</u>	<u>Dimension</u>	<u>In/Out</u>	<u>Description</u>
COVMTX	(VARSZ2,NOCLS2)	In	Covariance matrices
AVEMTX	(NOFET2,NOCLS2)	In	Mean vectors
S	(VARSZ2,NOCLS2)	In	S matrices
COVMT2	(VARSZ4,NOCLS2)	Out	Double Precision reduced covariance matrices
AVEMT2	(NOFET4,NOCLS2)	Out	Double Precision reduced mean vectors
S2	(VARSZ4,NOCLS2)	Out	Double Precision reduced S matrices
VEC	NOFET4	In	Reduced channel set

<u>Parameter</u>	<u>Dimension</u>	<u>In/Out</u>	<u>Description</u>
BMAT	NOFET2*NOFET4	In	Double Precision B-matrix for linear combination of channels (PRICKEY = 3 or 4)
WRKRY	IWRKSZ	In/Out	Double Precision
IWRKSZ	1	In	See WKRSIZ parameter PRELIM subprogram

3.2.4.4 Outputs

N/A

3.2.4.5 Storage

Code: 456₈ Data: 104₈

3.2.4.6 Description

The change to GTSTAT consists of a transfer if PRCKEY=G to the channel reduction section. This is the same location reached for PRCKEY = 1,2, and 5.

3.2.4.7 Flowchart

N/A

3.2.4.8 Listing


```

00101 1. SUBROUTINE GSTAT(COVRTX,AVEMTAS,COVRTZ,AVEMTZ,AVEMTZS2,
00101 2. VEC,BMAT,IRKRY,IRKRSZ)
00101 3.
00101 4. THIS SUBROUTINE SELECTS THE SUBSETS OF THE STATISTICAL
00101 5. PARAMETERS COVRTX,AVEMTAS AND S DEFINED BY VEC OR BMAT AND
00101 6. STORES THE SUBSETS INTO COVRTZ,AVEMTZ, AND S2 RESPECTIVELY.
00101 7.
00101 8. INCLUDE COMBK1.LIST
00104
00104 8. COMMON/INFORM/NOCLS2,RUSUB4,NOLETZ,VARSZ,TDVTZ,NOFLDZ,
00104 9. AVARZ,CUVARZ,CLS2,SUBNOZ,SUBDSZ,FLDSVZ,VERTZ,
00104 10. FEPSZ(JB),SUBVEZ(JB),SUBPTRZ(JB),CLSVCZ(6D),
00104 11. AEPZ(6D),RGRK,GRPMAT(6D),GRPDE(16I),
00104 12. GRPCR(6I),GRGPP(12I)
00104 13.
00104 14. END
00104 15. INCLUDE COMBK7.LIST
00104 16. COMMON/SLPRKKEY,CRKEY,INCFEI,INCFEC(3U),ICOUNT,SET*GT,
00104 17. EVALBF(10D),CFAS,TOIHSR,FEI*CH(4U),SEPMSE,
00104 18. *NOFLY,VARSZ,CURK*SDI*4,GRHSI*4,BESTVC(10),DIVSZ
00104 19. ,STATK,ADRESO,ADRESP,ADRESF,ADRSHI,ADRSH2,STATKY
00104 20. ,DOUBLE PRECISION CFAC,TOIHSR,SEPMSE
00104 21. END
00104 22. INTEGER PRCKEY,CRKEY,VEC,VARSZ,VARSZ4
00104 23. DOUBLE PRECISION COVRTX,AVEMTZ,S2,BMAT,IRKRY(1),SJM
00104 24. DIMENSION COVRTX(VARSZ,NOCLS2), COVRTZ(VARSZ,NOCLS2),
00104 25. AVEMTZ(VARSZ,NOCLS2), AVEMTZ(ROFET4,NOCLS2),
00104 26. S2(VARSZ,NOCLS2),S2(VARSZ,NOCLS2),VEC(1),
00104 27. BMAT(ROFET4,NOFET2)
00104 28.
00104 29. IF WITHOUT REPLACEMENT OR LX SEARCH PROCEDURE, SELECT ELEMENTS
00104 30. DETERMINED BY VEC
00104 31. CONTINUE(5,20,2D,5),PRCALY
00104 32. DO 10 I=1,NOCLS2
00104 33. IK=0
00104 34. DO 10 J=1,ROFET4
00104 35. K=VEL(J)
00104 36. LOC=K*(K-1)/2
00104 37. AVEMTZ(I,J)=AVEMT(K,I)
00104 38. DO 10 L=1,J
00104 39. IK=IK+1
00104 40. IM=VEL(L)+LOC
00104 41. COVRTZ(IK,I)=COVRTX(IM,I)
00104 42. IF(LRINEY,ME,1)GO TO 10
00104 43. S2(IK,I)=S2(IM,I)
00104 44. CONTINUE
00104 45. RETURN
00104 46.
00104 47. COMMON/INFORM OR USER INPUT PROCEDURE, MULTIPLY B-MATRIX
00104 48. CONTINUE
00104 49. TEST=101+NOFETZ*NOFET4
00104 50. IF(IRKRSZ,TEST)GO TO 30
00104 51. WRITE(6,100)IRKRSZ
00104 52. CALL CBERK
00104 53. CONTINUE
00104 54. DO 80 I=1,NOCLS2
00104 55. DO 60 J=1,NOFET4
00104 56. SUM=0.0
00104 57. DO 50 K=1,ROFETZ
00104 58. SUM=SUM+AVEMT(K,I)+BMAT(J,K)
00104 59. AVEMTZ(I,J)=SUM
00104 60. CONTINUE
00104 61. CALL TRANSR(COVRTX,COVRTZ,IRKRY(IM,I),BMAT)
00104 62. IF(CRKEY,1)CALL TRANSR(S2,IRKRY(IAI),BMAT)
00104 63.
00205 RETURN
00206 FORMATTED PRINT USING A,B,C G-PA E-PA I-PA J-PA K-PA L-PA M-PA N-PA O-PA P-PA Q-PA R-PA S-PA T-PA U-PA V-PA W-PA X-PA Y-PA Z-PA
00207 END

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3.2.5 SOFTWARE COMPONENT NO. 5 (GENRPT)

Subprogram GENRPT handles the reporting of results through printer output.

3.2.5.1 Linkages

GENRPT is called by routine SELECT, and calls UNIVAC RANDIO routine RREAD.

3.2.5.2 Interfaces

GENRPT interfaces with other routines through a calling sequence and common blocks GLOBAL, FSL, and INFORM.

3.2.5.3 Inputs

Calling Sequences

Subr. GENRPT (CLSNAM, WEIGHT, PIVTAB, WRKRY, IWRKSZ, FEJVEC)

<u>Parameter</u>	<u>Dimension</u>	<u>In/Out</u>	<u>Description</u>
CLSNAM	(NOCLSZ)	In	Class names
WEIGHT	(DIVISZ)	In	inter-subclass weights
DIVTAB	(DIVSIZ)	In	Double Precision inter-subclass separabilities
WRKRY	IWRKSZ	In	Double Precision separabilities for full feature set
IWRKSZ	1	In	See WRKSIZ parameter of routine PRELIM
FETVEC	30	In	Selected features

3.2.5.4 Outputs

Printed reports are outputted.

3.2.5.5 Storage

Code: 1116_g Data: 523_g

3.2.5.6 Description

The changes to GENRPT consist of provisions for extra printout if PRCKEY=6.

3.2.5.7 Flowchart

N/A

3.2.5.8 Listings

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00101 SUBROUTINE GENRPT(CLSNAM,WEIGHT,DIVTAB,WRKRY,IGRSZ,FETVEC)
00102 DIMENSION CLSNAM(100),DIVTAB(1),WRKRY(1),EIGHT(1)
00103 INCLUDE COMBK,LIST,42,MARTAP,DATEP,SAVTAP,BRFILE,BMKEY
00104 COMMON/GLOBAL/MSL,KEY,TRD,DATEP,IP,EMPRE,FA,UNT,NOFIL,
00105 DRUMAD,DRMADS,PAGSZ,DATEF,STAFIL,ASAV,ASAVFL
00106 *NASTUN,MSTFI,STRUN,MAFILL
00107 *DOTUNT,DOTFIL
00108 END
00109 DOUBLE PRECISION RATIO
00110 DOUBLE PRECISION WRKRY,DIVTAB
00111 DIMENSION FETVEC(30)
00112 INCLUDE COMBK,LIST
00113 COMMON/INFORM/NOCLS2,NOSUR2,NOFET2,VARSZ2,TOTVTZ,NOFLDZ,
00114 AVARZ,CVARZ,CLSIDZ,SUBNOZ,SUBP(175),FLDSVZ,VENTXZ,
00115 FETVCZ(30),SUBVCZ(75),SUBPTR(75),ELSYCZ(60),
00116 KEPTTS(60),NOGRP,GRPNAM(60),GRPDEK(61),
00117 GRPCHK(61),GROUPS(124)
00118 END
00119 INCLUDE COMBK,LIST
00120 COMMON/FSL/PRCKT,CRKEY,INCFET,INCVEC(30),ICOUNT,SETMGT,
00121 EVALRF(100),CFAC,TOHMR,FETVC(410),SEPHSR
00122 *MRELY,VARSZ,COMBA,DTAM,NGMSH1,BESTVC(10),DIVSIZ
00123 *STATKY,ADRES0,ADRESF,ADRESH,ADMSH2
00124 *INTE *ADRES0,ADRESF,ADRESH,ADMSH1,ADMSH2,STATKY
00125 *DOUBLE PRECISION CPAC,TOHMR,SEPHSR
00126 END
00127 INTEGER CRKEY,PKCKEY
00128 DIMENSION PRC(14),CRI(19,4)
00129 *EXHAUSTIVE SEARCH
00130 DATA PRC/
00131 *WITHOUT REPLACEMENT
00132 *DAVID00--FLETCHER
00133 *EVAL. B--MATRIX REQUEST
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00102 2
00103 3
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00105 3
00106 3
00107 3
00108 3
00109 4
00110 5
00111 6
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00122 9
00123 10
00124 11
00125 12
00126 13
00127 14

```

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00446
00447
00448
00450
00451
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00453

131. * T80, * ALL CHANNELS, * I99, * (RATIO,)
132. * 200, * FORMAT, * I22, * SUBCLASS, * PAIR, * I41, * *EIGHT, * T58, * LINEAR COMBINATION
133. * * T80, * ALL CHANNELS, * I99, * (RATIO,)
134. * * 200, * FORMAT, * I22, * SUBCLASS, * PAIR, * I41, * *EIGHT, * T58, * EVALUATED CHANNELS
135. * * T80, * ALL CHANNELS, * I99, * (RATIO,)
136. * * 210, * FORMAT, * I18, * *A, * *A, * *E, * T58, * * T80, * DI, * 8, * T78, * 014, * 8, * I96, * 014, * 8
137. * RETURN
138. * END

END OF COMPILATION: NO DIAGNOSTICS.
GENRPT CODE SYMBOLIC
RELOCATABLE

20 JUN 77 01:54:51 0 02927170 13 137 (DELETED)
20 JUN 77 01:54:51 0 01557470 14 138 (DELETED)
01557534 14 07

DELETED

3-33

FOR * HEDDAI, HEDDAI EXEC II LEVEL 25A - (EALC8 LEVEL E12010010A)
UNIT C I JOB TERMINATION WAS JUNE 01 18 NOV 77 AT 03:16:50
THIS COMPILATION WAS

18 NOV 77

3:16:59.203

3.2.6 SOFTWARE COMPONENT NO. 6 (REDDAT)

Subprogram REDDAT is one of a set of utility routines involved with reading statistics files.

3.2.6.1 Linkages

REDDAT is called by REDSAV.

3.2.6.2 Interfaces

REDDAT interfaces with other routines through a calling sequence and common blocks INFORM, GLOBAL and BESTKN.

3.2.6.3 Inputs

Calling Sequence:

Subr. REDDAT (COVAR, AVAR, CLSDS, SUBNO, SUBDES, FLDSAV, VERTEX,
COV, AVEN, CLSDS, SUBNOS, SUBDS, FLDSV, VERTX,
NOFEAT, VARSIZ, NOCLS, NOFLD, NOSVB, FETVEC)

These parameters are all associated with statistics file (SAVTAP) information.

3.2.6.4 Outputs

N/A

3.2.6.5 Storage

Code: 1014₈ Data: 212₈

3.2.6.6 Description

The additions to REDDAT involve the storage of the number of points per subclass (after grouping) into array KPPPTS of the newly-added common block BESTKN.

3.2.6.7 Flowchart

N/A

3.2.6.8 Listing


```

00123 32.
00124 33.
00125 34.
00126 35.
00127 36.
00128 37.
00129 38.
00130 39.
00131 40.
00132 41.
00133 42.
00134 43.
00135 44.
00136 45.
00137 46.
00138 47.
00139 48.
00140 49.
00141 50.
00142 51.
00143 52.
00144 53.
00145 54.
00146 55.
00147 56.
00148 57.
00149 58.
00150 59.
00151 60.
00152 61.
00153 62.
00154 63.
00155 64.
00156 65.
00157 66.
00158 67.
00159 68.
00160 69.
00161 70.
00162 71.
00163 72.
00164 73.
00165 74.
00166 75.
00167 76.
00168 77.
00169 78.
00170 79.
00171 80.
00172 81.
00173 82.
00174 83.
00175 84.
00176 85.
00177 86.
00178 87.
00179 88.
00180 89.

150 CLSDS(I) = CLSDS(I)
    SUBNOST(I) = SUBNOST(I)
C    REDUCE SUBCLASS DESCRIPTIONS
C
C    DO 160 I=1,NOSUBZ
160 SUBDSY(I) = SUBDSY(I)
C
C    REDUCE FIELD INFORMATION
C
C    DO 170 I=1,NOFLOZ
170 FLDSV(I,J) = FLDSV(I,J)
C
C    REDUCE VERTICES
C    DO 180 I=1,TOYVTZ
180 VERTX(I,J) = VERTX(I,J)
C
C    ZERO OUT JUST PORTION OF COVAR THAT WILL CONTAIN SUBCLASSES
C    THAT HAVE BEEN GROUPED
C
C    DO 200 J=1,NOGRP
200 COVAR(I,J,KK) = 0.0
C
C
C
C    CHECK CLASSIFICATION CHANNELS AGAINST TRAINING CHANNELS
C
C    DO 220 J=1,NOFETZ
220 IF (FETVC2(J) .EQ. FETVEC(I)) GO TO 220
WRITE(I,230) FETVC2(J),FETVEC(I),K=1,NOFETZ
230 FORMAT(1X,'TRAINING CHANNELS ARE -',10X,30(12:1X))
CALL EXIT
C
C    DO 100 JJ=1,NOSUB
100 IF (SUBPTR(JJ) .LE. 0) READ(SAVTAP) DUMMY
IF (SUBPTR(JJ) .LE. 0) GO TO 100
READ(SAVTAP)KEPPIS(JJ),COV,(AVAR(I,JJ),I=1,NOFETZ)
C
C    REDUCE BY CHANNELS
C
C    NE4SUB = SUBPTR(JJ)
KK = 0
DO 20 J=1,NOFETZ
20 LOC = K*(K-1)/2
DO 40 L=1,J
40 KK = KK + 1
MAT = LOC + DUHVEC(L)
40 COV(KK) = COV(MAT)

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00262 20 AVAR(J,JJ) = AVAR(K,JJ)
00263 GROUP SUBCLASSES
00264 IF (GRPCHK(JJ) .LE. 0) GO TO 60
00265 KK = 0
00266 DO 50 J1=1,NOFETZ
00267 DO 50 J2=1,J1
00268 KK = KK + 1
00269 R = COVAR(KK,NEWSUB)
00270 COVAR(KK,NEWSUB) = R + (COV(KK) * KEPPTS(JJ) - 1) +
00271 (AVAR(J1,JJ) * AVAR(J2,JJ) * KEPPTS(JJ))
00272
00273 50 CONTINUE
00274 GO TO 100
00275 60 DO 70 I=1,VARSZZ
00276 70 COVAR(I,NEWSUB) = COV(I)
00277 100 CONTINUE
00278
00279 C
00280 C
00281 C
00282 C
00283 GROUP MEANS
00284 DO 125 I=1,NOGRP
00285 KB = GRPDEX(I) + 1
00286 KE = KB + GROUPS(KH-1) - 1
00287 KBI = GROUPS(KB)
00288 IF (KB .GE. KE) GO TO 130
00289 DO 120 J=1,NOFETZ
00290 R = 0.0
00291 KPTS = 0
00292 DO 110 K=KB,KE
00293 KB2 = GROUPS(K)
00294 KPTS = KPTS + NEPPTS(KB2)
00295 110 R = R + AVAR(J,KB2) * KEPPTS(KB2)
00296 120 AVAR(J,KBI) = R / KPTS
00297 KEPPTS(KBI) = KPTS
00298 JJ = SUBTR(I,1)
00299 NEWSUB = SUBTR(I,1)
00300 DO 123 J1=1,NOFETZ
00301 DO 123 J2=1,J1
00302 JJ = JJ + 1
00303 123 COVAR(JJ,NEWSUB) = (COVAR(JJ,NEWSUB) - (AVAR(J1,KBI) *
00304 AVAR(J2,KBI)) * KPTS) / (KPTS - 1)
00305
00306 125 CONTINUE
00307 REDUCE MEANS
00308 DO 130 K=1,NO SUB82
00309 II = SUBVCZ(K)
00310 KPPPTS(K) = KEPPTS(II)
00311 DO 140 J=1,NOFETZ
00312 AVEN(J,K) = AVAR(J,II)
00313
00314 C
00315 C
00316 C
00317 C
00318 RETURN
00319 END
00320
00321
00322
00323
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00329
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00331
00332
00333
00334
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END OF COMPILATION: NO DIAGNOSTICS.
REDDAT CODE RELOCATABLE
16 JUL 77 13:03:59 0 03406650 36 139 (DELETED)
02860666 36 139 (DELETED)

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4. OPERATION

For the duration of the UNIVAC 1108 EXEC 2 system implementation, these options are included in the EOD-LARSYS system by means of PCF tapes X23778 and X14135. One of these tapes should be referenced as unit 2 in run setups.

These options are also included in the EOD-LARSYS implementation on the Purdue-LARS 370/148 system. Detailed instructions on the usage of this system will be provided at a later date.