```
 1 *------------------------------------------------------------
   --*
 2 User:                  u63452984
 3 Date:                  07 January 2024
 4 Time:                  05:58:59
 5 Site:                  70094220
 6 Platform:              Linux
 7 Maintenance Release: 9.04.01M7P080620
 8 EM Version:            15.2
 9 *
10 *------------------------------------------------------------
   --*
11 * Training Log
12 Date:                  07 January 2024
13 Time:                  05:58:56
14 *------------------------------------------------------------
   --*
15 15241  proc freq data=EMWS3.Tree2_VariableSet noprint;
16 15242  table ROLE*LEVEL/out=WORK.Tree2META;
17 15243  run;
18 15244  proc print data=WORK.Tree2META label noobs;
19 15245  var ROLE LEVEL COUNT;
20 15246  label ROLE = "%sysfunc(sasmsg(sashelp.dmine, meta_ro
   le_vlabel, NOQUOTE))" LEVEL = "%sysfunc(sasmsg(sashelp.dmin
   e, meta_level_vlabel, NOQUOTE))" COUNT = "%sysfunc(sasmsg(s
   ashelp.dmine, rpt_count_vlabel, NOQUOTE))";
21 15247  title9 ' ';
22 15248  title10 "%sysfunc(sasmsg(sashelp.dmine, rpt_varSumma
   ry_title  , NOQUOTE))";
23 15249  run;
24 15250  title10;
25 15251  %let EMNORLEN = %DMNORLEN;
26 EMWS3.Part2_TRAIN EMWS3.Part2_TRAIN
27 EMWS3.Part2_TRAIN EMWS3.Part2_TRAIN EMWS3 Part2_TRAIN
28 EMWS3.Part2_TRAIN EMWS3.Part2_TRAIN
29 EMWS3.Part2_TRAIN EMWS3.Part2_TRAIN EMWS3 Part2_TRAIN
```

```
30 Executing  SASHELP.EMCORE.EMINFOITERATOR.SCL _INIT >>
31 Executing  SASHELP.EMCORE.EMINFOITERATOR.SCL setMetaData >>
32 Executing  SASHELP.EMCORE.EMINFOITERATOR.SCL next >>
33 Executing  SASHELP.EMCORE.EMINFOITERATOR.SCL setMetaData >>
34 Executing  SASHELP.EMCORE.EMINFOITERATOR.SCL next >>
35 Executing  SASHELP.EMCORE.EMINFOITERATOR.SCL _term >>
36 15298  data WORK.Tree2_EVENT(KEEP=VARIABLE LABEL LEVEL EVEN
   T NUMLEVELS ORDER);
37 15299  length ORDER $20;
38 15300  label VARIABLE = "%sysfunc(sasmsg(sashelp.dmine, rpt
   _target_vlabel,  NOQUOTE))" EVENT = "%sysfunc(sasmsg(sashel
   p.dmine, assmt_event_vlabel, NOQUOTE))" NUMLEVELS = "%sysfu
   nc(sasmsg(sashelp.dmine, rpt_numcat_vlabel, NOQUOTE))" LEVE
   L =
39 15301     "%sysfunc(sasmsg(sashelp.dmine, meta_level_vlabel
   , NOQUOTE))" ORDER = "%sysfunc(sasmsg(sashelp.dmine, meta_o
   rder_vlabel, NOQUOTE))" LABEL = "%sysfunc(sasmsg(sashelp.dm
   ine, meta_label_vlabel, NOQUOTE))";
40 15302  set EMWS3.TREE2_IMP_CHURN_DM( where=(_TYPE_="TARGET"
   ));
41 15303  NumLevels=2;
42 15304  select(upcase(ORDER));
43 15305  when('DESC') ORDER = 'Descending';
44 15306  when('ASC') ORDER = 'Ascending';
45 15307  when('FMTDESC') ORDER = 'Formatted Descending';
46 15308  when('FMTASC') ORDER = 'Formatted Ascending';
47 15309  otherwise ORDER = 'Descending';
48 15310  end;
49 15311  output;
50 15312  run;
51 15313  title9 ' ';
52 15314  proc print data=WORK.Tree2_EVENT noobs label;
53 15315  var VARIABLE EVENT LEVEL NUMLEVELS ORDER LABEL;
54 15316  title9 ' ';
55 15317  title10 "%sysfunc(sasmsg(sashelp.dmine, rpt_modelEve
   nt_title  , NOQUOTE))";
```

```
56 15318  run;
57 15319  title10;
58 "No decisions defined for target "IMP_Churn"."
59 15320  proc print data = EMWS3.Tree2_IMP_Churn_DM noobs lab
   el;
60 15321  var _type_ variable label;
61 15322  where _type_ ^in('MATRIX', 'DECISION', 'TRAINPRIOR',
    'DATAPRIOR', 'DECPRIOR');
62 15323  label _TYPE_ = "%sysfunc(sasmsg(sashelp.dmine, rpt_t
   ype_vlabel,     NOQUOTE))" VARIABLE = "%sysfunc(sasmsg(sash
   elp.dmine, rpt_variable_vlabel, NOQUOTE))" LABEL = "%sysfun
   c(sasmsg(sashelp.dmine, meta_label_vlabel, NOQUOTE))";
63 15324  title9 ' ';
64 15325  title10 "%sysfunc(sasmsg(sashelp.dmine, rpt_predDecV
   ars_title  , NOQUOTE))";
65 15326  run;
66 15327  title10;
67 15328  %let EMEXCEPTIONSTRING=;
68 PERFORMANCE  DETAILS
69 15850  *-------------------------------------------------
   ---------*;
70 15851  * Tree2: Generation of macros and macro variables;
71 15852  * To see the code generated, set the EM_DEBUG macro
   variable to SOURCE or _ALL_;
72 15853  *-------------------------------------------------
   ---------*;
73
74 15854  %let EMEXCEPTIONSTRING=;
75 15855  *-------------------------------------------------
   ---------*;
76 15856  * TRAIN: Tree2;
77 15857  *-------------------------------------------------
   ---------*;
78 15858  %let EM_ACTION = TRAIN;
79 15859  %let syscc = 0;
80 15860  %macro main;
```

```
 81 15861
 82 15862    %if %upcase(&EM_ACTION) = CREATE %then %do;
 83 15863      filename temp catalog 'sashelp.emmodl.tree_creat
    e.source';
 84 15864      %include temp;
 85 15865      filename temp;
 86 15866
 87 15867      %em_tree_create;
 88 15868    %end;
 89 15869
 90 15870     %else
 91 15871     %if %upcase(&EM_ACTION) = TRAIN %then %do;
 92 15872
 93 15873         filename temp catalog 'sashelp.emmodl.tree_tr
    ain.source';
 94 15874         %include temp;
 95 15875         filename temp;
 96 15876         %em_tree_train;
 97 15877     %end;
 98 15878
 99 15879    %else
100 15880    %if %upcase(&EM_ACTION) = SCORE %then %do;
101 15881      filename temp catalog 'sashelp.emmodl.tree_score
    .source';
102 15882      %include temp;
103 15883      filename temp;
104 15884
105 15885      %em_tree_score;
106 15886
107 15887    %end;
108 15888
109 15889    %else
110 15890    %if %upcase(&EM_ACTION) = REPORT %then %do;
111 15891
112 15892         filename temp catalog 'sashelp.emmodl.tree_re
    port.source';
```

```
113  15893         %include temp;
114  15894         filename temp;
115  15895
116  15896         %em_tree_report;
117  15897      %end;
118  15898
119  15899    %else
120  15900    %if %upcase(&EM_ACTION) = OPENINT %then %do;
121  15901
122  15902         filename temp catalog 'sashelp.emmodl.tree_ac
     tions.source';
123  15903         %include temp;
124  15904         filename temp;
125  15905         %EM_TREE_OPENTREEVIEWER;
126  15906
127  15907      %end;
128  15908
129  15909    %else
130  15910    %if %upcase(&EM_ACTION) = CLOSEINT %then %do;
131  15911
132  15912         filename temp catalog 'sashelp.emmodl.tree_ac
     tions.source';
133  15913         %include temp;
134  15914         filename temp;
135  15915         %EM_TREE_CLOSETREEVIEWER;
136  15916
137  15917      %end;
138  15918
139  15919
140  15920      %doendm:
141  15921   %mend main;
142  15922
143  15923   %main;
144  NOTE: %INCLUDE (level 1) file TEMP is file SASHELP.EMMODL.T
     REE_TRAIN.SOURCE.
145  15925 +%macro em_tree_train;
```

```
146 15927 +   %if &EM_IMPORT_DATA eq %then %do;
147 15928 +       %let EMEXCEPTIONSTRING = exception.server.IMP
    ORT.NOTRAIN,1;
148 15929 +       %put &em_codebar;
149 15930 +       %let errormsg = %sysfunc(sasmsg(sashelp.dmine
    , error_nodeTrainRawData_note, NOQUOTE));
150 15931 +       %put &errormsg;
151 15932 +       %put &em_codebar;
152 15933 +       %goto doendm;
153 15934 +   %end;
154 15935 +   %else
155 15936 +       %let EMEXCEPTIONSTRING =;
156 15938 +   %if  &EM_NUM_TARGET lt 1 %then %do;
157 15939 +        %let EMEXCEPTIONSTRING = exception.server.US
    E1TARGET;
158 15940 +        %put &em_codebar;
159 15941 +        %let errormsg = %sysfunc(sasmsg(sashelp.dmin
    e, metadata.use01target_err, NOQUOTE));
160 15942 +        %put &errormsg;
161 15943 +        %put &em_codebar;
162 15944 +        %goto doendm;
163 15945 +   %end;
164 15947 +   %if  (&EM_NUM_INTERVAL_INPUT < 1) and (&EM_NUM_BI
    NARY_INPUT < 1) and (&EM_NUM_ORDINAL_INPUT < 1)
165 15948 +        and (&EM_NUM_NOMINAL_INPUT < 1) and (&EM_NUM
    _INTERVAL_REJECTED < 1) and (&EM_NUM_BINARY_REJECTED <1)
166 15949 +        and (&EM_NUM_ORDINAL_REJECTED < 1) and (&EM_
    NUM_NOMINAL_REJECTED < 1) %then %do;
167 15950 +        %let EMEXCEPTIONSTRING = exception.server.US
    EATLEAST1INPUTREJECT;
168 15951 +        %put &em_codebar;
169 15952 +        %let errormsg = %sysfunc(sasmsg(sashelp.dmin
    e, error_noInput_note, NOQUOTE));
170 15953 +        %put &errormsg;
171 15954 +        %put &em_codebar;
172 15955 +        %goto doendm;
```

```
173 15956 +   %end;
174 15958 +   /* Initialize property macro variables */
175 15959 +   filename temp catalog 'sashelp.emmodl.tree_macros
    .source';
176 15960 +   %include temp;
177 15961 +   filename temp;
178 15963 +   %EM_SetProperties;
179 15965 +   /* need to delete EMTREE if not used as import tr
    ee data since AUTODELETE=N */
180 15966 +   %EM_GETNAME(key=EMTREE, type=DATA);
181 15967 +   %if "&EM_PROPERTY_IMPORTMODEL" eq "Y" %then %do;
182 15968 +     /* if import eq Y and no importtable defined, t
    hrow an exception */
183 15969 +      %if %length(&EM_PROPERTY_ImportedTreeData)=0 %
    then %do;
184 15970 +         %let EMEXCEPTIONSTRING = exception.server.E
    MTOOL.NOTREEMODELDATASET;
185 15971 +         %let  errmsg = %sysfunc(sasmsg(sashelp.dmin
    e, NOTREEMODELDATASET_ERR , NOQUOTE));
186 15972 +         %put &em_codebar;
187 15973 +         %put &errmsg;
188 15974 +         %put &em_codebar;
189 15975 +         %goto doendm;
190 15976 +      %end;
191 15977 +      %else %if %sysfunc(exist(&EM_PROPERTY_Imported
    TreeData))=0 %then %do;
192 15978 +         %let EMEXCEPTIONSTRING = exception.server.E
    MTOOL.INVALIDTREEMODELDATASET;
193 15979 +         %put &em_codebar;
194 15980 +         %let errormsg = %sysfunc(sasmsg(sashelp.dmi
    ne, emtool.INVALIDTREEMODELDATASET_ERR, NOQUOTE));
195 15981 +         %put &errormsg;
196 15982 +         %put &em_codebar;
197 15983 +         %goto doendm;
198 15984 +      %end;
199 15985 +      %else %do;
```

```
200  15986 +         %let dsid=%sysfunc(open(&EM_PROPERTY_Import
     edTreeData));
201  15987 +         %let varnumID = %sysfunc(varnum(&dsid,ID));
202  15988 +         %let varnumLabel = %sysfunc(varnum(&dsid,LA
     BEL));
203  15989 +         %let varnumX = %sysfunc(varnum(&dsid,X));
204  15990 +         %let varnumY = %sysfunc(varnum(&dsid,Y));
205  15991 +         %let dsid = %sysfunc(close(&dsid));
206  15992 +         %if &varnumID=0 or &varnumLabel=0 or &varnu
     mX=0 or &varnumY=0 %then %do;
207  15993 +            %let EMEXCEPTIONSTRING = exception.serve
     r.EMTOOL.INVALIDTREEMODELDATASET;
208  15994 +            %put &em_codebar;
209  15995 +            %let errormsg = %sysfunc(sasmsg(sashelp.
     dmine, emtool.INVALIDTREEMODELDATASET_ERR, NOQUOTE));
210  15996 +            %put &errormsg;
211  15997 +            %put &em_codebar;
212  15998 +            %goto doendm;
213  15999 +         %end;
214  16000 +      %end;
215  16001 +      %if %qupcase(&EM_USER_EMTREE) ne %qupcase(&EM_
     PROPERTY_ImportedTreeData) and (%sysfunc(exist(&EM_USER_EMT
     REE)) or %sysfunc(exist(&EM_USER_EMTREE, VIEW))) %then %do;
216  16002 +         proc delete data=&EM_USER_EMTREE;
217  16003 +         run;
218  16004 +      %end;
219  16005 +   %end;
220  16006 +   %else %if "&EM_PROPERTY_FREEZE" ne "Y" and (%sysf
     unc(exist(&EM_USER_EMTREE)) or %sysfunc(exist(&EM_USER_EMTR
     EE, VIEW))) %then %do;
221  16007 +      proc delete data=&EM_USER_EMTREE;
222  16008 +      run;
223  16009 +   %end;
224  16011 +   /* load tree macros */
225  16012 +   filename temp catalog 'sashelp.emmodl.tree_trainm
     acros.source';
```

```
226 16013 +   %include temp;
227 16014 +   filename temp;
228 16016 +   /* data sets */
229 16017 +   %EM_GETNAME(key=OUTSTATS,   type=DATA);
230 16018 +   %EM_GETNAME(key=EXPORTTREE, type=DATA);
231 16019 +   %EM_GETNAME(key=TREE_PLOT,     type=DATA);
232 16021 +   /* files */
233 16022 +   %EM_REGISTER(key=ENGLISHRULES, type=FILE, extensi
    on=txt);
234 16024 +   /* check actual num of target levels */
235 16025 +   %if ("%EM_TARGET_LEVEL" eq "BINARY") %then %do;
236 16026 +      %EM_CheckBinaryTargetLevel(indata=&EM_IMPORT_D
    ATA, target=%EM_TARGET,
237 16027 +                                 nLevel=_nTargetLevel )
    ;
238 16028 +      %if &_nTargetLevel  > 2 %then %do;
239 16029 +        %let EMEXCEPTIONSTRING = exception.server.ME
    TADATA.WRONGTARGETLEVEL,&target_Var;
240 16030 +        %put &em_codebar;
241 16031 +        %let errormsg = %sysfunc(sasmsg(sashelp.dmin
    e, metadata.wrongtargetlevel, NOQUOTE));
242 16032 +        %put &errormsg;
243 16033 +        %put &em_codebar;
244 16034 +        %goto doendm;
245 16035 +      %end;
246 16036 +   %end;
247 16038 +   /* neither cost variables nor constant cost are v
    alid with USEDECISIONS */
248 16039 +   %if "&EM_PROPERTY_USEDECISION" eq "Y" %then %do;
249 16040 +     %if %sysfunc(exist(&EM_DEC_DECMETA)) %then %do;
250 16041 +        %let costflag=0;
251 16042 +        data _null_;
252 16043 +          set &EM_DEC_DECMETA(where=(_TYPE_="DECISIO
    N" AND USE="Y" AND ^missing(COST) )) end=eof;
253 16044 +          if eof then call symput("costflag", _N_);
254 16045 +        run;
```

```
255 16046 +        %if &costflag gt 0 %then %do;
256 16047 +          %let EMEXCEPTIONSTRING = exception.server.
    TREE.INVALIDDECISION;
257 16048 +          %put &em_codebar;
258 16049 +          %let errormsg = %sysfunc(sasmsg(sashelp.dm
    ine, costnotvalidwithusedecisions_note_err, NOQUOTE));
259 16050 +          %put &errormsg;
260 16051 +          %put &em_codebar;
261 16052 +          %goto doendm;
262 16053 +       %end;
263 16054 +     %end;
264 16055 +   %end;
265 16057 +   /* determine if multiple targets will be processe
    d */
266 16058 +   %let em_tree_multipleTargets=N;
267 16059 +   %let em_tree_numTarget = 1;
268 16060 +   %let em_tree_targetVars=;
269 16062 +   %if "&EM_PROPERTY_USEMULTIPLETARGET" eq "Y" %then
     %do;
270 16063 +      /* determine if there are any ordinal target v
    ariables - if so, multiple targets are not supported */
271 16064 +      %if &EM_NUM_ORDINAL_TARGET gt 0 %then %do;
272 16065 +         %let em_tree_multipleTargets=N;
273 16066 +      %end;
274 16067 +      %else %do;
275 16068 +         /* create macro array of targets  */
276 16069 +         data _null_;
277 16070 +           set &EM_DATA_VARIABLESET(where=(ROLE='TAR
    GET' AND LEVEL^='ORDINAL')) end=eof;
278 16071 +           call symput('em_tree_targetVars'!!strip(p
    ut(_N_, BEST.)), strip(Name));
279 16072 +           if eof then
280 16073 +             call symput('em_tree_numTarget', strip(
    put(_N_, BEST.)));
281 16074 +        run;
282 16076 +        %if &em_tree_numTarget gt 1 %then %do;
```

```
283 16077 +           %let em_tree_multipleTargets=Y;
284 16078 +         %end;
285 16079 +       %end;
286 16080 +   %end;
287 16082 +   /* create view of only necessary variable for per
    formance reasons */
288 16083 +   %let tempData = &EM_LIB..em_&EM_NODEID;
289 16084 +   data &tempData / view=&tempData;
290 16085 +     set &EM_IMPORT_DATA (keep=%EM_INPUT %EM_REJECTE
    D %EM_TARGET %EM_FREQ %EM_COST
291 16086 +     %if "&em_tree_multipleTargets" eq "N" %then %do
    ;
292 16087 +       %EM_TARGET
293 16088 +     %end;
294 16089 +     %else %do;
295 16090 +       %if &em_tree_numTarget ne 0 %then %do;
296 16091 +         %do i=1 %to &em_tree_numTarget;
297 16092 +            &&em_tree_targetVars&i
298 16093 +         %end;
299 16094 +       %end;
300 16095 +     %end;
301 16096 +     );
302 16097 +   run;
303 16099 +   /* run Tree procedure */
304 16100 +   %em_tree_runTreeProcedure(indata=&tempData, multi
    pleTar=&em_tree_multipleTargets);
305 16102 +   /* Check return code and throw exception if error
     is detected */
306 16103 +   %if %length(&EMEXCEPTIONSTRING) %then %goto doend
    m;
307 16104 +   %if &syserr %then %do;
308 16105 +     %let EMEXCEPTIONSTRING = exception.server.EMTOO
    L.GENERICRUNTIMEEXCEPTION;
309 16106 +     %goto doendm;
310 16107 +   %end;
311 16109 +   /* add decision score code if multiple targets ar
```

```
    e processed */
312 16110 +   %if "&em_tree_multipleTargets" eq "Y" %then %do;
313 16111 +     %EM_MODEL(TARGET=%EM_TARGET, DECSCORECODE=Y, CL
    ASSIFICATION=Y, FITSTATISTICS=N);
314 16112 +   %end;
315 16114 +   /* create outfit dataset if multiple score statem
    ents have been executed */
316 16115 +   %em_tree_createFitStats(multipleTar=&em_tree_mult
    ipleTargets);
317 16117 +   /* create English Rules */
318 16118 +   filename X "&EM_USER_ENGLISHRULES" encoding='utf-
    8' NOBOM;
319 16119 +     %if "&em_Tree_multipleTargets" eq "N" %then %do
    ;
320 16120 +       %em_tree_makeEnglishRules;
321 16122 +       /* English Rules */
322 16123 +       %EM_REPORT(key=ENGLISHRULES, viewtype=SOURCE,
     block=MODEL, description=ENGLISHRULES, autodisplay=N);
323 16125 +     %end;
324 16126 +   filename x;
325 16128 +   %doendm:
326 16129 +%mend em_tree_train;
327 NOTE: %INCLUDE (level 1) ending.
328 NOTE: Fileref TEMP has been deassigned.
329 NOTE: %INCLUDE (level 1) file TEMP is file SASHELP.EMMODL.T
    REE_MACROS.SOURCE.
330 16130 +%macro EM_SetProperties;
331 16132 +   /* train properties */
332 16133 +   %em_checkmacro(name=EM_PROPERTY_ImportModel,
           value=N, global=Y);
333 16134 +   %em_checkmacro(name=EM_PROPERTY_ImportedTreeData,
           value=, global=Y);
334 16135 +   %em_checkmacro(name=EM_PROPERTY_FREEZE,
           value=N, global=Y);
335 16136 +   %em_checkmacro(name=EM_PROPERTY_USEMULTIPLETARGET
    ,      value=N, global=Y);
```

```
336  16137 +   %em_checkmacro(name=EM_PROPERTY_NOMINALCRITERION,
           value=PROBCHISQ, global=Y);
337  16138 +   %em_checkmacro(name=EM_PROPERTY_ORDINALCRITERION,
           value=ENTROPY, global=Y);
338  16139 +   %em_checkmacro(name=EM_PROPERTY_INTERVALCRITERION
    ,      value=PROBF, global=Y);
339  16140 +   %em_checkmacro(name=EM_PROPERTY_CRITERION,
           value=DEFAULT, global=Y);
340  16141 +   %em_checkmacro(name=EM_PROPERTY_SIGLEVEL,
           value=0.2, global=Y);
341  16142 +   %em_checkmacro(name=EM_PROPERTY_SPLITSIZE,
           value=., global=Y);
342  16143 +   %em_checkmacro(name=EM_PROPERTY_LEAFSIZE,
           value=5, global=Y);
343  16144 +   %em_checkmacro(name=EM_PROPERTY_MINCATSIZE,
           value=5, global=Y);
344  16145 +   %em_checkmacro(name=EM_PROPERTY_MAXBRANCH,
           value=2, global=Y);
345  16146 +   %em_checkmacro(name=EM_PROPERTY_MAXDEPTH,
           value=6, global=Y);
346  16147 +   %em_checkmacro(name=EM_PROPERTY_NRULES,
           value=5, global=Y);
347  16148 +   %em_checkmacro(name=EM_PROPERTY_NSURRS,
           value=0, global=Y);
348  16149 +   %em_checkmacro(name=EM_PROPERTY_MISSINGVALUE,
           value=USEINSEARCH, global=Y);
349  16150 +   %em_checkmacro(name=EM_PROPERTY_USEVARONCE,
           value=N, global=Y);
350  16151 +   %em_checkmacro(name=EM_PROPERTY_SUBTREE,
           value=ASSESSMENT, global=Y);
351  16152 +   %em_checkmacro(name=EM_PROPERTY_NSUBTREE,
           value=1, global=Y);
352  16153 +   %em_checkmacro(name=EM_PROPERTY_ASSESSMEASURE,
           value=PROFIT/LOSS, global=Y);
353  16154 +   %em_checkmacro(name=EM_PROPERTY_ASSESSPERCENTAGE,
           value=0.25, global=Y);
```

```
354  16155 +   %em_checkmacro(name=EM_PROPERTY_NODESAMPLE,
           value=20000, global=Y);
355  16156 +   %em_checkmacro(name=EM_PROPERTY_EXHAUSTIVE,
           value=5000, global=Y);
356  16157 +   %em_checkmacro(name=EM_PROPERTY_USEDECISION,
           value=N, global=Y);
357  16158 +   %em_checkmacro(name=EM_PROPERTY_USEPRIORS,
           value=N, global=Y);
358  16159 +   %em_checkmacro(name=EM_PROPERTY_KASS,
           value=Y, global=Y);
359  16160 +   %em_checkmacro(name=EM_PROPERTY_KASSAPPLY,
           value=BEFORE, global=Y);
360  16161 +   %em_checkmacro(name=EM_PROPERTY_DEPTH,
           value=Y, global=Y);
361  16162 +   %em_checkmacro(name=EM_PROPERTY_INPUTS,
           value=N, global=Y);
362  16163 +   %em_checkmacro(name=EM_PROPERTY_NUMINPUTS,
           value=1, global=Y);
363  16164 +   %em_checkmacro(name=EM_PROPERTY_DUMMY,
           value=N, global=Y);
364  16165 +   %em_checkmacro(name=EM_PROPERTY_LEAFID,
           value=Y, global=Y);
365  16166 +   %em_checkmacro(name=EM_PROPERTY_PREDICT,
           value=Y, global=Y);
366  16167 +   %em_checkmacro(name=EM_PROPERTY_PERFORMANCE,
           value=DISK, global=Y);
367  16168 +   %em_checkmacro(name=EM_PROPERTY_CV,
           value=N, global=Y);
368  16169 +   %em_checkmacro(name=EM_PROPERTY_CVNITER,
           value=10, global=Y);
369  16170 +   %em_checkmacro(name=EM_PROPERTY_CVREPEAT,
           value=1, global=Y);
370  16171 +   %em_checkmacro(name=EM_PROPERTY_CVSEED,
           value=12345, global=Y);
371  16172 +   %em_checkmacro(name=EM_PROPERTY_OBSIMPORTANCE,
           value=N, global=Y);
```

```
372 16173 +   %em_checkmacro(name=EM_PROPERTY_NUMSINGLEIMP,
          value=5, global=Y);
373 16175 +   /* properties for interactive sample */
374 16176 +   %em_checkmacro(name=EM_PROPERTY_CREATESAMPLE,
          value=DEFAULT, global=Y);
375 16177 +   %em_checkmacro(name=EM_PROPERTY_SAMPLEMETHOD,
          value=RANDOM, global=Y);
376 16178 +   %em_checkmacro(name=EM_PROPERTY_SAMPLESIZE,
          value=10000, global=Y);
377 16179 +   %em_checkmacro(name=EM_PROPERTY_SAMPLESEED,
          value=12345, global=Y);
378 16181 +   /* report properties */
379 16182 +   %em_checkmacro(name=EM_PROPERTY_PRECISION,
          value=4, global=Y);
380 16183 +   %em_checkmacro(name=EM_PROPERTY_SPLITPRECISION,
          value=4, global=Y);
381 16184 +   %em_checkmacro(name=EM_PROPERTY_CLASSCOLORBY,
          value=PERCENTEVEN, global=Y);
382 16185 +   %em_checkmacro(name=EM_PROPERTY_INTCOLORBY,
          value=AVG, global=Y);
383 16186 +   %em_checkmacro(name=EM_PROPERTY_SHOWNODEID,
          value=Y, global=Y);
384 16187 +   %em_checkmacro(name=EM_PROPERTY_SHOWVALID,
          value=Y, global=Y);
385 16188 +   %em_checkmacro(name=EM_PROPERTY_PRED,
          value=N, global=Y);
386 16189 +   %em_checkmacro(name=EM_PROPERTY_TARGET,
          value=ALL, global=Y);
387 16190 +   %em_checkmacro(name=EM_PROPERTY_COUNT,
          value=Y, global=Y);
388 16191 +   %em_checkmacro(name=EM_PROPERTY_PERCENTCORRECT,
          value=N, global=Y);
389 16192 +   %em_checkmacro(name=EM_PROPERTY_PROFITLOSS,
          value=NONE, global=Y);
390 16193 +   %em_checkmacro(name=EM_PROPERTY_AVG,
          value=Y, global=Y);
```

```
391  16194 +   %em_checkmacro(name=EM_PROPERTY_RASE,
           value=N, global=Y);
392  16196 +   /* score properties */
393  16197 +   %em_checkmacro(name=EM_PROPERTY_VARSELECTION,
           value=Y, global=Y);
394  16198 +   %em_checkmacro(name=EM_PROPERTY_NODEROLE,
           value=SEGMENT, global=Y);
395  16200 +%mend EM_SetProperties;
396  NOTE: %INCLUDE (level 1) ending.
397  NOTE: Fileref TEMP has been deassigned.
398
399  NOTE: Deleting EMWS3.TREE2_EMTREE (memtype=DATA).
400  NOTE: PROCEDURE DELETE used (Total process time):
401        real time           0.00 seconds
402        user cpu time       0.00 seconds
403        system cpu time     0.00 seconds
404        memory              30436.75k
405        OS Memory           40560.00k
406        Timestamp           07/01/2024 05:58:56 AM
407        Step Count                        1  Switch Count  0
408        Page Faults                       0
409        Page Reclaims                     21
410        Page Swaps                        0
411        Voluntary Context Switches        17
412        Involuntary Context Switches      0
413        Block Input Operations            0
414        Block Output Operations           0
415
416
417  NOTE: %INCLUDE (level 1) file TEMP is file SASHELP.EMMODL.T
     REE_TRAINMACROS.SOURCE.
418  16202 +%Macro EM_CheckBinaryTargetLevel(indata=, target=,
     nLevel= );
419  16203 +  %global &nLevel;
420  16204 +  proc dmdb batch data=&indata
421  16205 +    classout=_tmp_dmdbout;
```

```
422 16206 +    class &target;
423 16207 +  run;
424 16208 +  data _tmp_dmdbout;
425 16209 +    set _tmp_dmdbout;
426 16210 +    if strip(TYPE) = 'N' and  strip(LEVEL) = '.' the
    n delete;
427 16211 +    if strip(TYPE) = 'C' and  strip(LEVEL) = '' then
     delete;
428 16212 +  run;
429 16213 +  data _null_;
430 16214 +    %let dsid = %sysfunc(open(work._tmp_dmdbout));
431 16215 +    %let _obs = %sysfunc(attrn(&dsid, NOBS));
432 16216 +    %let dsid = %sysfunc(close(&dsid));
433 16217 +     call symput("&nLevel", put(&_obs, Best12.));
434 16218 +  run;
435 16220 +  proc datasets lib=work nolist;
436 16221 +     delete _tmp_dmdbout;
437 16222 +  run;
438 16223 +  quit;
439 16224 +%Mend EM_CheckBinaryTargetLevel;
440 16227 +%macro em_tree_runTreeProcedure(indata= , multipleTa
    r= , intFlag= );
441 16229 +  /* determine the number of obs in training data */
442 16230 +  proc sql;
443 16231 +    reset noprint;
444 16232 +    select count(*) into :em_nobs from &indata;
445 16233 +  quit;
446 16235 +  /* determine the number of input variables */
447 16236 +  %let numinputs = %eval(&EM_NUM_BINARY_INPUT + &EM_
    NUM_NOMINAL_INPUT + &EM_NUM_ORDINAL_INPUT + &EM_NUM_INTERVA
    L_INPUT+
448 16237 +                          &EM_NUM_BINARY_REJECTED + &
    EM_NUM_NOMINAL_REJECTED + &EM_NUM_ORDINAL_REJECTED + &EM_NU
    M_INTERVAL_REJECTED);
449 16239 +  /* retrieve targetEvent from decmeta */
450 16240 +  %let targetEvent=;
```

```
451 16241 +  %if "%EM_TARGET_LEVEL" ne "INTERVAL" %then %do;
452 16242 +    %if %sysfunc(exist(&EM_DEC_DECMETA)) %then %do;
453 16243 +      data _null_;
454 16244 +       set &EM_DEC_DECMETA(where=(_TYPE_="TARGET"));
455 16245 +       call symput('targetEvent', strip(tranwrd(EVEN
    T,'"',''''')));
456 16246 +      run;
457 16247 +    %end;
458 16248 +  %end;
459 16250 +  /* create targetTable if multipleTar eq Y */
460 16251 +  data temptarget;
461 16252 +    set &EM_DATA_VARIABLESET;
462 16253 +    where ROLE="TARGET" AND LEVEL^="ORDINAL";
463 16254 +  run;
464 16256 + /* data sets */
465 16257 + %EM_GETNAME(key=OUTSTATS,      type=DATA);
466 16258 + %EM_GETNAME(key=EMTREE,        type=DATA);
467 16259 + %EM_GETNAME(key=OUTOBSIMP,     type=DATA);
468 16260 + %EM_GETNAME(key=OUTSEQ,        type=DATA);
469 16261 + %EM_GETNAME(key=OUTIMPORT,     type=DATA);
470 16262 + %EM_GETNAME(key=OUTNODES,      type=DATA);
471 16263 + %EM_GETNAME(key=OUTSUMMARY,    type=DATA);
472 16264 + %EM_GETNAME(key=OUTTOPOLOGY,   type=DATA);
473 16265 + %EM_GETNAME(key=OUTPATH,       type=DATA);
474 16266 + %EM_GETNAME(key=OUTRULES,      type=DATA);
475 16268 + /* files */
476 16269 + %EM_GETNAME(key=TREEFLOW, type=FILE, extension=sas)
    ;
477 16270 + %EM_GETNAME(key=TREEPUBLISH, type=FILE, extension=s
    as);
478 16272 + /* turn on pmml if requested */
479 16273 + %let nnpmml=0;
480 16274 + %if %symexist(EM_PMML) %then %do;
481 16275 +    %if %upcase(&EM_PMML)=Y or %upcase(&EM_PMML)=YES
     %then %do;
482 16276 +       %let nnpmml=1;
```

```
483 16278 +       ods pmml file="&EM_FILE_EMPMML" encoding="UTF
    -8";
484 16279 +   %end;
485 16280 +%end;
486 16282 +%let numClassTarget = %sysevalf(&EM_NUM_BINARY_TARGE
    T + &EM_NUM_NOMINAL_TARGET + &EM_NUM_ORDINAL_TARGET);
487 16284 +%if &nnpmml or &numClassTarget %then %do;
488 16286 +    /* create dmdb needed for pmml generation */
489 16287 +    %let tree_maxlevel = 512;
490 16288 +    %if %symexist(EM_TRAIN_MAXLEVELS) %then %do;
491 16289 +      %if &EM_TRAIN_MAXLEVELS ne %then %do;
492 16290 +        %let tree_maxlevel = &EM_TRAIN_MAXLEVELS;
493 16291 +      %end;
494 16292 +    %end;
495 16293 +    %if &tree_maxlevel gt 0 %then %do;
496 16294 +        %let tree_maxlevel=%sysevalf(&tree_maxlevel+
    1);
497 16295 +       %let tree_maxlevel=%sysfunc(max(3, &tree_maxl
    evel ));
498 16296 +    %end;
499 16298 +    %let targetOrderString =;
500 16299 +    %let targetString = ;
501 16300 +    data _null_;
502 16301 +       length orderString nameString $10000;
503 16302 +       retain orderString nameString;
504 16303 +       set &em_data_variableset end=eof;
505 16304 +       %if "&EM_PROPERTY_USEMULTIPLETARGET" eq "Y" a
    nd ^&em_num_ordinal_target %then %do;
506 16305 +           where ROLE="TARGET" and LEVEL in("BINARY"
    , "NOMINAL");
507 16306 +       %end;
508 16307 +       %else %do;
509 16308 +           where ROLE="TARGET" and LEVEL in("BINARY"
    , "NOMINAL", "ORDINAL") and USE ='Y';
510 16309 +       %end;          select(order);
511 16310 +         when('')        order ='DESC';
```

```
512 16311 +         when('FMTASC')  order='ASCFMT';
513 16312 +         when('FMTDESC') order='DESFMT';
514 16313 +         otherwise;
515 16314 +       end;
516 16315 +       orderString = trim(orderString)!!' '!!trim(NA
    ME)!!'('!!trim(order)!!')';
517 16316 +       nameString = trim(nameString)!!' '!!trim(NAME
    );
518 16318 +       if eof then do;
519 16319 +          call symput('targetOrderString', trim(orde
    rString));
520 16320 +          call symput('targetString', trim(nameStrin
    g));
521 16321 +       end;
522 16322 +    run;
523 16324 +    %let arborkluge= "work._treeDMDB";
524 16326 +    proc dmdb batch data=&indata
525 16327 +    %if &nnpmml %then %do;
526 16328 +        PMML
527 16329 +    %end;
528 16330 +     dmdbcat=_treeDMDB classout=classout varout=varo
    ut maxlevel=&tree_maxlevel;
529 16332 +      %if &nnpmml %then %do;
530 16333 +           %if "%EM_ID" ne "" %then %do;
531 16334 +             id %EM_ID;
532 16335 +           %end;
533 16336 +           %if &EM_NUM_CLASS gt 0 %then %do;
534 16337 +             class %EM_BINARY_INPUT %EM_NOMINAL_INPU
    T %EM_ORDINAL_INPUT
535 16338 +                   %EM_BINARY_REJECTED %EM_NOMINAL_RE
    JECTED %EM_ORDINAL_REJECTED
536 16339 +                   &targetOrderString;
537 16340 +           %end;
538 16341 +           %if &EM_NUM_INTERVAL gt 0 %then %do;
539 16342 +             var %EM_INTERVAL_INPUT %EM_INTERVAL_REJ
    ECTED %EM_INTERVAL_TARGET;
```

```
540 16343 +           %end;
541 16344 +           target &targetString %EM_INTERVAL_TARGET;
542 16345 +           %if "%EM_FREQ" ne "" %then %do;
543 16346 +             freq %EM_FREQ;
544 16347 +           %end;
545 16348 +      %end;
546 16349 +      %else %do;
547 16350 +         class  &targetOrderString;
548 16351 +         target &targetString %EM_INTERVAL_TARGET;
549 16352 +      %end;
550 16353 +    run;
551 16354 +    quit;
552 16356 +    proc datasets lib=work nolist;
553 16357 +       delete classout varout;
554 16358 +    run;
555 16359 +    quit;
556 16361 + %end;
557 16364 + /* run Arbor procedure */
558 16365 + %if "&EM_PROPERTY_FREEZE" eq "N" and "&EM_PROPERTY_
    IMPORTMODEL" eq "N" %then %do;
559 16366 +  proc arbor data=&INDATA
560 16368 +  %if "&EM_PROPERTY_LEAFSIZE" ne "" %then %do;
561 16369 +    Leafsize = &EM_PROPERTY_LEAFSIZE
562 16370 +  %end;
563 16372 +  %if (("&EM_PROPERTY_SPLITSIZE" ne ".") AND (&EM_PR
    OPERTY_SPLITSIZE lt &em_nobs)) %then %do;
564 16373 +    Splitsize = &EM_PROPERTY_SPLITSIZE
565 16374 +  %end;
566 16376 +  %if "&EM_PROPERTY_MINCATSIZE" ne "" %then %do;
567 16377 +    MinCatSize = &EM_PROPERTY_MINCATSIZE
568 16378 +  %end;
569 16380 +  %if "&EM_PROPERTY_MAXBRANCH" ne "" %then %do;
570 16381 +    MaxBranch = &EM_PROPERTY_MAXBRANCH
571 16382 +  %end;
572 16384 +  %if "&EM_PROPERTY_MAXDEPTH" ne "" %then %do;
573 16385 +    MaxDepth = &EM_PROPERTY_MAXDEPTH
```

```
574 16386 +  %end;
575 16388 +  %if (("%EM_TARGET_LEVEL" eq "NOMINAL") OR ("%EM_TA
    RGET_LEVEL" eq "BINARY")) %then %do;
576 16389 +    %let Criterion = &EM_PROPERTY_NOMINALCRITERION;
577 16390 +  %end;
578 16391 +  %else %if "%EM_TARGET_LEVEL" eq "ORDINAL" %then %d
    o;
579 16392 +    %let Criterion = &EM_PROPERTY_ORDINALCRITERION;
580 16393 +  %end;
581 16394 +  %else %if "%EM_TARGET_LEVEL" eq "INTERVAL" %then %
    do;
582 16395 +    %let Criterion = &EM_PROPERTY_INTERVALCRITERION;
583 16396 +  %end;
584 16398 +  %if (("&criterion" eq "PROBCHISQ") or ("&criterion
    " eq "PROBF")) %then %do;
585 16399 +    %if "&EM_PROPERTY_SIGLEVEL" ne "" %then %do;
586 16400 +      alpha = &EM_PROPERTY_SIGLEVEL
587 16401 +    %end;
588 16402 +  %end;
589 16404 +  %if (("&EM_PROPERTY_KASS" eq "Y") OR ("&EM_PROPERT
    Y_DEPTH" eq "Y") or ("&EM_PROPERTY_INPUTS" eq "Y")) %then %
    do;
590 16405 +    %if (("&Criterion" eq "PROBCHISQ") OR ("&Criteri
    on" eq "PROBF") OR ("&Criterion" eq "DEFAULT")) %then %do;
591 16406 +      %if (("&EM_PROPERTY_KASS" eq "Y") or ("&EM_PRO
    PERTY_DEPTH" eq "Y")) %then %do;
592 16407 +        %if "&EM_PROPERTY_KASSAPPLY" eq "BEFORE" %th
    en %let chaid = CHAIDBEFORE;
593 16408 +        %else %if "&EM_PROPERTY_KASSAPPLY" eq "AFTER
    " %then %let chaid = CHAIDAFTER;
594 16410 +        padjust =
595 16411 +        %if "&EM_PROPERTY_KASS" eq "Y" %then %do;
596 16412 +          &chaid
597 16413 +        %end;
598 16414 +        %if "&EM_PROPERTY_DEPTH" eq "Y" %then %do;
599 16415 +          DEPTH
```

```
600 16416 +        %end;
601 16417 +      %end;
602 16418 +      %if "&EM_PROPERTY_INPUTS" eq "Y" %then %do;
603 16419 +         %let num_inputs = %sysfunc(min(&numinputs,
    &EM_PROPERTY_NUMINPUTS));
604 16420 +         pvars = &num_inputs
605 16421 +      %end;
606 16422 +    %end;
607 16423 +  %end;
608 16424 +  %else %do;
609 16425 +      %if (("&Criterion" eq "PROBCHISQ") OR ("&Crite
    rion" eq "PROBF") OR ("&Criterion" eq "DEFAULT")) %then %do
    ;
610 16426 +         padjust = NONE
611 16427 +      %end;
612 16428 +  %end;
613 16430 +  %if "&EM_PROPERTY_NRULES" ne "" %then %do;
614 16431 +    %let num_nrules = %sysfunc(min(&numinputs, &EM_P
    ROPERTY_NRULES));
615 16432 +    Maxrules = &num_nrules
616 16433 +  %end;
617 16435 +  %if "&EM_PROPERTY_NSURRS" ne "" %then %do;
618 16436 +    %let num_nsurrs = %sysfunc(min((&numinputs-1), &
    EM_PROPERTY_NSURRS));
619 16437 +    Maxsurrs = &num_nsurrs
620 16438 +  %end;
621 16440 +  %if "&EM_PROPERTY_MISSINGVALUE" ne "" %then %do;
622 16441 +     Missing=&EM_PROPERTY_MISSINGVALUE
623 16442 +  %end;
624 16444 +  %if "&EM_PROPERTY_USEVARONCE" eq "Y" %then %do;
625 16445 +     USEVARONCE
626 16446 +  %end;
627 16448 +  %if "&EM_PROPERTY_EXHAUSTIVE" ne "" %then %do;
628 16449 +    Exhaustive=&EM_PROPERTY_EXHAUSTIVE
629 16450 +  %end;
630 16453 +  %if (("&multipleTar" eq "N") AND ("%EM_TARGET_LEVE
```

```
    L" ne "INTERVAL")) %then %do;
631 16454 +    event = "&targetEvent"
632 16455 +  %end;
633 16457 +  %if "&EM_PROPERTY_USEDECISION" eq "Y" %then %do;
634 16458 +     DECSEARCH
635 16459 +  %end;
636 16461 +  %if "&EM_PROPERTY_USEPRIORS" eq "Y" %then %do;
637 16462 +     PRIORSSEARCH
638 16463 +  %end;
639 16465 +  %if &arbor_1 ne %then %do;
640 16466 +    &arbor_1
641 16467 +  %end;
642 16469 +  %if &em_arbor ne %then %do;
643 16470 +     &em_arbor
644 16471 +  %end;
645 16472 +  ;
646 16473 + %end;
647 16474 + %else %if "&EM_PROPERTY_IMPORTMODEL" eq "Y"  %then
    %do;
648 16475 +     proc arbor data=&INDATA inmodel=&EM_PROPERTY_Im
    portedTreeData refreshtrain;
649 16476 +       Performance &EM_PROPERTY_PERFORMANCE
650 16477 +       %if "&EM_PROPERTY_NODESAMPLE" ne "" %then %do
    ;
651 16478 +         nodesize=&EM_PROPERTY_NODESAMPLE
652 16479 +       %end;
653 16480 +       ;
654 16481 +       interact;
655 16482 + %end;
656 16483 + %else %if "&EM_PROPERTY_FREEZE" eq "Y" %then %do;
657 16484 +   %if %sysfunc(exist(&EM_USER_EMTREE)) ne 1 %then %
    do;
658 16485 +    %let EMEXCEPTIONSTRING = exception.server.EMTOOL
    .NOTREEDATASET;
659 16486 +    %put &em_codebar;
660 16487 +    %let errormsg = %sysfunc(sasmsg(sashelp.dmine, e
```

```
    mtool.notreedataset_err, NOQUOTE));
661 16488 +    %put &errormsg;
662 16489 +    %put &em_codebar;
663 16490 +    %goto doendm;
664 16491 +   %end;
665 16492 +   %else %do;
666 16493 +     proc arbor data=&INDATA inmodel=&EM_USER_EMTREE
     refreshtrain;
667 16494 +       Performance &EM_PROPERTY_PERFORMANCE
668 16495 +       %if "&EM_PROPERTY_NODESAMPLE" ne "" %then %do
    ;
669 16496 +         nodesize=&EM_PROPERTY_NODESAMPLE
670 16497 +       %end;
671 16498 +       ;
672 16499 +       interact;
673 16500 +   %end;
674 16501 + %end;
675 16503 + %else %do;
676 16504 +   %if %sysfunc(exist(&EM_USER_BROWSETREE)) ne 1 %th
    en %do;
677 16505 +    %let EMEXCEPTIONSTRING = exception.server.EMTOOL
    .NOTREEDATASET;
678 16506 +    %put &em_codebar;
679 16507 +    %let errormsg = %sysfunc(sasmsg(sashelp.dmine, e
    mtool.notreedataset_err, NOQUOTE));
680 16508 +    %put &errormsg;
681 16509 +    %put &em_codebar;
682 16510 +    %goto doendm;
683 16511 +   %end;
684 16512 +   %else %do;
685 16513 +     proc arbor data=&INDATA inmodel=&EM_USER_BROWS
    ETREE refrestrain;
686 16514 +       Performance &EM_PROPERTY_PERFORMANCE
687 16515 +       %if "&EM_PROPERTY_NODESAMPLE" ne "" %then %do
    ;
688 16516 +         nodesize=&EM_PROPERTY_NODESAMPLE
```

```
689 16517 +       %end;
690 16518 +       ;
691 16519 +        interact;
692 16520 +   %end;
693 16521 + %end;
694 16523 + %if "&EM_PROPERTY_FREEZE" eq "N" and "&EM_PROPERTY_
    IMPORTMODEL" eq "N" %then %do;
695 16524 +    %if %eval(&EM_NUM_INTERVAL_INPUT + &EM_NUM_INTER
    VAL_REJECTED) gt 0 %then %do;
696 16525 +      input %EM_INTERVAL_INPUT %EM_INTERVAL_REJECTED
    / level = interval;
697 16526 +    %end;
698 16528 +    %if  %eval(&EM_NUM_NOMINAL_INPUT + &EM_NUM_NOMIN
    AL_REJECTED) gt 0 %then %do;
699 16529 +      input %EM_NOMINAL_INPUT %EM_NOMINAL_REJECTED /
     level = nominal;
700 16530 +    %end;
701 16532 +    %if %eval(&EM_NUM_BINARY_INPUT + &EM_NUM_BINARY_
    REJECTED) gt 0 %then %do;
702 16533 +      input %EM_BINARY_INPUT %EM_BINARY_REJECTED / l
    evel = nominal;
703 16534 +    %end;
704 16536 +    %if %eval(&EM_NUM_ORDINAL_INPUT + &EM_NUM_ORDINA
    L_REJECTED) gt 0 %then %do;
705 16537 +      input %EM_ORDINAL_INPUT %EM_ORDINAL_REJECTED/
    level = ordinal;
706 16538 +    %end;
707 16540 +    %if "%EM_FREQ" ne "" %then %do;
708 16541 +       freq %EM_FREQ;
709 16542 +    %end;
710 16544 +    %if "&multipleTar" eq "Y" %then %do;
711 16545 +       /* cycle through all target vars in variables
    et */
712 16546 +       %let tdsid = %sysfunc(open(temptarget));
713 16547 +       %if &tdsid %then %do;
714 16548 +          %let n_var = %sysfunc(varnum(&tdsid, NAME)
```

```
    );
715 16549 +          %let n_lvl = %sysfunc(varnum(&tdsid, LEVEL
    ));
716 16550 +          %do %while(^ %sysfunc(fetch(&tdsid)));
717 16551 +             %let var = %sysfunc(getvarc(&tdsid, &n_
    var));
718 16552 +             %let lvl = %sysfunc(getvarc(&tdsid, &n_
    lvl));
719 16553 +             target &var / level = &lvl
720 16554 +             %if (("&lvl" eq "BINARY") or ("&lvl" eq
     "NOMINAL")) %then %do;
721 16555 +               Criterion=&EM_PROPERTY_NOMINALCRITERI
    ON;
722 16556 +             %end;
723 16557 +             %else %if "&lvl" eq "INTERVAL" %then %d
    o;
724 16558 +               Criterion=&EM_PROPERTY_INTERVALCRITER
    ION;
725 16559 +             %end;
726 16560 +             %else %if "&lvl" eq "ORDINAL" %then %do
    ;
727 16561 +               Criterion=&EM_PROPERTY_ORDINALCRITERI
    ON;
728 16562 +             %end;
729 16563 +          %end;
730 16564 +          %if &tdsid %then %let tdsid=%sysfunc(close
    (&tdsid));
731 16565 +       %end;
732 16566 +       useTarget variable = %EM_TARGET;
733 16567 +    %end;
734 16568 +    %else %do;
735 16569 +      target %EM_TARGET / level = %EM_TARGET_LEVEL
736 16570 +      %if (("%EM_TARGET_LEVEL" eq "BINARY") or ("%EM
    _TARGET_LEVEL" eq "NOMINAL")) %then %do;
737 16571 +        Criterion=&EM_PROPERTY_NOMINALCRITERION;
738 16572 +      %end;
```

```
739 16573 +      %else %if "%EM_TARGET_LEVEL" eq "INTERVAL" %th
    en %do;
740 16574 +        Criterion=&EM_PROPERTY_INTERVALCRITERION;
741 16575 +      %end;
742 16576 +      %else %if "%EM_TARGET_LEVEL" eq "ORDINAL" %the
    n %do;
743 16577 +        Criterion=&EM_PROPERTY_ORDINALCRITERION;
744 16578 +      %end;
745 16579 +    %end;
746 16581 +    %if "&multipleTar" eq "N" %then %do;
747 16582 +      &EM_DEC_STATEMENT;
748 16583 +    %end;
749 16585 +    Performance &EM_PROPERTY_PERFORMANCE
750 16586 +    %if "&EM_PROPERTY_NODESAMPLE" ne "" %then %do;
751 16587 +      nodesize=&EM_PROPERTY_NODESAMPLE
752 16588 +    %end;
753 16589 +    ;
754 16591 +    %if "&intFlag" eq "Y" %then %do;
755 16592 +       INTERACT Largest;
756 16593 +       Train maxnewdepth=0;
757 16594 +    %end;
758 16596 +       %if "&EM_PROPERTY_ASSESSMEASURE" ne "" %then
    %do;
759 16597 +         Assess
760 16598 +         %if (("&EM_IMPORT_VALIDATE" ne "") AND (%sy
    sfunc(exist(&EM_IMPORT_VALIDATE)) or %sysfunc(exist(&EM_IMP
    ORT_VALIDATE,VIEW)) )) %then %do;
761 16599 +           %if "&EM_PROPERTY_CV" eq "Y" %then %do;
762 16600 +             %put &em_codebar;
763 16601 +             %let errormsg = %sysfunc(sasmsg(sashel
    p.dmine, novalidationwithcv_note, NOQUOTE));
764 16602 +             %put &errormsg;
765 16603 +             %put &em_codebar;
766 16604 +           %end;
767 16605 +           %else %do;
768 16606 +              Validata=&EM_IMPORT_VALIDATE
```

```
769 16607 +            %end;
770 16608 +         %end;
771 16609 +         %else %do;
772 16610 +           NoValidata
773 16611 +         %end;
774 16612 +         %if "&EM_PROPERTY_TRAINMODE" ne "INTERACTIV
    E" %then %do;
775 16613 +            %if "&EM_PROPERTY_ASSESSMEASURE" eq "PRO
    FIT/LOSS" %then %do;
776 16614 +               %let dsid=%sysfunc(open(&EM_DEC_DECME
    TA(where=(_TYPE_='MATRIX'))));
777 16615 +               %if &dsid %then %do;
778 16616 +                 %let usenum = %sysfunc(varnum(&dsid
    , USE));
779 16617 +                 %do %while(^ %sysfunc(fetch(&dsid))
    );
780 16618 +                   %let use = %sysfunc(getvarc(&dsid
    , &usenum));
781 16619 +                   %if "&use" eq "Y" %then %let meas
    ure=PROFIT;
782 16620 +                   %else %do;
783 16621 +                      %if "%EM_TARGET_LEVEL" eq "INT
    ERVAL" %then %let measure = ASE;
784 16622 +                      %else %let measure= MISC;
785 16623 +                   %end;
786 16624 +                 %end;
787 16625 +               %end;
788 16626 +               %if &dsid %then %let dsid = %sysfunc(
    close(&dsid));
789 16627 +            %end;
790 16628 +            %else %if "&EM_PROPERTY_ASSESSMEASURE" e
    q "MISC" %then %do;
791 16629 +              %if "%EM_TARGET_LEVEL" eq "INTERVAL" %
    then  %do;
792 16630 +                 %let measure=ASE;
793 16631 +              %end;
```

```
794  16632 +              %else %do;
795  16633 +                 %let measure=MISC;
796  16634 +              %end;
797  16635 +           %end;
798  16636 +           %else %if "&EM_PROPERTY_ASSESSMEASURE" e
     q "ASE" %then %do;
799  16637 +              %let measure=ASE;
800  16638 +           %end;
801  16639 +           %else %if "&EM_PROPERTY_ASSESSMEASURE" e
     q "LIFT" %then %do;
802  16640 +               %let measure = LIFT;
803  16641 +               %let dsid=%sysfunc(open(&EM_DEC_DECME
     TA(where=(_TYPE_='MATRIX'))));
804  16642 +               %if &dsid %then %do;
805  16643 +                 %let usenum = %sysfunc(varnum(&dsid
     , USE));
806  16644 +                 %do %while(^ %sysfunc(fetch(&dsid))
     );
807  16645 +                   %let use = %sysfunc(getvarc(&dsid
     , &usenum));
808  16646 +                   %if "&use" eq "Y" %then %let meas
     ure=LIFTPROFIT;
809  16647 +                 %end;
810  16648 +               %end;
811  16649 +               %if &dsid %then %let dsid = %sysfunc(
     close(&dsid));
812  16650 +           %end;
813  16651 +           measure=&measure
814  16652 +           %if (("&measure" eq "LIFT") AND ("%EM_TA
     RGET_LEVEL" ne "INTERVAL")) %then %do;
815  16653 +               event = "&targetEvent"
816  16654 +           %end;
817  16655 +           %if (("&measure" eq "LIFT") OR ("&measur
     e" eq "LIFTPROFIT")) %then %do;
818  16656 +             proportion=&EM_PROPERTY_ASSESSPERCENTA
     GE
```

```
819 16657 +            %end;
820 16658 +          %end;
821 16659 +          %if "&multipleTar" eq "N" %then %do;
822 16660 +            %if "&EM_PROPERTY_CV" eq "Y" %then %do;
823 16661 +              CV
824 16662 +              %if "&EM_PROPERTY_CVNIter" ne "" %the
    n %do;
825 16663 +                CVNITer = &EM_PROPERTY_CVNITER
826 16664 +              %end;
827 16665 +              %if "&EM_PROPERTY_CVREPEAT" ne "" %th
    en %do;
828 16666 +                CVRepeat = &EM_PROPERTY_CVREPEAT
829 16667 +              %end;
830 16668 +              %if "&EM_PROPERTY_CVSEED" ne "" %then
     %do;
831 16669 +                CVSeed = &EM_PROPERTY_CVSEED
832 16670 +              %end;
833 16671 +            %end;
834 16672 +          %end;
835 16673 +        %end;
836 16674 +       ;
837 16676 +       %if "&intFlag" ne "Y" %then %do;
838 16677 +         %if "&EM_PROPERTY_SUBTREE" ne "" %then %do;
839 16678 +           %if "&EM_PROPERTY_SUBTREE" eq "ASSESSMENT"
     %then %let subtree=BEST;
840 16679 +           %else %if "&EM_PROPERTY_SUBTREE" eq "N" %t
    hen %let subtree=NLEAVES;
841 16680 +           %else %if "&EM_PROPERTY_SUBTREE" eq "LARGE
    ST" %then %let subtree=LARGEST;
842 16682 +           SUBTREE &subtree
843 16683 +           %if "&subtree" eq "NLEAVES" %then %do;
844 16684 +             =&EM_PROPERTY_NSUBTREE
845 16685 +           %end;
846 16686 +           ;
847 16687 +         %end;
848 16689 +       %if (("&EM_PROPERTY_OBSIMPORTANCE" eq "Y") AN
```

```
    D ("&multipleTar" eq "N")) %then %do;
849 16690 +          %if "&EM_USER_OUTOBSIMP" ne "" %then %do;
850 16691 +            importance data=&INDATA outfit=&EM_USER_
    OUTOBSIMP nvars=&EM_PROPERTY_NUMSINGLEIMP;
851 16692 +          %end;
852 16693 +       %end;
853 16694 +      %end;
854 16695 + %end;
855 16698 + MakeMacro nleaves = nleaves;
856 16699 + save
857 16700 + %if "&EM_USER_EMTREE" ne "" %then %do;
858 16701 +   MODEL=&EM_USER_EMTREE
859 16702 + %end;
860 16703 + %if "&EM_USER_OUTSEQ" ne "" %then %do;
861 16704 +   SEQUENCE=&EM_USER_OUTSEQ
862 16705 + %end;
863 16706 + %if "&EM_USER_OUTIMPORT" ne "" %then %do;
864 16707 +   IMPORTANCE=&EM_USER_OUTIMPORT
865 16708 + %end;
866 16709 + %if "&EM_USER_OUTNODES" ne "" %then %do;
867 16710 +   NODESTAT=&EM_USER_OUTNODES
868 16711 + %end;
869 16712 + %if "&EM_USER_OUTSUMMARY" ne "" %then %do;
870 16713 +   SUMMARY=&EM_USER_OUTSUMMARY
871 16714 + %end;
872 16715 + %if "&EM_USER_OUTSTATS" ne "" %then %do;
873 16716 +   STATSBYNODE=&EM_USER_OUTSTATS
874 16717 + %end;
875 16718 + %if "&EM_USER_OUTTOPOLOGY" ne "" %then %do;
876 16719 +   TOPOLOGY=&EM_USER_OUTTOPOLOGY
877 16720 + %end;
878 16721 + %if "&EM_USER_OUTPATH" ne "" %then %do;
879 16722 +   Pathlistnonmissing=&EM_USER_OUTPATH
880 16723 + %end;
881 16724 + %if "&EM_USER_OUTRULES" ne "" %then %do;
882 16725 +   RULES = &EM_USER_OUTRULES
```

```
883 16726 + %end;
884 16727 + ;
885 16729 + %if "&intFlag" ne "Y" %then %do;
886 16731 +   %let lookupString = ;
887 16732 +   %if ^%symexist(EM_OPTION) %then
888 16733 +     %let EM_OPTION=;
889 16735 +   %if %sysfunc(index(%upcase(&EM_DEBUG), I18N)) or
    %sysfunc(index(%upcase(&EM_OPTION), I18N)) %then %do;
890 16736 +     %let lookupString = LOOKUP=SELECT;
891 16737 +   %end;
892 16739 +   %let codetext=;
893 16740 +   %let norescodetxt=;
894 16742 +   %if "&EM_PROPERTY_DUMMY" eq "Y" %then %do;
895 16743 +     %let codetext=&codetext DUMMY;
896 16744 +     %let norescodetxt=&norescodetxt DUMMY;
897 16745 +   %end;
898 16746 +   %if "&EM_PROPERTY_LEAFID" ne "Y" %then %do;
899 16747 +     %let codetext=&codetext NOLEAFID;
900 16748 +     %let norescodetxt=&norescodetxt NOLEAFID;
901 16749 +   %end;
902 16750 +   %if "&EM_PROPERTY_PREDICT" ne "Y" %then %do;
903 16751 +     %let norescodetxt=&norescodetxt NOPRED;
904 16752 +   %end;
905 16754 +   code file="&EM_USER_TREEFLOW" res &codetext group
    =&emloopid &lookupString;
906 16755 +   code file="&EM_USER_TREEPUBLISH" nores &norescode
    txt group=&emloopid &lookupString;
907 16757 +   %if &nnpmml %then %do;
908 16758 +     code pmml;
909 16759 +   %end;
910 16761 +   score data=&INDATA out=_NULL_ outfit=work.fit_tra
    in role=TRAIN;
911 16762 +   %if "&EM_IMPORT_VALIDATE" ne "" %then %do;
912 16763 +     score data=&EM_IMPORT_VALIDATE out=_NULL_ outfi
    t=work.fit_valid role=VALID;
913 16764 +   %end;
```

```
914 16765 +   %if "&EM_IMPORT_TEST" ne "" %then %do;
915 16766 +     score data=&EM_IMPORT_TEST out=_NULL_ outfit=wo
    rk.fit_test role=TEST;
916 16767 +   %end;
917 16768 + %end;
918 16770 + run;
919 16771 + quit;
920 16773 + /*%em_checkerror(); */
921 16774 +  %if %sysfunc(cexist(work._treeDMDB)) %then %do;
922 16775 +   /* Delete DMDB catalog */
923 16776 +   proc datasets lib=work nolist;
924 16777 +       delete _treeDMDB / mt=cat;
925 16778 +  run;
926 16779 +  %end;
927 16781 + %if &nnpmml %then %do;
928 16782 +    ods pmml close;
929 16783 + %end;
930 16785 +  %doendm:
931 16787 +%mend em_tree_runTreeProcedure;
932 16789 +%macro em_tree_createFitStats( multipleTar= );
933 16792 +  /* create targetTable is multipleTar eq Y */
934 16793 +  data temptarget;
935 16794 +    set &EM_DATA_VARIABLESET;
936 16795 +    where ROLE="TARGET";
937 16796 +  run;
938 16798 +  %EM_GETNAME(key=EMOUTFIT, type=DATA);
939 16799 +   data &EM_USER_EMOUTFIT;
940 16800 +     length target $32;
941 16801 +     merge work.fit_train
942 16802 +     %if "&EM_IMPORT_VALIDATE" ne "" %then %do;
943 16803 +       work.fit_valid
944 16804 +     %end;
945 16805 +     %if "&EM_IMPORT_TEST" ne "" %then %do;
946 16806 +       work.fit_test
947 16807 +     %end;
948 16808 +     ;
```

```
949 16809 +     %if "&multipleTar" eq "N" %then %do;
950 16810 +       target="%EM_TARGET";
951 16811 +     %end;
952 16812 +     %else %do;
953 16813 +       target = _TARGET_;
954 16814 +     %end;
955 16815 +     drop _NW_ _SUMW_
956 16816 +     %if "&EM_IMPORT_VALIDATE" ne "" %then %do;
957 16817 +        _VSUMW_
958 16818 +     %end;
959 16819 +     ;
960 16820 +   run;
961 16822 +   %if "&EM_IMPORT_VALIDATE" ne "" %then %do;
962 16823 +     proc datasets library=work nolist;
963 16824 +       delete fit_valid;
964 16825 +     run;
965 16826 +   %end;
966 16827 +   %if "&EM_IMPORT_TEST" ne "" %then %do;
967 16828 +     proc datasets library=work nolist;
968 16829 +       delete fit_test;
969 16830 +     run;
970 16831 +   %end;
971 16833 +%mend em_tree_createFitStats;
972 16836 +%macro em_tree_makeEnglishRules;
973 16838 +  %EM_GETNAME(key=OUTNODES, type=DATA);
974 16839 +  %EM_GETNAME(key=OUTPATH, type=DATA);
975 16841 +  /* verify that necessary tables exist and if not,
    skip processing */
976 16842 +  %if %sysfunc(exist(&EM_USER_OUTNODES)) ne 1 %then
    %do;
977 16843 +    %let EMEXCEPTIONSTRING = exception.server.EMTOOL
    .GENERICRUNTIMEEXCEPTION;
978 16844 +    %goto doendm;
979 16845 +  %end;
980 16846 +  %if %sysfunc(exist(&EM_USER_OUTPATH)) ne 1 %then %
    do;
```

```
 981  16847 +    %let EMEXCEPTIONSTRING = exception.server.EMTOOL
      .GENERICRUNTIMEEXCEPTION;
 982  16848 +    %goto doendm;
 983  16849 +  %end;
 984  16851 +  /* determine length of variable in outpath dataset
       */
 985  16852 +  %let vlength= ;
 986  16853 +  %let dsid = %sysfunc(open(&EM_USER_OUTPATH));
 987  16854 +  %if &dsid ne %then %do;
 988  16855 +    %let varnum = %sysfunc(varnum(&dsid, VARIABLE));
 989  16856 +    %let vlength = %sysfunc(VARLEN(&dsid, &varnum));
 990  16857 +  %end;
 991  16858 +  %if &dsid ne %then %let dsid = %sysfunc(close(&dsi
      d));
 992  16860 +  data tempoutpath;
 993  16861 +    length varname $&vlength;
 994  16862 +    retain varname;
 995  16863 +    set &EM_USER_OUTPATH;
 996  16865 +    if ^missing(variable) then varname=variable;
 997  16866 +    else if ^missing(var_name) then varname=var_name
      ;
 998  16867 +    output;
 999  16868 +  run;
1000  16870 +  /* create an array of generated predicted variable
       names */
1001  16871 +  %let tree_pred_vars = ;
1002  16872 +  %let tree_pred_label = ;
1003  16873 +  %let numpred= 0;
1004  16874 +  %if %sysfunc(exist(&EM_DEC_DECMETA)) %then %do;
1005  16876 +    data _null_;
1006  16877 +     set &EM_DEC_DECMETA(where=(_TYPE_="PREDICTED"))
       end=eof;
1007  16878 +     call symput('tree_pred_vars'!!strip(put(_N_, BE
      ST.)), strip(VARIABLE));
1008  16879 +     call symput('tree_pred_label'!!strip(put(_N_, B
      EST.)), strip(tranwrd(LABEL,'"','""')));
```

```
1009 16880 +     if eof then
1010 16881 +       call symput('numpred', strip(put(_N_, BEST.))
     );
1011 16882 +    run;
1012 16883 +  %end;
1013 16885 +  /* determine if NPRIORS exists in outnodes  */
1014 16886 +  %local nprior_flag;
1015 16887 +  data _null_;
1016 16888 +    set &EM_USER_OUTNODES(obs=2) end=eof;
1017 16889 +    if eof then do;
1018 16890 +      call symput('nprior_flag', strip(put(npriors,
     best.)));
1019 16891 +    end;
1020 16892 +  run;
1021 16894 +  proc sort data=tempoutpath; by node; run;
1022 16895 +  proc sort data=&EM_USER_OUTNODES out=outnodes; by
     node; run;
1023 16897 +  data tempoutpath;
1024 16898 +    merge tempoutpath(in=_a) outnodes(keep= node
1025 16899 +    %if "&nprior_flag" ne "." %then %do;
1026 16900 +      NPRIORS
1027 16901 +    %end;
1028 16902 +    %else %do;
1029 16903 +      N
1030 16904 +    %end;
1031 16905 +    %if &numpred gt 0 %then %do;
1032 16906 +      %do i=1 %to &numpred;
1033 16907 +        &&tree_pred_vars&i
1034 16908 +      %end;
1035 16909 +    %end;
1036 16910 +    );
1037 16911 +    by node;
1038 16912 +    if _a;
1039 16913 +  run;
1040 16915 +  proc sort data=tempoutpath; by node descending var
     name descending numeric_value; run;
```

```
1041  16917 +  data _null_;
1042  16918 +    file x;
1043  16919 +    set tempoutpath;
1044  16920 +    by node descending varname;
1045  16921 +    retain origvar oldnode string;
1046  16922 +    length origvar $32 oldnode 8 string $5000;
1047  16924 +    if _N_ = 1 then do;
1048  16925 +      origvar = varname;
1049  16926 +      oldnode = node;
1050  16927 +    end;
1051  16929 +    if first.node then do;
1052  16930 +       put "&EM_CODEBAR";
1053  16931 +       put " Node = " node;
1054  16932 +       put "&EM_CODEBAR";
1055  16933 +    end;
1056  16935 +      if first.varname then do;
1057  16936 +         if RELATION ^in ("=", "ISMISSING", "ISNOTMI
      SSING") then do;
1058  16937 +           if MISSING(CHARACTER_VALUE) then do;
1059  16938 +            if NUMERIC_VALUE ne .  then do;
1060  16939 +             if ^first.node then do;
1061  16940 +               string= "AND "|| strip(varname)||" "
      ||strip(relation)||" "||strip(numeric_value);
1062  16941 +             end;
1063  16942 +             else do;
1064  16943 +               string= "if "|| strip(varname)||" "|
      |strip(relation)||" "||strip(numeric_value);
1065  16944 +             end;
1066  16945 +            end;
1067  16946 +           end;
1068  16947 +           else do;
1069  16948 +             if ^first.node then do;
1070  16949 +               string= "AND "|| strip(varname)||" "
      ||strip(relation)||" "||strip(character_value);
1071  16950 +             end;
1072  16951 +             else do;
```

```
1073 16952 +                string= "if "|| strip(varname)||" "|
     |strip(relation)||" "||strip(character_value);
1074 16953 +              end;
1075 16954 +             end;
1076 16955 +         end;
1077 16956 +         else if RELATION in ("=") then do;
1078 16957 +            if ^first.node then do;
1079 16958 +              string = "AND "||strip(varname) ||" IS
      ONE OF: "||character_value;
1080 16959 +            end;
1081 16960 +            else do;
1082 16961 +              string = "if "|| strip(varname) ||" IS
      ONE OF: "||character_value;
1083 16962 +            end;
1084 16963 +         end;
1085 16964 +         else if RELATION in ("ISMISSING") then do;
1086 16965 +            if ^first.node then do;
1087 16966 +              string = " AND "|| strip(varname) || "
      equals Missing";
1088 16967 +            end;
1089 16968 +            else do;
1090 16969 +              string = "if "|| strip(varname) ||" eq
     uals Missing";
1091 16970 +            end;
1092 16971 +         end;
1093 16972 +         else if RELATION in ("ISNOTMISSING") then d
     o;
1094 16973 +            if ^first.node then do;
1095 16974 +              string = " AND "|| strip(varname) || "
      equals All Values";
1096 16975 +            end;
1097 16976 +            else do;
1098 16977 +              string = "if "|| strip(varname) ||" eq
     uals All Values";
1099 16978 +            end;
1100 16979 +         end;
```

```
1101 16980 +         if ^missing(varname) then origvar = varname
     ;
1102 16981 +         oldnode=node;
1103 16983 +      end;
1104 16984 +      else do;
1105 16985 +         if RELATION ^in ("=", "ISMISSING", "ISNOTMI
     SSING") then do;
1106 16986 +          if MISSING(CHARACTER_VALUE) then do;
1107 16987 +           if  NUMERIC_VALUE ne .  then do;
1108 16988 +            if ^MISSING(string) then
1109 16989 +              string= strip(string)||" AND "|| strip
     (varname)||" "||strip(relation)||" "||strip(numeric_value);
1110 16990 +            else
1111 16991 +              string= " if "|| strip(varname)||" "||
     strip(relation)||" "||strip(numeric_value);
1112 16992 +           end;
1113 16993 +          end;
1114 16994 +          else do;
1115 16995 +            if ^MISSING(string) then
1116 16996 +              string= strip(string)||" AND "|| strip
     (varname)||" "||strip(relation)||" "||strip(character_value
     );
1117 16997 +            else
1118 16998 +              string= " if "|| strip(varname)||" "||
     strip(relation)||" "||strip(character_value);
1119 16999 +          end;
1120 17001 +         end;
1121 17002 +         else if RELATION in ("=") then do;
1122 17003 +           string = strip(string)||", "||strip(chara
     cter_value);
1123 17004 +         end;
1124 17005 +         else if RELATION in ("ISMISSING") then do;
1125 17007 +         end;
1126 17008 +         if ^missing(varname) then origvar = varname
     ;
1127 17009 +         oldnode=node;
```

```
1128  17010 +      end;
1129  17011 +      if last.varname then do;
1130  17012 +         if RELATION in ("ISMISSING") then do;
1131  17013 +           if ^first.varname then do;
1132  17014 +             string = strip(string) || " or MISSING"
      ;
1133  17015 +           end;
1134  17016 +         end;
1135  17017 +         put string;
1136  17018 +         if ^missing(varname) then origvar = varname
      ;
1137  17019 +         oldnode=node;
1138  17020 +      end;
1139  17022 +      if last.node then do;
1140  17023 +         put "then ";
1141  17024 +         put " Tree Node Identifier   = " node;
1142  17026 +         %if "&nprior_flag" ne "." %then %do;
1143  17027 +           put " Number of Observations = " NPRIORS;
1144  17028 +         %end;
1145  17029 +         %else %do;
1146  17030 +           put " Number of Observations = " N;
1147  17031 +         %end;
1148  17033 +         %if &numpred gt 0 %then %do;
1149  17034 +           %do i=1 %to &numpred;
1150  17035 +             put " &&tree_pred_label&i = " &&tree_pr
      ed_vars&i;
1151  17036 +           %end;
1152  17037 +         %end;
1153  17039 +         put " ";
1154  17040 +         if ^missing(varname) then origvar = varname
      ;
1155  17041 +         oldnode=node;
1156  17042 +      end;
1157  17044 +  run;
1158  17046 +  proc datasets lib=work nolist;
1159  17047 +    delete tempoutpath outnodes;
```

```
1160  17048 +  run;
1161  17050 +  %doendm:
1162  17051 +%mend em_tree_makeEnglishRules;
1163  NOTE: %INCLUDE (level 1) ending.
1164  NOTE: Fileref TEMP has been deassigned.
1165
1166  NOTE: The data set WORK.EM_USER_KEY has 1 observations and
      9 variables.
1167  NOTE: DATA statement used (Total process time):
1168        real time           0.00 seconds
1169        user cpu time       0.00 seconds
1170        system cpu time     0.00 seconds
1171        memory              30436.75k
1172        OS Memory           40560.00k
1173        Timestamp           07/01/2024 05:58:56 AM
1174        Step Count                        1  Switch Count  0
1175        Page Faults                       0
1176        Page Reclaims                     92
1177        Page Swaps                        0
1178        Voluntary Context Switches        0
1179        Involuntary Context Switches      0
1180        Block Input Operations            0
1181        Block Output Operations           264
1182
1183
1184
1185  NOTE: Records processed = 17497   Memory used = 511K.
1186  NOTE: There were 17497 observations read from the data set
      EMWS3.PART2_TRAIN.
1187  NOTE: The data set WORK._TMP_DMDBOUT has 2 observations and
       9 variables.
1188  NOTE: PROCEDURE DMDB used (Total process time):
1189        real time           0.00 seconds
1190        user cpu time       0.00 seconds
1191        system cpu time     0.01 seconds
1192        memory              30436.75k
```

```
1193       OS Memory           41828.00k
1194       Timestamp           07/01/2024 05:58:56 AM
1195       Step Count                       1  Switch Count  0
1196       Page Faults                      0
1197       Page Reclaims                    439
1198       Page Swaps                       0
1199       Voluntary Context Switches       2
1200       Involuntary Context Switches     0
1201       Block Input Operations           0
1202       Block Output Operations          264
1203
1204
1205
1206 NOTE: There were 2 observations read from the data set WORK
     ._TMP_DMDBOUT.
1207 NOTE: The data set WORK._TMP_DMDBOUT has 2 observations and
      9 variables.
1208 NOTE: DATA statement used (Total process time):
1209       real time           0.00 seconds
1210       user cpu time       0.00 seconds
1211       system cpu time     0.00 seconds
1212       memory              30436.75k
1213       OS Memory           41828.00k
1214       Timestamp           07/01/2024 05:58:56 AM
1215       Step Count                       1  Switch Count  0
1216       Page Faults                      0
1217       Page Reclaims                    131
1218       Page Swaps                       0
1219       Voluntary Context Switches       0
1220       Involuntary Context Switches     0
1221       Block Input Operations           0
1222       Block Output Operations          264
1223
1224
1225
1226 NOTE: DATA statement used (Total process time):
```

```
1227        real time           0.00 seconds
1228        user cpu time       0.00 seconds
1229        system cpu time     0.00 seconds
1230        memory              30436.75k
1231        OS Memory           41828.00k
1232        Timestamp           07/01/2024 05:58:56 AM
1233        Step Count                        1  Switch Count  0
1234        Page Faults                       0
1235        Page Reclaims                     60
1236        Page Swaps                        0
1237        Voluntary Context Switches        0
1238        Involuntary Context Switches      0
1239        Block Input Operations            0
1240        Block Output Operations           0
1241
1242
1243
1244  NOTE: Deleting WORK._TMP_DMDBOUT (memtype=DATA).
1245
1246  NOTE: PROCEDURE DATASETS used (Total process time):
1247        real time           0.00 seconds
1248        user cpu time       0.00 seconds
1249        system cpu time     0.00 seconds
1250        memory              30436.75k
1251        OS Memory           41828.00k
1252        Timestamp           07/01/2024 05:58:56 AM
1253        Step Count                        1  Switch Count  0
1254        Page Faults                       0
1255        Page Reclaims                     61
1256        Page Swaps                        0
1257        Voluntary Context Switches        0
1258        Involuntary Context Switches      0
1259        Block Input Operations            0
1260        Block Output Operations           8
1261
1262
```

```
1263
1264 NOTE: DATA STEP view saved on file EMWS3.EM_TREE2.
1265 NOTE: A stored DATA STEP view cannot run under a different
     operating system.
1266 NOTE: DATA statement used (Total process time):
1267       real time           0.01 seconds
1268       user cpu time       0.00 seconds
1269       system cpu time     0.00 seconds
1270       memory              30436.75k
1271       OS Memory           41828.00k
1272       Timestamp           07/01/2024 05:58:56 AM
1273       Step Count                        1  Switch Count  0
1274       Page Faults                       0
1275       Page Reclaims                     356
1276       Page Swaps                        0
1277       Voluntary Context Switches        31
1278       Involuntary Context Switches      0
1279       Block Input Operations            0
1280       Block Output Operations           264
1281
1282
1283 NOTE: View EMWS3.EM_TREE2.VIEW used (Total process time):
1284       real time           0.04 seconds
1285       user cpu time       0.01 seconds
1286       system cpu time     0.03 seconds
1287       memory              99662.50k
1288       OS Memory           111224.00k
1289       Timestamp           07/01/2024 05:58:56 AM
1290       Step Count                        1  Switch Count  7
1291       Page Faults                       0
1292       Page Reclaims                     16791
1293       Page Swaps                        0
1294       Voluntary Context Switches        15
1295       Involuntary Context Switches      0
1296       Block Input Operations            0
1297       Block Output Operations           0
```

```
1298
1299 NOTE: There were 17497 observations read from the data set
     EMWS3.PART2_TRAIN.
1300 NOTE: PROCEDURE SQL used (Total process time):
1301       real time           0.05 seconds
1302       user cpu time       0.02 seconds
1303       system cpu time     0.03 seconds
1304       memory              99662.50k
1305       OS Memory           111224.00k
1306       Timestamp           07/01/2024 05:58:56 AM
1307       Step Count                        1  Switch Count  8
1308       Page Faults                       0
1309       Page Reclaims                     17096
1310       Page Swaps                        0
1311       Voluntary Context Switches        33
1312       Involuntary Context Switches      0
1313       Block Input Operations            272
1314       Block Output Operations           0
1315
1316
1317
1318 NOTE: There were 1 observations read from the data set EMWS
     3.TREE2_IMP_CHURN_DM.
1319       WHERE _TYPE_='TARGET';
1320 NOTE: DATA statement used (Total process time):
1321       real time           0.00 seconds
1322       user cpu time       0.00 seconds
1323       system cpu time     0.00 seconds
1324       memory              99662.50k
1325       OS Memory           111224.00k
1326       Timestamp           07/01/2024 05:58:56 AM
1327       Step Count                        1  Switch Count  0
1328       Page Faults                       0
1329       Page Reclaims                     66
1330       Page Swaps                        0
1331       Voluntary Context Switches        2
```

```
1332       Involuntary Context Switches      0
1333       Block Input Operations            0
1334       Block Output Operations           0
1335
1336
1337
1338 NOTE: There were 1 observations read from the data set EMWS
     3.TREE2_VARIABLESET.
1339       WHERE (ROLE='TARGET') and (LEVEL not = 'ORDINAL');
1340 NOTE: The data set WORK.TEMPTARGET has 1 observations and 2
     1 variables.
1341 NOTE: DATA statement used (Total process time):
1342       real time           0.00 seconds
1343       user cpu time       0.01 seconds
1344       system cpu time     0.00 seconds
1345       memory              99662.50k
1346       OS Memory           111224.00k
1347       Timestamp           07/01/2024 05:58:56 AM
1348       Step Count                        1  Switch Count  0
1349       Page Faults                       0
1350       Page Reclaims                     128
1351       Page Swaps                        0
1352       Voluntary Context Switches        4
1353       Involuntary Context Switches      0
1354       Block Input Operations            0
1355       Block Output Operations           264
1356
1357
1358
1359 NOTE: There were 1 observations read from the data set EMWS
     3.TREE2_VARIABLESET.
1360       WHERE (ROLE='TARGET') and LEVEL in ('BINARY', 'NOMINA
     L', 'ORDINAL') and (USE='Y');
1361 NOTE: DATA statement used (Total process time):
1362       real time           0.00 seconds
1363       user cpu time       0.00 seconds
```

```
1364        system cpu time     0.00 seconds
1365        memory              99662.50k
1366        OS Memory           111224.00k
1367        Timestamp           07/01/2024 05:58:56 AM
1368        Step Count                        1  Switch Count  0
1369        Page Faults                       0
1370        Page Reclaims                     68
1371        Page Swaps                        0
1372        Voluntary Context Switches        3
1373        Involuntary Context Switches      0
1374        Block Input Operations            0
1375        Block Output Operations           0
1376
1377
1378
1379  NOTE: Records processed = 17497   Memory used = 511K.
1380  NOTE: View EMWS3.EM_TREE2.VIEW used (Total process time):
1381        real time           0.04 seconds
1382        user cpu time       0.01 seconds
1383        system cpu time     0.03 seconds
1384        memory              99662.50k
1385        OS Memory           111224.00k
1386        Timestamp           07/01/2024 05:58:56 AM
1387        Step Count                        1  Switch Count  5
1388        Page Faults                       0
1389        Page Reclaims                     16843
1390        Page Swaps                        0
1391        Voluntary Context Switches        14
1392        Involuntary Context Switches      0
1393        Block Input Operations            0
1394        Block Output Operations           328
1395
1396  NOTE: There were 17497 observations read from the data set
      EMWS3.PART2_TRAIN.
1397  NOTE: There were 17497 observations read from the data set
      EMWS3.EM_TREE2.
```

```
1398 NOTE: The data set WORK.CLASSOUT has 2 observations and 9 v
     ariables.
1399 NOTE: PROCEDURE DMDB used (Total process time):
1400       real time           0.05 seconds
1401       user cpu time       0.01 seconds
1402       system cpu time     0.04 seconds
1403       memory              99662.50k
1404       OS Memory           111224.00k
1405       Timestamp           07/01/2024 05:58:56 AM
1406       Step Count                        1  Switch Count  6
1407       Page Faults                       0
1408       Page Reclaims                     16965
1409       Page Swaps                        0
1410       Voluntary Context Switches        19
1411       Involuntary Context Switches      0
1412       Block Input Operations            0
1413       Block Output Operations           584
1414
1415
1416
1417 NOTE: Deleting WORK.CLASSOUT (memtype=DATA).
1418 NOTE: Deleting WORK.VAROUT (memtype=DATA).
1419
1420 NOTE: PROCEDURE DATASETS used (Total process time):
1421       real time           0.00 seconds
1422       user cpu time       0.00 seconds
1423       system cpu time     0.00 seconds
1424       memory              99662.50k
1425       OS Memory           111224.00k
1426       Timestamp           07/01/2024 05:58:56 AM
1427       Step Count                        1  Switch Count  0
1428       Page Faults                       0
1429       Page Reclaims                     58
1430       Page Swaps                        0
1431       Voluntary Context Switches        0
1432       Involuntary Context Switches      0
```

```
1433       Block Input Operations            0
1434       Block Output Operations           8
1435
1436
1437 NOTE: 3269778 kilobytes of physical memory.
1438 NOTE: Will use 17497 out of 17497 training cases.
1439 NOTE: Using memory pool with 147830784 bytes.
1440 NOTE: Passed training data 9 times.
1441 NOTE: Training used 3227080 bytes of work memory.
1442 NOTE: The subtree sequence contains 7 subtrees. The largest
      has 13 nodes and 7 leaves.
1443 NOTE: Using subtree with 5 nodes and 3 leaves.
1444 NOTE: Using subtree with 5 nodes and 3 leaves.
1445 NOTE: Created macro variable NLEAVES equal to 3.
1446 NOTE: The data set EMWS3.TREE2_OUTIMPORT has 6 observations
      and 6 variables.
1447 NOTE: The data set EMWS3.TREE2_EMTREE has 403 observations
     and 4 variables.
1448 NOTE: The data set EMWS3.TREE2_OUTNODES has 5 observations
     and 24 variables.
1449 NOTE: The data set EMWS3.TREE2_OUTPATH has 12 observations
     and 7 variables.
1450 NOTE: The data set EMWS3.TREE2_OUTRULES has 59 observations
      and 6 variables.
1451 NOTE: The data set EMWS3.TREE2_OUTSEQ has 7 observations an
     d 20 variables.
1452 NOTE: The data set EMWS3.TREE2_OUTSTATS has 35 observations
      and 5 variables.
1453 NOTE: The data set EMWS3.TREE2_OUTSUMMARY has 24 observatio
     ns and 6 variables.
1454 NOTE: The data set EMWS3.TREE2_OUTTOPOLOGY has 5 observatio
     ns and 5 variables.
1455 NOTE: External file /home/u63452984/case-study-s2192852/Wor
     kspaces/EMWS3/Tree2/TREEFLOW.sas opened.
1456 NOTE: External file /home/u63452984/case-study-s2192852/Wor
     kspaces/EMWS3/Tree2/TREEPUBLISH.sas opened.
```

```
1457 NOTE: The data set WORK.FIT_TRAIN has 1 observations and 10
      variables.
1458 NOTE: View EMWS3.EM_TREE2.VIEW used (Total process time):
1459       real time           0.08 seconds
1460       user cpu time       0.06 seconds
1461       system cpu time     0.03 seconds
1462       memory              309005.43k
1463       OS Memory           320880.00k
1464       Timestamp           07/01/2024 05:58:56 AM
1465       Step Count                        1  Switch Count  7
1466       Page Faults                       0
1467       Page Reclaims                     16534
1468       Page Swaps                        0
1469       Voluntary Context Switches        14
1470       Involuntary Context Switches      3
1471       Block Input Operations            0
1472       Block Output Operations           264
1473
1474 NOTE: There were 17497 observations read from the data set
      EMWS3.PART2_TRAIN.
1475 NOTE: The data set WORK.FIT_VALID has 1 observations and 8
      variables.
1476
1477
1478 NOTE: View EMWS3.EM_TREE2.VIEW used (Total process time):
1479       real time           0.54 seconds
1480       user cpu time       0.33 seconds
1481       system cpu time     0.12 seconds
1482       memory              309005.43k
1483       OS Memory           320880.00k
1484       Timestamp           07/01/2024 05:58:56 AM
1485       Step Count                        1  Switch Count  5
1486       Page Faults                       0
1487       Page Reclaims                     36273
1488       Page Swaps                        0
1489       Voluntary Context Switches        372
```

```
1490       Involuntary Context Switches      7
1491       Block Input Operations            32
1492       Block Output Operations           133504
1493
1494 NOTE: There were 17497 observations read from the data set
     EMWS3.PART2_TRAIN.
1495 NOTE: There were 17497 observations read from the data set
     EMWS3.EM_TREE2.
1496 NOTE: The data set WORK._NAMEDAT has 2 observations and 5 v
     ariables.
1497 NOTE: PROCEDURE ARBOR used (Total process time):
1498       real time           0.55 seconds
1499       user cpu time       0.33 seconds
1500       system cpu time     0.13 seconds
1501       memory              309005.43k
1502       OS Memory           320880.00k
1503       Timestamp           07/01/2024 05:58:56 AM
1504       Step Count                        1  Switch Count  14
1505       Page Faults                       0
1506       Page Reclaims                     36436
1507       Page Swaps                        0
1508       Voluntary Context Switches        376
1509       Involuntary Context Switches      10
1510       Block Input Operations            32
1511       Block Output Operations           133760
1512
1513
1514
1515 NOTE: Deleting WORK._TREEDMDB (memtype=CATALOG).
1516
1517 NOTE: PROCEDURE DATASETS used (Total process time):
1518       real time           0.00 seconds
1519       user cpu time       0.00 seconds
1520       system cpu time     0.00 seconds
1521       memory              309005.43k
1522       OS Memory           320880.00k
```

```
1523        Timestamp           07/01/2024 05:58:56 AM
1524        Step Count                        1  Switch Count  0
1525        Page Faults                       0
1526        Page Reclaims                     49
1527        Page Swaps                        0
1528        Voluntary Context Switches        0
1529        Involuntary Context Switches      0
1530        Block Input Operations            0
1531        Block Output Operations           8
1532
1533
1534
1535 NOTE: There were 1 observations read from the data set EMWS
     3.TREE2_VARIABLESET.
1536        WHERE ROLE='TARGET';
1537 NOTE: The data set WORK.TEMPTARGET has 1 observations and 2
     1 variables.
1538 NOTE: DATA statement used (Total process time):
1539        real time           0.00 seconds
1540        user cpu time       0.01 seconds
1541        system cpu time     0.00 seconds
1542        memory              309005.43k
1543        OS Memory           320880.00k
1544        Timestamp           07/01/2024 05:58:56 AM
1545        Step Count                        1  Switch Count  0
1546        Page Faults                       0
1547        Page Reclaims                     127
1548        Page Swaps                        0
1549        Voluntary Context Switches        3
1550        Involuntary Context Switches      7
1551        Block Input Operations            0
1552        Block Output Operations           264
1553
1554
1555
1556 NOTE: There were 1 observations read from the data set WORK
```

```
      .FIT_TRAIN.
1557  NOTE: There were 1 observations read from the data set WORK
      .FIT_VALID.
1558  NOTE: The data set EMWS3.TREE2_EMOUTFIT has 1 observations
      and 16 variables.
1559  NOTE: DATA statement used (Total process time):
1560        real time           0.01 seconds
1561        user cpu time       0.00 seconds
1562        system cpu time     0.00 seconds
1563        memory              309005.43k
1564        OS Memory           320880.00k
1565        Timestamp           07/01/2024 05:58:56 AM
1566        Step Count                        1  Switch Count  0
1567        Page Faults                       0
1568        Page Reclaims                     163
1569        Page Swaps                        0
1570        Voluntary Context Switches        30
1571        Involuntary Context Switches      5
1572        Block Input Operations            0
1573        Block Output Operations           264
1574
1575
1576
1577  NOTE: Deleting WORK.FIT_VALID (memtype=DATA).
1578
1579  NOTE: PROCEDURE DATASETS used (Total process time):
1580        real time           0.00 seconds
1581        user cpu time       0.00 seconds
1582        system cpu time     0.00 seconds
1583        memory              309005.43k
1584        OS Memory           320880.00k
1585        Timestamp           07/01/2024 05:58:56 AM
1586        Step Count                        1  Switch Count  0
1587        Page Faults                       0
1588        Page Reclaims                     84
1589        Page Swaps                        0
```

```
1590        Voluntary Context Switches        23
1591        Involuntary Context Switches      4
1592        Block Input Operations            288
1593        Block Output Operations           16
1594
1595
1596
1597  NOTE: There were 12 observations read from the data set EMW
      S3.TREE2_OUTPATH.
1598  NOTE: The data set WORK.TEMPOUTPATH has 12 observations and
       8 variables.
1599  NOTE: DATA statement used (Total process time):
1600        real time           0.00 seconds
1601        user cpu time       0.00 seconds
1602        system cpu time     0.01 seconds
1603        memory              309005.43k
1604        OS Memory           320880.00k
1605        Timestamp           07/01/2024 05:58:56 AM
1606        Step Count                        1  Switch Count  0
1607        Page Faults                       0
1608        Page Reclaims                     127
1609        Page Swaps                        0
1610        Voluntary Context Switches        4
1611        Involuntary Context Switches      0
1612        Block Input Operations            0
1613        Block Output Operations           264
1614
1615
1616
1617  NOTE: There were 2 observations read from the data set EMWS
      3.TREE2_IMP_CHURN_DM.
1618        WHERE _TYPE_='PREDICTED';
1619  NOTE: DATA statement used (Total process time):
1620        real time           0.00 seconds
1621        user cpu time       0.01 seconds
1622        system cpu time     0.00 seconds
```

```
1623        memory                309005.43k
1624        OS Memory             320880.00k
1625        Timestamp             07/01/2024 05:58:56 AM
1626        Step Count                          1  Switch Count  0
1627        Page Faults                         0
1628        Page Reclaims                       63
1629        Page Swaps                          0
1630        Voluntary Context Switches          2
1631        Involuntary Context Switches        0
1632        Block Input Operations              0
1633        Block Output Operations             0
1634
1635
1636
1637 NOTE: There were 2 observations read from the data set EMWS
     3.TREE2_OUTNODES.
1638 NOTE: DATA statement used (Total process time):
1639        real time             0.00 seconds
1640        user cpu time         0.00 seconds
1641        system cpu time       0.00 seconds
1642        memory                309005.43k
1643        OS Memory             320880.00k
1644        Timestamp             07/01/2024 05:58:56 AM
1645        Step Count                          1  Switch Count  0
1646        Page Faults                         0
1647        Page Reclaims                       63
1648        Page Swaps                          0
1649        Voluntary Context Switches          9
1650        Involuntary Context Switches        0
1651        Block Input Operations              288
1652        Block Output Operations             0
1653
1654
1655
1656 NOTE: There were 12 observations read from the data set WOR
     K.TEMPOUTPATH.
```

```
1657 NOTE: The data set WORK.TEMPOUTPATH has 12 observations and
      8 variables.
1658 NOTE: PROCEDURE SORT used (Total process time):
1659       real time           0.00 seconds
1660       user cpu time       0.00 seconds
1661       system cpu time     0.00 seconds
1662       memory              309005.43k
1663       OS Memory           320880.00k
1664       Timestamp           07/01/2024 05:58:56 AM
1665       Step Count                        1  Switch Count  0
1666       Page Faults                       0
1667       Page Reclaims                     117
1668       Page Swaps                        0
1669       Voluntary Context Switches        0
1670       Involuntary Context Switches      0
1671       Block Input Operations            0
1672       Block Output Operations           264
1673
1674
1675
1676 NOTE: There were 5 observations read from the data set EMWS
     3.TREE2_OUTNODES.
1677 NOTE: The data set WORK.OUTNODES has 5 observations and 24
     variables.
1678 NOTE: PROCEDURE SORT used (Total process time):
1679       real time           0.00 seconds
1680       user cpu time       0.00 seconds
1681       system cpu time     0.00 seconds
1682       memory              309005.43k
1683       OS Memory           320880.00k
1684       Timestamp           07/01/2024 05:58:56 AM
1685       Step Count                        1  Switch Count  0
1686       Page Faults                       0
1687       Page Reclaims                     153
1688       Page Swaps                        0
1689       Voluntary Context Switches        4
```

```
1690        Involuntary Context Switches      0
1691        Block Input Operations            0
1692        Block Output Operations           272
1693
1694
1695
1696  NOTE: There were 12 observations read from the data set WOR
      K.TEMPOUTPATH.
1697  NOTE: There were 5 observations read from the data set WORK
      .OUTNODES.
1698  NOTE: The data set WORK.TEMPOUTPATH has 12 observations and
       11 variables.
1699  NOTE: DATA statement used (Total process time):
1700        real time           0.00 seconds
1701        user cpu time       0.00 seconds
1702        system cpu time     0.00 seconds
1703        memory              309005.43k
1704        OS Memory           320880.00k
1705        Timestamp           07/01/2024 05:58:56 AM
1706        Step Count                        1  Switch Count  0
1707        Page Faults                       0
1708        Page Reclaims                     169
1709        Page Swaps                        0
1710        Voluntary Context Switches        0
1711        Involuntary Context Switches      0
1712        Block Input Operations            0
1713        Block Output Operations           264
1714
1715
1716
1717  NOTE: There were 12 observations read from the data set WOR
      K.TEMPOUTPATH.
1718  NOTE: The data set WORK.TEMPOUTPATH has 12 observations and
       11 variables.
1719  NOTE: PROCEDURE SORT used (Total process time):
1720        real time           0.00 seconds
```

```
1721        user cpu time       0.01 seconds
1722        system cpu time     0.00 seconds
1723        memory              309005.43k
1724        OS Memory           320880.00k
1725        Timestamp           07/01/2024 05:58:56 AM
1726        Step Count                        1  Switch Count  0
1727        Page Faults                       0
1728        Page Reclaims                     117
1729        Page Swaps                        0
1730        Voluntary Context Switches        0
1731        Involuntary Context Switches      0
1732        Block Input Operations            0
1733        Block Output Operations           264
1734
1735
1736
1737 NOTE: Numeric values have been converted to character value
     s at the places given by: (Line):(Column).
1738        218:176   228:190   374:191   381:195
1739 NOTE: The file X is:
1740        Filename=/home/u63452984/case-study-s2192852/Workspac
     es/EMWS3/Tree2/ENGLISHRULES.txt,
1741        Owner Name=u63452984,Group Name=oda,
1742        Access Permission=-rw-r--r--,
1743        Last Modified=07 January 2024 05:58:56
1744
1745 NOTE: 32 records were written to the file X.
1746        The minimum record length was 1.
1747        The maximum record length was 62.
1748 NOTE: There were 12 observations read from the data set WOR
     K.TEMPOUTPATH.
1749 NOTE: DATA statement used (Total process time):
1750        real time           0.01 seconds
1751        user cpu time       0.00 seconds
1752        system cpu time     0.00 seconds
1753        memory              309005.43k
```

```
1754        OS Memory           320880.00k
1755        Timestamp           07/01/2024 05:58:56 AM
1756        Step Count                       1  Switch Count  0
1757        Page Faults                      0
1758        Page Reclaims                    83
1759        Page Swaps                       0
1760        Voluntary Context Switches       4
1761        Involuntary Context Switches     0
1762        Block Input Operations           0
1763        Block Output Operations          8
1764
1765
1766
1767  NOTE: Deleting WORK.TEMPOUTPATH (memtype=DATA).
1768  NOTE: Deleting WORK.OUTNODES (memtype=DATA).
1769
1770  NOTE: PROCEDURE DATASETS used (Total process time):
1771        real time           0.00 seconds
1772        user cpu time       0.00 seconds
1773        system cpu time     0.00 seconds
1774        memory              309005.43k
1775        OS Memory           320880.00k
1776        Timestamp           07/01/2024 05:58:57 AM
1777        Step Count                       1  Switch Count  0
1778        Page Faults                      0
1779        Page Reclaims                    52
1780        Page Swaps                       0
1781        Voluntary Context Switches       0
1782        Involuntary Context Switches     0
1783        Block Input Operations           0
1784        Block Output Operations          8
1785
1786
1787
1788  NOTE: The data set WORK.EM_USER_REPORT has 132 observations
        and 4 variables.
```

```
1789 NOTE: DATA statement used (Total process time):
1790       real time           0.03 seconds
1791       user cpu time       0.04 seconds
1792       system cpu time     0.00 seconds
1793       memory              309005.43k
1794       OS Memory           320880.00k
1795       Timestamp           07/01/2024 05:58:57 AM
1796       Step Count                        1  Switch Count  0
1797       Page Faults                       0
1798       Page Reclaims                     221
1799       Page Swaps                        0
1800       Voluntary Context Switches        0
1801       Involuntary Context Switches      0
1802       Block Input Operations            0
1803       Block Output Operations           264
1804
1805
1806 NOTE: Fileref X has been deassigned.
1807 17053
1808 17054  *-------------------------------------------------
     ---------*;
1809 17055  * End TRAIN: Tree2;
1810 17056  *-------------------------------------------------
     ---------*;
1811
1812 17057  *-------------------------------------------------
     ---------*;
1813 17058  * Close any missing semi colons;
1814 17059  *-------------------------------------------------
     ---------*;
1815 17060  ;
1816 17061  ;
1817 17062  ;
1818 17063  ;
1819 17064  quit;
1820 17065  *-------------------------------------------------
```

```
     ---------*;
1821 17066  * Close any unbalanced quotes;
1822 17067  *-------------------------------------------------
     ---------*;
1823 17068  /*; *"; *'; */
1824 17069  ;
1825 17070  run;
1826 17071  quit;
1827 17072  /* Reset EM Options */
1828 17073  options formchar="|----|+|---+=|-/\<>*";
1829 17074  options nocenter ls=256 ps=10000;
1830 17075  goptions reset=all device=GIF NODISPLAY;
1831
1832 17076  proc sort data=WORK.EM_USER_REPORT;
1833 17077  by ID VIEW;
1834 17078  run;
1835
1836 NOTE: There were 132 observations read from the data set WO
     RK.EM_USER_REPORT.
1837 NOTE: The data set WORK.EM_USER_REPORT has 132 observations
      and 4 variables.
1838 NOTE: PROCEDURE SORT used (Total process time):
1839       real time           0.00 seconds
1840       user cpu time       0.00 seconds
1841       system cpu time     0.00 seconds
1842       memory              309005.43k
1843       OS Memory           320880.00k
1844       Timestamp           07/01/2024 05:58:57 AM
1845       Step Count                        1  Switch Count  0
1846       Page Faults                       0
1847       Page Reclaims                     107
1848       Page Swaps                        0
1849       Voluntary Context Switches        0
1850       Involuntary Context Switches      0
1851       Block Input Operations            0
1852       Block Output Operations           264
```

```
1853
1854
1855 *------------------------------------------------------------
     --*
1856 * Score Log
1857 Date:                07 January 2024
1858 Time:                05:58:57
1859 *------------------------------------------------------------
     --*
1860 17180  %let EMEXCEPTIONSTRING=;
1861 17181  *-------------------------------------------------
     ---------*;
1862 17182  * SCORE: Tree2;
1863 17183  *-------------------------------------------------
     ---------*;
1864 17184  %let EM_ACTION = SCORE;
1865 17185  %let syscc = 0;
1866 17186  %macro main;
1867 17187
1868 17188    %if %upcase(&EM_ACTION) = CREATE %then %do;
1869 17189      filename temp catalog 'sashelp.emmodl.tree_creat
     e.source';
1870 17190      %include temp;
1871 17191      filename temp;
1872 17192
1873 17193      %em_tree_create;
1874 17194    %end;
1875 17195
1876 17196     %else
1877 17197     %if %upcase(&EM_ACTION) = TRAIN %then %do;
1878 17198
1879 17199         filename temp catalog 'sashelp.emmodl.tree_tr
     ain.source';
1880 17200         %include temp;
1881 17201         filename temp;
1882 17202         %em_tree_train;
```

```
1883 17203     %end;
1884 17204
1885 17205    %else
1886 17206    %if %upcase(&EM_ACTION) = SCORE %then %do;
1887 17207      filename temp catalog 'sashelp.emmodl.tree_score
     .source';
1888 17208      %include temp;
1889 17209      filename temp;
1890 17210
1891 17211      %em_tree_score;
1892 17212
1893 17213    %end;
1894 17214
1895 17215    %else
1896 17216    %if %upcase(&EM_ACTION) = REPORT %then %do;
1897 17217
1898 17218         filename temp catalog 'sashelp.emmodl.tree_re
     port.source';
1899 17219         %include temp;
1900 17220         filename temp;
1901 17221
1902 17222         %em_tree_report;
1903 17223     %end;
1904 17224
1905 17225    %else
1906 17226    %if %upcase(&EM_ACTION) = OPENINT %then %do;
1907 17227
1908 17228         filename temp catalog 'sashelp.emmodl.tree_ac
     tions.source';
1909 17229         %include temp;
1910 17230         filename temp;
1911 17231         %EM_TREE_OPENTREEVIEWER;
1912 17232
1913 17233     %end;
1914 17234
1915 17235    %else
```

```
1916 17236    %if %upcase(&EM_ACTION) = CLOSEINT %then %do;
1917 17237
1918 17238         filename temp catalog 'sashelp.emmodl.tree_ac
     tions.source';
1919 17239         %include temp;
1920 17240         filename temp;
1921 17241         %EM_TREE_CLOSETREEVIEWER;
1922 17242
1923 17243     %end;
1924 17244
1925 17245
1926 17246     %doendm:
1927 17247  %mend main;
1928 17248
1929 17249  %main;
1930 NOTE: %INCLUDE (level 1) file TEMP is file SASHELP.EMMODL.T
     REE_SCORE.SOURCE.
1931 17251 +%macro em_tree_score;
1932 17253 +   /* determine if multiple targets will be processe
     d */
1933 17254 +   %let em_tree_multipleTargets=N;
1934 17255 +   %let em_tree_numTarget=1;
1935 17256 +   %if "&EM_PROPERTY_USEMULTIPLETARGET" eq "Y" %then
      %do;
1936 17257 +      /* determine if there are any ordinal target v
     ariables - if so, multiple targets are not supported */
1937 17258 +      %if &EM_NUM_ORDINAL_TARGET gt 0 %then %do;
1938 17259 +         %let em_tree_multipleTargets=N;
1939 17260 +      %end;
1940 17261 +      %else %do;
1941 17262 +         /* create macro array of targets  */
1942 17263 +         data _null_;
1943 17264 +           set &EM_DATA_VARIABLESET(where=(ROLE='TAR
     GET' AND LEVEL^='ORDINAL')) end=eof;
1944 17265 +           call symput('em_tree_targetVars'!!strip(p
     ut(_N_, BEST.)), strip(Name));
```

```
1945 17266 +           if eof then
1946 17267 +             call symput('em_tree_numTarget', strip(
     put(_N_, BEST.)));
1947 17268 +         run;
1948 17270 +         %if &em_tree_numTarget gt 1 %then %do;
1949 17271 +            %let em_tree_multipleTargets=Y;
1950 17272 +         %end;
1951 17273 +       %end;
1952 17274 +   %end;
1953 17276 +   /* build flow and publish scoring code */
1954 17277 +   %EM_GETNAME(key=TREEFLOW, type=FILE, extension=sa
     s);
1955 17278 +   %EM_GETNAME(key=TREEPUBLISH, type=FILE, extension
     =sas);
1956 17280 +   filename treeflow "&EM_USER_TREEFLOW";
1957 17281 +   filename treepub "&EM_USER_TREEPUBLISH";
1958 17283 +   filename flowref  "&EM_FILE_EMFLOWSCORECODE";
1959 17284 +   filename pubref   "&EM_FILE_EMPUBLISHSCORECODE";
1960 17286 +   %em_copyfile(infref=treeflow, outfref=flowref);
1961 17287 +   %em_copyfile(infref=treepub, outfref=pubref);
1962 17289 +   filename treeflow;
1963 17290 +   filename treepub;
1964 17292 +   /* if priors are used, add code to generate unadj
     usted residuals in export */
1965 17293 +   %let useAdjPriors = N;
1966 17294 +   data _null_;
1967 17295 +     set &EM_DEC_DECMETA(where=(_TYPE_="DECPRIOR"));
1968 17296 +     if USE="Y" then call symput('useAdjPriors', 'Y'
     );
1969 17297 +   run;
1970 17298 +   %if (("&em_tree_multipleTargets" eq "N") AND ("&u
     seAdjPriors" eq "Y")) %then %do;
1971 17299 +      filename temp catalog 'sashelp.emutil.em_makeu
     nadjustedresidualvars.source';
1972 17300 +      %include temp;
1973 17301 +      filename temp;
```

```
1974  17303 +      %EM_GETNAME(key=adjResidualCode, type=FILE, ex
      tension=sas);
1975  17304 +      filename adjref "&EM_USER_adjResidualCode";
1976  17305 +      %makeUnadjustedResidualVars(target=%EM_TARGET,
       decmeta=&EM_DEC_DECMETA, fref=adjref);
1977  17307 +      %em_copyfile(infref=adjref, outfref=flowref, a
      ppend=Y);
1978  17309 +      filename adjref;
1979  17310 +   %end;
1980  17312 +   /* LEAF */
1981  17313 +   %if "&EM_PROPERTY_LEAFID" eq "Y" %then %do;
1982  17314 +      data _null_;
1983  17315 +        file flowref mod;
1984  17316 +        put 'drop _LEAF_;';
1985  17317 +      run;
1986  17319 +      data _null_;
1987  17320 +        file pubref mod;
1988  17321 +        put 'drop _LEAF_;';
1989  17322 +      run;
1990  17324 +   %end;
1991  17326 +   filename flowref;
1992  17327 +   filename pubref;
1993  17329 +   /* em_metachange code */
1994  17330 +   %if "&EM_PROPERTY_LEAFID" eq "Y" %then %do;
1995  17331 +     %EM_METACHANGE(name=_NODE_, role=&EM_PROPERTY_N
      ODEROLE, LEVEL=NOMINAL);
1996  17332 +   %end;
1997  17334 +   /* variable selection based on importance stat
       */
1998  17335 +   %if "&EM_PROPERTY_VARSELECTION" eq "Y" %then %do;
1999  17336 +     %EM_GETNAME(key=OUTIMPORT, type=DATA);
2000  17337 +     %let dsid = %sysfunc(open(&EM_USER_OUTIMPORT(wh
      ere=(IMPORTANCE<0.05))));
2001  17338 +     %let varnum = %sysfunc(varnum(&dsid, NAME));
2002  17339 +     %let obs = %sysfunc(fetch(&dsid));
2003  17340 +     %do %while(&obs=0);
```

```
2004 17341 +       %let temp = %nrbquote(%sysfunc(getvarc(&dsid,
      &varnum)));
2005 17342 +       %let varname = %nrbquote(%sysfunc(tranwrd(&te
     mp,  %str(%"),"")));
2006 17343 +       %EM_METACHANGE(name=&varname, role=REJECTED);
2007 17344 +       %let obs = %sysfunc(fetch(&dsid));
2008 17345 +     %end;
2009 17346 +     %if &dsid %then %let dsid=%sysfunc(close(&dsid)
     );
2010 17347 +   %end;
2011 17349 +   /* set Q_ varaibles to role of ASSESS when in the
      presense of prior probabilities */
2012 17350 +   %if %sysfunc(exist(&EM_DEC_DECMETA)) %then %do;
2013 17351 +    %let tree_pred_vars = ;
2014 17352 +    %let tree_pred_lvl =;
2015 17353 +    %let numpred= 0;
2016 17355 +    data _null_;
2017 17356 +     set &EM_DEC_DECMETA(where=(_TYPE_="PREDICTED"))
      end=eof;
2018 17357 +     call symput('tree_pred_vars'!!strip(put(_N_, BE
     ST.)), strip(VARIABLE));
2019 17358 +     call symput('tree_pred_lvl'!!strip(put(_N_, BES
     T.)), strip(LEVEL));
2020 17359 +     if eof then
2021 17360 +       call symput('numpred', strip(put(_N_, BEST.))
     );
2022 17361 +    run;
2023 17362 +   %end;
2024 17364 +   %if &numpred ne 0 %then %do;
2025 17365 +    %do i=1 %to &numpred;
2026 17366 +      %let qpred = Q%substr(&&tree_pred_vars&i,2);
2027 17367 +      %EM_METACHANGE(name=&qpred, role=ASSESS);
2028 17368 +    %end;
2029 17369 +   %end;
2030 17371 +   /* determine if multiple targets will be processe
     d */
```

```
2031 17372 +   %let em_tree_multipleTargets=N;
2032 17373 +   %let em_tree_numTarget=1;
2033 17374 +   %if "&EM_PROPERTY_USEMULTIPLETARGET" eq "Y" %then
      %do;
2034 17375 +      /* determine if there are any ordinal target v
     ariables - if so, multiple targets are not supported */
2035 17376 +      %if &EM_NUM_ORDINAL_TARGET gt 0 %then %do;
2036 17377 +         %let em_tree_multipleTargets=N;
2037 17378 +      %end;
2038 17379 +      %else %do;
2039 17380 +        data _null_;
2040 17381 +          set &EM_DATA_VARIABLESET(where=(ROLE='TARG
     ET' AND LEVEL^='ORDINAL')) end=eof;
2041 17382 +          if eof then
2042 17383 +            call symput('em_tree_numTarget', strip(p
     ut(_N_, BEST.)));
2043 17384 +        run;
2044 17386 +        %if &em_tree_numTarget gt 1 %then %do;
2045 17387 +           %let em_tree_multipleTargets=Y;
2046 17388 +        %end;
2047 17389 +     %end;
2048 17390 +   %end;
2049 17392 +   /* need to include this code to do the %em_report
      for OUTIMPORT here instead of in Report code so _loop data
      set is created when group processing */
2050 17393 +   %if "&em_tree_multipleTargets" eq "N" %then %do;
2051 17395 +      /* variable importance */
2052 17396 +      %EM_GETNAME(key=OUTIMPORT, type=DATA);
2053 17397 +      %if %sysfunc(exist(&EM_USER_OUTIMPORT)) eq 1 %
     then %do;
2054 17399 +         %let validexist=0;
2055 17400 +         %if (("&EM_IMPORT_VALIDATE" ne "") AND (%sy
     sfunc(exist(&EM_IMPORT_VALIDATE)) or %sysfunc(exist(&EM_IMP
     ORT_VALIDATE,VIEW)))) %then %do;
2056 17401 +           %let validexist=1;
2057 17402 +         %end;
```

```
2058 17404 +         /* determine if vars exists - properties co
     uld indicate they are they but freeze=Y would mean the node
      wasn't retrained */
2059 17405 +         /* and the columns may not be generated

                       */
2060 17406 +         %let em_tree_cvexists=;
2061 17407 +         %let em_tree_surrexists=.;
2062 17408 +         data _null_;
2063 17409 +            set &EM_USER_OUTIMPORT (obs=2) end=eof;
2064 17410 +            if eof then do ;
2065 17411 +               call symput("em_tree_cvexists" , stri
     p(put(cvimportance,best.))) ;
2066 17412 +               call symput("em_tree_surrexists", str
     ip(put(nsurrogates, best.)));
2067 17413 +            end;
2068 17414 +         run;
2069 17416 +         data &EM_USER_OUTIMPORT;
2070 17417 +            set &EM_USER_OUTIMPORT;
2071 17419 +            /* format columns based on Precison valu
     e specified */
2072 17420 +            format importance 15.&EM_PROPERTY_PRECIS
     ION
2073 17421 +                 %if &validexist %then %do;
2074 17422 +                   vimportance ratio 15.&EM_PROPERTY
     _PRECISION
2075 17423 +                 %end;
2076 17424 +                 %if "&EM_TREE_CVEXISTS" ne "." %the
     n %do;
2077 17425 +                   cvimportance vimportance ratio 15
     .&EM_PROPERTY_PRECISION
2078 17426 +                 %end;
2079 17427 +            ;
2080 17428 +            label  NAME       = "%sysfunc(sasmsg(sas
     help.dmine, meta_name_vlabel, noquote))"
2081 17429 +                 LABEL        = "%sysfunc(sasmsg(sas
```

```
      help.dmine, meta_label_vlabel, noquote))"
2082  17430 +                NRULES       = "%sysfunc(sasmsg(sas
      help.dmine, rpt_nrules_vlabel, noquote))"
2083  17431 +                IMPORTANCE   = "%sysfunc(sasmsg(sas
      help.dmine, rpt_importance_vlabel, noquote))"
2084  17432 +                %if "&em_tree_surrexists" ne "" %th
      en %do;
2085  17433 +                  NSURROGATES  = "%sysfunc(sasmsg(s
      ashelp.dmine, rpt_nsurrogates_vlabel, noquote))"
2086  17434 +                %end;
2087  17435 +                %if &validexist %then %do;
2088  17436 +                  VIMPORTANCE = "%sysfunc(sasmsg(sa
      shelp.dmine, rpt_vimportance_vlabel, noquote))"
2089  17437 +                  RATIO       = "%sysfunc(sasmsg(sa
      shelp.dmine, rpt_ratio_vlabel, noquote))"
2090  17438 +                %end;
2091  17439 +                %if "&EM_TREE_CVEXISTS" ne "" %then
       %do;
2092  17440 +                  VIMPORTANCE = "%sysfunc(sasmsg(sa
      shelp.dmine, rpt_vimportance_vlabel, noquote))"
2093  17441 +                  CVIMPORTANCE =  "%sysfunc(sasmsg(
      sashelp.dmine, rpt_cvimport_vlabel, noquote))"
2094  17442 +                  CVRULES= "%sysfunc(sasmsg(sashelp
      .dmine, rpt_cvrules_vlabel, noquote))"
2095  17443 +                  RATIO = "%sysfunc(sasmsg(sashelp.
      dmine, rpt_ratio_vlabel, noquote))"
2096  17444 +                %end;
2097  17445 +           ;
2098  17446 +         run;
2099  17448 +         %EM_REPORT(key=OUTIMPORT, viewtype=DATA, bl
      ock=MODEL, description=IMPORTANCE, autodisplay=N);
2100  17449 +      %end;
2101  17450 +   %end;
2102  17452 +   %doendm:
2103  17453 +%mend em_tree_score;
2104  NOTE: %INCLUDE (level 1) ending.
```

```
2105 NOTE: Fileref TEMP has been deassigned.
2106
2107 NOTE: The file FLOWREF is:
2108       Filename=/home/u63452984/case-study-s2192852/Workspac
     es/EMWS3/Tree2/EMFLOWSCORE.sas,
2109       Owner Name=u63452984,Group Name=oda,
2110       Access Permission=-rw-r--r--,
2111       Last Modified=07 January 2024 05:58:57
2112
2113 NOTE: 95 records were written to the file FLOWREF.
2114       The minimum record length was 1.
2115       The maximum record length was 65.
2116 NOTE: DATA statement used (Total process time):
2117       real time           0.00 seconds
2118       user cpu time       0.00 seconds
2119       system cpu time     0.00 seconds
2120       memory              309005.43k
2121       OS Memory           320880.00k
2122       Timestamp           07/01/2024 05:58:57 AM
2123       Step Count                        1  Switch Count  0
2124       Page Faults                       0
2125       Page Reclaims                     28
2126       Page Swaps                        0
2127       Voluntary Context Switches        12
2128       Involuntary Context Switches      0
2129       Block Input Operations            0
2130       Block Output Operations           8
2131
2132
2133
2134 NOTE: The file PUBREF is:
2135       Filename=/home/u63452984/case-study-s2192852/Workspac
     es/EMWS3/Tree2/EMPUBLISHSCORE.sas,
2136       Owner Name=u63452984,Group Name=oda,
2137       Access Permission=-rw-r--r--,
2138       Last Modified=07 January 2024 05:58:57
```

```
2139
2140 NOTE: 73 records were written to the file PUBREF.
2141       The minimum record length was 1.
2142       The maximum record length was 65.
2143 NOTE: DATA statement used (Total process time):
2144       real time           0.00 seconds
2145       user cpu time       0.00 seconds
2146       system cpu time     0.00 seconds
2147       memory              309005.43k
2148       OS Memory           320880.00k
2149       Timestamp           07/01/2024 05:58:57 AM
2150       Step Count                        1  Switch Count  0
2151       Page Faults                       0
2152       Page Reclaims                     30
2153       Page Swaps                        0
2154       Voluntary Context Switches        8
2155       Involuntary Context Switches      0
2156       Block Input Operations            0
2157       Block Output Operations           8
2158
2159
2160 NOTE: Fileref TREEFLOW has been deassigned.
2161 NOTE: Fileref TREEPUB has been deassigned.
2162
2163 NOTE: There were 1 observations read from the data set EMWS
     3.TREE2_IMP_CHURN_DM.
2164       WHERE _TYPE_='DECPRIOR';
2165 NOTE: DATA statement used (Total process time):
2166       real time           0.00 seconds
2167       user cpu time       0.00 seconds
2168       system cpu time     0.00 seconds
2169       memory              309005.43k
2170       OS Memory           320880.00k
2171       Timestamp           07/01/2024 05:58:57 AM
2172       Step Count                        1  Switch Count  0
2173       Page Faults                       0
```

```
2174       Page Reclaims                     64
2175       Page Swaps                        0
2176       Voluntary Context Switches        2
2177       Involuntary Context Switches      0
2178       Block Input Operations            0
2179       Block Output Operations           0
2180
2181
2182
2183 NOTE: The file FLOWREF is:
2184       Filename=/home/u63452984/case-study-s2192852/Workspac
     es/EMWS3/Tree2/EMFLOWSCORE.sas,
2185       Owner Name=u63452984,Group Name=oda,
2186       Access Permission=-rw-r--r--,
2187       Last Modified=07 January 2024 05:58:57,
2188       File Size (bytes)=3321
2189
2190 NOTE: 1 record was written to the file FLOWREF.
2191       The minimum record length was 12.
2192       The maximum record length was 12.
2193 NOTE: DATA statement used (Total process time):
2194       real time           0.00 seconds
2195       user cpu time       0.00 seconds
2196       system cpu time     0.00 seconds
2197       memory              309005.43k
2198       OS Memory           320880.00k
2199       Timestamp           07/01/2024 05:58:57 AM
2200       Step Count                        1  Switch Count  0
2201       Page Faults                       0
2202       Page Reclaims                     27
2203       Page Swaps                        0
2204       Voluntary Context Switches        8
2205       Involuntary Context Switches      0
2206       Block Input Operations            0
2207       Block Output Operations           16
2208
```

```
2209
2210
2211 NOTE: The file PUBREF is:
2212       Filename=/home/u63452984/case-study-s2192852/Workspac
     es/EMWS3/Tree2/EMPUBLISHSCORE.sas,
2213       Owner Name=u63452984,Group Name=oda,
2214       Access Permission=-rw-r--r--,
2215       Last Modified=07 January 2024 05:58:57,
2216       File Size (bytes)=2670
2217
2218 NOTE: 1 record was written to the file PUBREF.
2219       The minimum record length was 12.
2220       The maximum record length was 12.
2221 NOTE: DATA statement used (Total process time):
2222       real time           0.00 seconds
2223       user cpu time       0.00 seconds
2224       system cpu time     0.00 seconds
2225       memory              309005.43k
2226       OS Memory           320880.00k
2227       Timestamp           07/01/2024 05:58:57 AM
2228       Step Count                        1  Switch Count  0
2229       Page Faults                       0
2230       Page Reclaims                     28
2231       Page Swaps                        0
2232       Voluntary Context Switches        7
2233       Involuntary Context Switches      0
2234       Block Input Operations            0
2235       Block Output Operations           8
2236
2237
2238 NOTE: Fileref FLOWREF has been deassigned.
2239 NOTE: Fileref PUBREF has been deassigned.
2240
2241 NOTE: The data set WORK.EM_METACHANGE has 1 observations an
     d 9 variables.
2242 NOTE: DATA statement used (Total process time):
```

```
2243       real time           0.00 seconds
2244       user cpu time       0.00 seconds
2245       system cpu time     0.00 seconds
2246       memory              309005.43k
2247       OS Memory           320880.00k
2248       Timestamp           07/01/2024 05:58:57 AM
2249       Step Count                        1  Switch Count  0
2250       Page Faults                       0
2251       Page Reclaims                     92
2252       Page Swaps                        0
2253       Voluntary Context Switches        0
2254       Involuntary Context Switches      0
2255       Block Input Operations            0
2256       Block Output Operations           264
2257
2258
2259
2260 NOTE: There were 1 observations read from the data set WORK
     .EM_METACHANGE.
2261 NOTE: The data set WORK.EM_METACHANGE has 2 observations an
     d 9 variables.
2262 NOTE: DATA statement used (Total process time):
2263       real time           0.00 seconds
2264       user cpu time       0.00 seconds
2265       system cpu time     0.00 seconds
2266       memory              309005.43k
2267       OS Memory           320880.00k
2268       Timestamp           07/01/2024 05:58:57 AM
2269       Step Count                        1  Switch Count  0
2270       Page Faults                       0
2271       Page Reclaims                     132
2272       Page Swaps                        0
2273       Voluntary Context Switches        0
2274       Involuntary Context Switches      0
2275       Block Input Operations            0
2276       Block Output Operations           264
```

```
2277
2278
2279
2280 NOTE: There were 2 observations read from the data set WORK
     .EM_METACHANGE.
2281 NOTE: The data set WORK.EM_METACHANGE has 3 observations an
     d 9 variables.
2282 NOTE: DATA statement used (Total process time):
2283       real time           0.00 seconds
2284       user cpu time       0.00 seconds
2285       system cpu time     0.00 seconds
2286       memory              309005.43k
2287       OS Memory           320880.00k
2288       Timestamp           07/01/2024 05:58:57 AM
2289       Step Count                        1  Switch Count  0
2290       Page Faults                       0
2291       Page Reclaims                     129
2292       Page Swaps                        0
2293       Voluntary Context Switches        0
2294       Involuntary Context Switches      0
2295       Block Input Operations            0
2296       Block Output Operations           264
2297
2298
2299
2300 NOTE: There were 3 observations read from the data set WORK
     .EM_METACHANGE.
2301 NOTE: The data set WORK.EM_METACHANGE has 4 observations an
     d 9 variables.
2302 NOTE: DATA statement used (Total process time):
2303       real time           0.00 seconds
2304       user cpu time       0.01 seconds
2305       system cpu time     0.00 seconds
2306       memory              309005.43k
2307       OS Memory           320880.00k
2308       Timestamp           07/01/2024 05:58:57 AM
```

```
2309        Step Count                         1  Switch Count  0
2310        Page Faults                        0
2311        Page Reclaims                      131
2312        Page Swaps                         0
2313        Voluntary Context Switches         0
2314        Involuntary Context Switches       0
2315        Block Input Operations             0
2316        Block Output Operations            264
2317
2318
2319
2320 NOTE: There were 4 observations read from the data set WORK
     .EM_METACHANGE.
2321 NOTE: The data set WORK.EM_METACHANGE has 5 observations an
     d 9 variables.
2322 NOTE: DATA statement used (Total process time):
2323        real time           0.00 seconds
2324        user cpu time       0.00 seconds
2325        system cpu time     0.01 seconds
2326        memory              309005.43k
2327        OS Memory           320880.00k
2328        Timestamp           07/01/2024 05:58:57 AM
2329        Step Count                         1  Switch Count  0
2330        Page Faults                        0
2331        Page Reclaims                      128
2332        Page Swaps                         0
2333        Voluntary Context Switches         0
2334        Involuntary Context Switches       0
2335        Block Input Operations             0
2336        Block Output Operations            264
2337
2338
2339
2340 NOTE: There were 2 observations read from the data set EMWS
     3.TREE2_IMP_CHURN_DM.
2341        WHERE _TYPE_='PREDICTED';
```

```
2342 NOTE: DATA statement used (Total process time):
2343       real time           0.00 seconds
2344       user cpu time       0.00 seconds
2345       system cpu time     0.00 seconds
2346       memory              309005.43k
2347       OS Memory           320880.00k
2348       Timestamp           07/01/2024 05:58:57 AM
2349       Step Count                        1  Switch Count  0
2350       Page Faults                       0
2351       Page Reclaims                     64
2352       Page Swaps                        0
2353       Voluntary Context Switches        3
2354       Involuntary Context Switches      0
2355       Block Input Operations            0
2356       Block Output Operations           0
2357
2358
2359
2360 NOTE: There were 5 observations read from the data set WORK
     .EM_METACHANGE.
2361 NOTE: The data set WORK.EM_METACHANGE has 6 observations an
     d 9 variables.
2362 NOTE: DATA statement used (Total process time):
2363       real time           0.00 seconds
2364       user cpu time       0.00 seconds
2365       system cpu time     0.00 seconds
2366       memory              309005.43k
2367       OS Memory           320880.00k
2368       Timestamp           07/01/2024 05:58:57 AM
2369       Step Count                        1  Switch Count  0
2370       Page Faults                       0
2371       Page Reclaims                     129
2372       Page Swaps                        0
2373       Voluntary Context Switches        0
2374       Involuntary Context Switches      0
2375       Block Input Operations            0
```

```
2376       Block Output Operations          264
2377
2378
2379
2380 NOTE: There were 6 observations read from the data set WORK
     .EM_METACHANGE.
2381 NOTE: The data set WORK.EM_METACHANGE has 7 observations an
     d 9 variables.
2382 NOTE: DATA statement used (Total process time):
2383       real time           0.00 seconds
2384       user cpu time       0.00 seconds
2385       system cpu time     0.00 seconds
2386       memory              309005.43k
2387       OS Memory           320880.00k
2388       Timestamp           07/01/2024 05:58:57 AM
2389       Step Count                       1  Switch Count  0
2390       Page Faults                      0
2391       Page Reclaims                    131
2392       Page Swaps                       0
2393       Voluntary Context Switches       0
2394       Involuntary Context Switches     0
2395       Block Input Operations           0
2396       Block Output Operations          264
2397
2398
2399
2400 NOTE: Variable cvimportance is uninitialized.
2401 NOTE: Variable nsurrogates is uninitialized.
2402 NOTE: There were 2 observations read from the data set EMWS
     3.TREE2_OUTIMPORT.
2403 NOTE: DATA statement used (Total process time):
2404       real time           0.00 seconds
2405       user cpu time       0.01 seconds
2406       system cpu time     0.00 seconds
2407       memory              309005.43k
2408       OS Memory           320880.00k
```

```
2409        Timestamp           07/01/2024 05:58:57 AM
2410        Step Count                        1  Switch Count  0
2411        Page Faults                       0
2412        Page Reclaims                     63
2413        Page Swaps                        0
2414        Voluntary Context Switches        7
2415        Involuntary Context Switches      0
2416        Block Input Operations            0
2417        Block Output Operations           0
2418
2419
2420
2421  NOTE: Variable NSURROGATES is uninitialized.
2422  NOTE: Variable CVIMPORTANCE is uninitialized.
2423  NOTE: Variable CVRULES is uninitialized.
2424  NOTE: There were 6 observations read from the data set EMWS
      3.TREE2_OUTIMPORT.
2425  NOTE: The data set EMWS3.TREE2_OUTIMPORT has 6 observations
       and 6 variables.
2426  NOTE: DATA statement used (Total process time):
2427        real time           0.01 seconds
2428        user cpu time       0.00 seconds
2429        system cpu time     0.00 seconds
2430        memory              309005.43k
2431        OS Memory           320880.00k
2432        Timestamp           07/01/2024 05:58:57 AM
2433        Step Count                        1  Switch Count  0
2434        Page Faults                       0
2435        Page Reclaims                     1383
2436        Page Swaps                        0
2437        Voluntary Context Switches        28
2438        Involuntary Context Switches      0
2439        Block Input Operations            0
2440        Block Output Operations           264
2441
2442
```

```
2443
2444 NOTE: The data set WORK.EM_USER_REPORT has 132 observations
      and 4 variables.
2445 NOTE: DATA statement used (Total process time):
2446       real time           0.02 seconds
2447       user cpu time       0.03 seconds
2448       system cpu time     0.01 seconds
2449       memory              309005.43k
2450       OS Memory           320880.00k
2451       Timestamp           07/01/2024 05:58:57 AM
2452       Step Count                        1  Switch Count  0
2453       Page Faults                       0
2454       Page Reclaims                     214
2455       Page Swaps                        0
2456       Voluntary Context Switches        0
2457       Involuntary Context Switches      0
2458       Block Input Operations            0
2459       Block Output Operations           264
2460
2461
2462 17454
2463 17455  *-------------------------------------------------
     ---------*;
2464 17456  * End SCORE: Tree2;
2465 17457  *-------------------------------------------------
     ---------*;
2466
2467 17458  proc sort data=WORK.EM_METACHANGE;
2468 17459  by key uname;
2469 17460  run;
2470
2471 NOTE: There were 7 observations read from the data set WORK
     .EM_METACHANGE.
2472 NOTE: The data set WORK.EM_METACHANGE has 7 observations an
     d 9 variables.
2473 NOTE: PROCEDURE SORT used (Total process time):
```

```
2474        real time           0.00 seconds
2475        user cpu time       0.00 seconds
2476        system cpu time     0.00 seconds
2477        memory              309005.43k
2478        OS Memory           320880.00k
2479        Timestamp           07/01/2024 05:58:57 AM
2480        Step Count                        1  Switch Count  0
2481        Page Faults                       0
2482        Page Reclaims                     116
2483        Page Swaps                        0
2484        Voluntary Context Switches        0
2485        Involuntary Context Switches      0
2486        Block Input Operations            0
2487        Block Output Operations           264
2488
2489
2490 17461  filename x "/home/u63452984/case-study-s2192852/Work
     spaces/EMWS3/Tree2/CDELTA_TRAIN.sas";
2491 17462  data _null_;
2492 17463  file x;
2493 17464  put 'if upcase(NAME) = "AGE" then do;';
2494 17465  put 'ROLE = "REJECTED";';
2495 17466  put 'end;';
2496 17467  put 'else ';
2497 17468  put 'if upcase(NAME) = "MEMBERSHIPLEVEL" then do;';
2498 17469  put 'ROLE = "REJECTED";';
2499 17470  put 'end;';
2500 17471  put 'else ';
2501 17472  put 'if upcase(NAME) = "M_VARIABLE" then do;';
2502 17473  put 'ROLE = "REJECTED";';
2503 17474  put 'end;';
2504 17475  put 'else ';
2505 17476  put 'if upcase(NAME) = "PAYMENTMETHOD" then do;';
2506 17477  put 'ROLE = "REJECTED";';
2507 17478  put 'end;';
2508 17479  put 'else ';
```

```
2509 17480  put 'if upcase(NAME) = "Q_IMP_CHURN0" then do;';
2510 17481  put 'ROLE = "ASSESS";';
2511 17482  put 'end;';
2512 17483  put 'else ';
2513 17484  put 'if upcase(NAME) = "Q_IMP_CHURN1" then do;';
2514 17485  put 'ROLE = "ASSESS";';
2515 17486  put 'end;';
2516 17487  put 'else ';
2517 17488  put 'if upcase(NAME) = "_NODE_" then do;';
2518 17489  put 'ROLE = "SEGMENT";';
2519 17490  put 'LEVEL = "NOMINAL";';
2520 17491  put 'end;';
2521 17492  run;
2522
2523 NOTE: The file X is:
2524       Filename=/home/u63452984/case-study-s2192852/Workspac
     es/EMWS3/Tree2/CDELTA_TRAIN.sas,
2525       Owner Name=u63452984,Group Name=oda,
2526       Access Permission=-rw-r--r--,
2527       Last Modified=07 January 2024 05:58:57
2528
2529 NOTE: 28 records were written to the file X.
2530       The minimum record length was 4.
2531       The maximum record length was 44.
2532 NOTE: DATA statement used (Total process time):
2533       real time           0.00 seconds
2534       user cpu time       0.00 seconds
2535       system cpu time     0.00 seconds
2536       memory              309005.43k
2537       OS Memory           320880.00k
2538       Timestamp           07/01/2024 05:58:57 AM
2539       Step Count                        1  Switch Count  0
2540       Page Faults                       0
2541       Page Reclaims                     32
2542       Page Swaps                        0
2543       Voluntary Context Switches        5
```

```
2544        Involuntary Context Switches      0
2545        Block Input Operations            0
2546        Block Output Operations           8
2547
2548
2549  17493  filename x;
2550  NOTE: Fileref X has been deassigned.
2551
2552  17494  filename emflow "/home/u63452984/case-study-s2192852
      /Workspaces/EMWS3/Tree2/EMFLOWSCORE.sas";
2553  17495  *-------------------------------------------------
      ---------*;
2554  17496  * Tree2: Scoring DATA data;
2555  17497  *-------------------------------------------------
      ---------*;
2556  17498  data EMWS3.Tree2_TRAIN
2557  17499  / view=EMWS3.Tree2_TRAIN
2558  17500  ;
2559  17501  set EMWS3.Part2_TRAIN
2560  17502  ;
2561  17503  %inc emflow;
2562  NOTE: %INCLUDE (level 1) file EMFLOW is file /home/u6345298
      4/case-study-s2192852/Workspaces/EMWS3/Tree2/EMFLOWSCORE.sa
      s.
2563  17504 +*************************************************
      ************;
2564  17505 +******             DECISION TREE SCORING CODE
            ******;
2565  17506 +*************************************************
      ************;
2566  17507 +
2567  17508 +******         LENGTHS OF NEW CHARACTER VARIABLES
            ******;
2568  17509 +LENGTH F_IMP_Churn  $   12;
2569  17510 +LENGTH I_IMP_Churn  $   12;
2570  17511 +LENGTH _WARN_  $    4;
```

```
2571  17512 +
2572  17513 +******              LABELS FOR NEW VARIABLES
            ******;
2573  17514 +label _NODE_ = 'Node' ;
2574  17515 +label _LEAF_ = 'Leaf' ;
2575  17516 +label P_IMP_Churn0 = 'Predicted: IMP_Churn=0' ;
2576  17517 +label P_IMP_Churn1 = 'Predicted: IMP_Churn=1' ;
2577  17518 +label Q_IMP_Churn0 = 'Unadjusted P: IMP_Churn=0' ;
2578  17519 +label Q_IMP_Churn1 = 'Unadjusted P: IMP_Churn=1' ;
2579  17520 +label V_IMP_Churn0 = 'Validated: IMP_Churn=0' ;
2580  17521 +label V_IMP_Churn1 = 'Validated: IMP_Churn=1' ;
2581  17522 +label R_IMP_Churn0 = 'Residual: IMP_Churn=0' ;
2582  17523 +label R_IMP_Churn1 = 'Residual: IMP_Churn=1' ;
2583  17524 +label F_IMP_Churn = 'From: IMP_Churn' ;
2584  17525 +label I_IMP_Churn = 'Into: IMP_Churn' ;
2585  17526 +label U_IMP_Churn = 'Unnormalized Into: IMP_Churn' ;
2586  17527 +label _WARN_ = 'Warnings' ;
2587  17528 +
2588  17529 +
2589  17530 +******      TEMPORARY VARIABLES FOR FORMATTED VALUES
            ******;
2590  17531 +LENGTH _ARBFMT_12 $     12; DROP _ARBFMT_12;
2591  17532 +_ARBFMT_12 = ' '; /* Initialize to avoid warning. */
2592  17533 +
2593  17534 +
2594  17535 +_ARBFMT_12 = PUT( IMP_Churn , BEST12.);
2595  17536 + %DMNORMCP( _ARBFMT_12, F_IMP_Churn );
2596  17537 +
2597  17538 +******             ASSIGN OBSERVATION TO NODE
            ******;
2598  17539 +IF  NOT MISSING(TotalPurchases ) AND
2599  17540 +                 15.5 <= TotalPurchases  THEN DO;
2600  17541 +  IF  NOT MISSING(IMP_TotalSpent ) AND
2601  17542 +                  18749 <= IMP_TotalSpent  THEN DO;
2602  17543 +    _NODE_  =                   7;
2603  17544 +    _LEAF_  =                   3;
```

```
2604  17545 +    P_IMP_Churn0  =     0.38059701492537;
2605  17546 +    P_IMP_Churn1  =     0.61940298507462;
2606  17547 +    Q_IMP_Churn0  =     0.38059701492537;
2607  17548 +    Q_IMP_Churn1  =     0.61940298507462;
2608  17549 +    V_IMP_Churn0  =     0.47169811320754;
2609  17550 +    V_IMP_Churn1  =     0.52830188679245;
2610  17551 +    I_IMP_Churn  = '1' ;
2611  17552 +    U_IMP_Churn  =                   1;
2612  17553 +    END;
2613  17554 +  ELSE DO;
2614  17555 +    _NODE_  =                   6;
2615  17556 +    _LEAF_  =                   2;
2616  17557 +    P_IMP_Churn0  =     0.59861591695501;
2617  17558 +    P_IMP_Churn1  =     0.40138408304498;
2618  17559 +    Q_IMP_Churn0  =     0.59861591695501;
2619  17560 +    Q_IMP_Churn1  =     0.40138408304498;
2620  17561 +    V_IMP_Churn0  =     0.49549549549549;
2621  17562 +    V_IMP_Churn1  =      0.5045045045045;
2622  17563 +    I_IMP_Churn  = '0' ;
2623  17564 +    U_IMP_Churn  =                   0;
2624  17565 +    END;
2625  17566 +  END;
2626  17567 +ELSE DO;
2627  17568 +  _NODE_  =                   2;
2628  17569 +  _LEAF_  =                   1;
2629  17570 +  P_IMP_Churn0  =     0.78259341689117;
2630  17571 +  P_IMP_Churn1  =     0.21740658310882;
2631  17572 +  Q_IMP_Churn0  =     0.78259341689117;
2632  17573 +  Q_IMP_Churn1  =     0.21740658310882;
2633  17574 +  V_IMP_Churn0  =      0.7827745979831;
2634  17575 +  V_IMP_Churn1  =     0.21722540201689;
2635  17576 +  I_IMP_Churn  = '0' ;
2636  17577 +  U_IMP_Churn  =                   0;
2637  17578 +  END;
2638  17579 +
2639  17580 +*****  RESIDUALS R_ *************;
```

```
2640 17581 +IF  F_IMP_Churn  NE '0'
2641 17582 +AND F_IMP_Churn  NE '1'  THEN DO;
2642 17583 +        R_IMP_Churn0  = .;
2643 17584 +        R_IMP_Churn1  = .;
2644 17585 + END;
2645 17586 + ELSE DO;
2646 17587 +       R_IMP_Churn0  =  -P_IMP_Churn0 ;
2647 17588 +       R_IMP_Churn1  =  -P_IMP_Churn1 ;
2648 17589 +       SELECT( F_IMP_Churn  );
2649 17590 +          WHEN( '0'  ) R_IMP_Churn0  = R_IMP_Churn0
      +1;
2650 17591 +          WHEN( '1'  ) R_IMP_Churn1  = R_IMP_Churn1
      +1;
2651 17592 +       END;
2652 17593 + END;
2653 17594 +
2654 17595 +************************************************
     ************;
2655 17596 +******          END OF DECISION TREE SCORING CODE
           ******;
2656 17597 +************************************************
     ************;
2657 17598 +
2658 17599 +drop _LEAF_;
2659 NOTE: %INCLUDE (level 1) ending.
2660 17600  run;
2661
2662 NOTE: DATA STEP view saved on file EMWS3.TREE2_TRAIN.
2663 NOTE: A stored DATA STEP view cannot run under a different
     operating system.
2664 NOTE: DATA statement used (Total process time):
2665       real time           0.01 seconds
2666       user cpu time       0.01 seconds
2667       system cpu time     0.00 seconds
2668       memory              309005.43k
2669       OS Memory           320880.00k
```

```
2670       Timestamp           07/01/2024 05:58:57 AM
2671       Step Count                        1  Switch Count  0
2672       Page Faults                       0
2673       Page Reclaims                     329
2674       Page Swaps                        0
2675       Voluntary Context Switches        14
2676       Involuntary Context Switches      0
2677       Block Input Operations            0
2678       Block Output Operations           272
2679
2680
2681 17601  quit;
2682 17602  filename emflow;
2683 NOTE: Fileref EMFLOW has been deassigned.
2684
2685 17603  filename emflow "/home/u63452984/case-study-s2192852
     /Workspaces/EMWS3/Tree2/EMFLOWSCORE.sas";
2686 17604  *-------------------------------------------------
     ---------*;
2687 17605  * Tree2: Scoring VALIDATE data;
2688 17606  *-------------------------------------------------
     ---------*;
2689 17607  data EMWS3.Tree2_VALIDATE
2690 17608  / view=EMWS3.Tree2_VALIDATE
2691 17609  ;
2692 17610  set EMWS3.Part2_VALIDATE
2693 17611  ;
2694 17612  %inc emflow;
2695 NOTE: %INCLUDE (level 1) file EMFLOW is file /home/u6345298
     4/case-study-s2192852/Workspaces/EMWS3/Tree2/EMFLOWSCORE.sa
     s.
2696 17613 +*************************************************
     ************;
2697 17614 +******            DECISION TREE SCORING CODE
           ******;
2698 17615 +*************************************************
```

```
     ************;
2699 17616 +
2700 17617 +******         LENGTHS OF NEW CHARACTER VARIABLES
           ******;
2701 17618 +LENGTH F_IMP_Churn  $   12;
2702 17619 +LENGTH I_IMP_Churn  $   12;
2703 17620 +LENGTH _WARN_  $    4;
2704 17621 +
2705 17622 +******              LABELS FOR NEW VARIABLES
           ******;
2706 17623 +label _NODE_ = 'Node' ;
2707 17624 +label _LEAF_ = 'Leaf' ;
2708 17625 +label P_IMP_Churn0 = 'Predicted: IMP_Churn=0' ;
2709 17626 +label P_IMP_Churn1 = 'Predicted: IMP_Churn=1' ;
2710 17627 +label Q_IMP_Churn0 = 'Unadjusted P: IMP_Churn=0' ;
2711 17628 +label Q_IMP_Churn1 = 'Unadjusted P: IMP_Churn=1' ;
2712 17629 +label V_IMP_Churn0 = 'Validated: IMP_Churn=0' ;
2713 17630 +label V_IMP_Churn1 = 'Validated: IMP_Churn=1' ;
2714 17631 +label R_IMP_Churn0 = 'Residual: IMP_Churn=0' ;
2715 17632 +label R_IMP_Churn1 = 'Residual: IMP_Churn=1' ;
2716 17633 +label F_IMP_Churn = 'From: IMP_Churn' ;
2717 17634 +label I_IMP_Churn = 'Into: IMP_Churn' ;
2718 17635 +label U_IMP_Churn = 'Unnormalized Into: IMP_Churn' ;
2719 17636 +label _WARN_ = 'Warnings' ;
2720 17637 +
2721 17638 +
2722 17639 +******      TEMPORARY VARIABLES FOR FORMATTED VALUES
           ******;
2723 17640 +LENGTH _ARBFMT_12 $     12; DROP _ARBFMT_12;
2724 17641 +_ARBFMT_12 = ' '; /* Initialize to avoid warning. */
2725 17642 +
2726 17643 +
2727 17644 +_ARBFMT_12 = PUT( IMP_Churn , BEST12.);
2728 17645 + %DMNORMCP( _ARBFMT_12, F_IMP_Churn );
2729 17646 +
2730 17647 +******             ASSIGN OBSERVATION TO NODE
```

```
           ******;
2731  17648 +IF  NOT MISSING(TotalPurchases ) AND
2732  17649 +                  15.5 <= TotalPurchases  THEN DO;
2733  17650 +  IF  NOT MISSING(IMP_TotalSpent ) AND
2734  17651 +                   18749 <= IMP_TotalSpent  THEN DO;
2735  17652 +    _NODE_  =                    7;
2736  17653 +    _LEAF_  =                    3;
2737  17654 +    P_IMP_Churn0  =     0.38059701492537;
2738  17655 +    P_IMP_Churn1  =     0.61940298507462;
2739  17656 +    Q_IMP_Churn0  =     0.38059701492537;
2740  17657 +    Q_IMP_Churn1  =     0.61940298507462;
2741  17658 +    V_IMP_Churn0  =     0.47169811320754;
2742  17659 +    V_IMP_Churn1  =     0.52830188679245;
2743  17660 +    I_IMP_Churn  = '1' ;
2744  17661 +    U_IMP_Churn  =                   1;
2745  17662 +    END;
2746  17663 +  ELSE DO;
2747  17664 +    _NODE_  =                    6;
2748  17665 +    _LEAF_  =                    2;
2749  17666 +    P_IMP_Churn0  =     0.59861591695501;
2750  17667 +    P_IMP_Churn1  =     0.40138408304498;
2751  17668 +    Q_IMP_Churn0  =     0.59861591695501;
2752  17669 +    Q_IMP_Churn1  =     0.40138408304498;
2753  17670 +    V_IMP_Churn0  =     0.49549549549549;
2754  17671 +    V_IMP_Churn1  =      0.5045045045045;
2755  17672 +    I_IMP_Churn  = '0' ;
2756  17673 +    U_IMP_Churn  =                   0;
2757  17674 +    END;
2758  17675 +  END;
2759  17676 +ELSE DO;
2760  17677 +  _NODE_  =                    2;
2761  17678 +  _LEAF_  =                    1;
2762  17679 +  P_IMP_Churn0  =     0.78259341689117;
2763  17680 +  P_IMP_Churn1  =     0.21740658310882;
2764  17681 +  Q_IMP_Churn0  =     0.78259341689117;
2765  17682 +  Q_IMP_Churn1  =     0.21740658310882;
```

```
2766 17683 +  V_IMP_Churn0  =      0.7827745979831;
2767 17684 +  V_IMP_Churn1  =     0.21722540201689;
2768 17685 +  I_IMP_Churn  = '0' ;
2769 17686 +  U_IMP_Churn  =                    0;
2770 17687 +  END;
2771 17688 +
2772 17689 +*****  RESIDUALS R_ ************;
2773 17690 +IF  F_IMP_Churn  NE '0'
2774 17691 +AND F_IMP_Churn  NE '1'  THEN DO;
2775 17692 +        R_IMP_Churn0  = .;
2776 17693 +        R_IMP_Churn1  = .;
2777 17694 + END;
2778 17695 + ELSE DO;
2779 17696 +       R_IMP_Churn0  =  -P_IMP_Churn0 ;
2780 17697 +       R_IMP_Churn1  =  -P_IMP_Churn1 ;
2781 17698 +       SELECT( F_IMP_Churn  );
2782 17699 +          WHEN( '0'  ) R_IMP_Churn0  = R_IMP_Churn0
      +1;
2783 17700 +          WHEN( '1'  ) R_IMP_Churn1  = R_IMP_Churn1
      +1;
2784 17701 +       END;
2785 17702 + END;
2786 17703 +
2787 17704 +**************************************************
     ************;
2788 17705 +******          END OF DECISION TREE SCORING CODE
           ******;
2789 17706 +**************************************************
     ************;
2790 17707 +
2791 17708 +drop _LEAF_;
2792 NOTE: %INCLUDE (level 1) ending.
2793 17709  run;
2794
2795 NOTE: DATA STEP view saved on file EMWS3.TREE2_VALIDATE.
2796 NOTE: A stored DATA STEP view cannot run under a different
```

```
     operating system.
2797 NOTE: DATA statement used (Total process time):
2798       real time           0.00 seconds
2799       user cpu time       0.00 seconds
2800       system cpu time     0.00 seconds
2801       memory              309005.43k
2802       OS Memory           320880.00k
2803       Timestamp           07/01/2024 05:58:57 AM
2804       Step Count                        1  Switch Count  0
2805       Page Faults                       0
2806       Page Reclaims                     247
2807       Page Swaps                        0
2808       Voluntary Context Switches        12
2809       Involuntary Context Switches      0
2810       Block Input Operations            0
2811       Block Output Operations           264
2812
2813
2814 17710  quit;
2815 17711  filename emflow;
2816 NOTE: Fileref EMFLOW has been deassigned.
2817
2818 NOTE: View EMWS3.TREE2_TRAIN.VIEW used (Total process time)
     :
2819       real time           0.04 seconds
2820       user cpu time       0.01 seconds
2821       system cpu time     0.02 seconds
2822       memory              309005.43k
2823       OS Memory           320880.00k
2824       Timestamp           07/01/2024 05:58:57 AM
2825       Step Count                        1  Switch Count  5
2826       Page Faults                       0
2827       Page Reclaims                     16448
2828       Page Swaps                        0
2829       Voluntary Context Switches        12
2830       Involuntary Context Switches      0
```

```
2831       Block Input Operations            0
2832       Block Output Operations           0
2833
2834 17713  proc sort data=WORK.EM_USER_REPORT;
2835 17714  by ID VIEW;
2836 17715  run;
2837
2838 NOTE: There were 132 observations read from the data set WO
     RK.EM_USER_REPORT.
2839 NOTE: The data set WORK.EM_USER_REPORT has 132 observations
      and 4 variables.
2840 NOTE: PROCEDURE SORT used (Total process time):
2841       real time           0.00 seconds
2842       user cpu time       0.00 seconds
2843       system cpu time     0.00 seconds
2844       memory              309005.43k
2845       OS Memory           320880.00k
2846       Timestamp           07/01/2024 05:58:57 AM
2847       Step Count                        1  Switch Count  0
2848       Page Faults                       0
2849       Page Reclaims                     101
2850       Page Swaps                        0
2851       Voluntary Context Switches        0
2852       Involuntary Context Switches      0
2853       Block Input Operations            0
2854       Block Output Operations           264
2855
2856
2857 17716  *------------------------------------------------
     ---------*;
2858 17717  * Tree2: Computing metadata for TRAIN data;
2859 17718  *------------------------------------------------
     ---------*;
2860
2861 NOTE: View EMWS3.TREE2_TRAIN.VIEW used (Total process time)
     :
```

```
2862       real time           0.04 seconds
2863       user cpu time       0.01 seconds
2864       system cpu time     0.03 seconds
2865       memory              309005.43k
2866       OS Memory           320880.00k
2867       Timestamp           07/01/2024 05:58:57 AM
2868       Step Count                        1  Switch Count  5
2869       Page Faults                       0
2870       Page Reclaims                     16446
2871       Page Swaps                        0
2872       Voluntary Context Switches        11
2873       Involuntary Context Switches      3
2874       Block Input Operations            0
2875       Block Output Operations           0
2876
2877 18094  data WORK.MODELTEMP_INFO;
2878 18095  set EMWS3.Tree2_EMINFO;
2879 18096  where DATA='Tree2' and KEY ^in('DECDATA', 'DECMETA',
      'IMPORTANCE', 'MODEL');
2880 18097  run;
2881
2882 NOTE: There were 0 observations read from the data set EMWS
     3.TREE2_EMINFO.
2883       WHERE (DATA='Tree2') and KEY not in ('DECDATA', 'DECM
     ETA', 'IMPORTANCE', 'MODEL');
2884 NOTE: The data set WORK.MODELTEMP_INFO has 0 observations a
     nd 3 variables.
2885 NOTE: DATA statement used (Total process time):
2886       real time           0.00 seconds
2887       user cpu time       0.00 seconds
2888       system cpu time     0.00 seconds
2889       memory              309005.43k
2890       OS Memory           320880.00k
2891       Timestamp           07/01/2024 05:58:57 AM
2892       Step Count                        1  Switch Count  0
2893       Page Faults                       0
```

```
2894        Page Reclaims                       126
2895        Page Swaps                          0
2896        Voluntary Context Switches          2
2897        Involuntary Context Switches        0
2898        Block Input Operations              0
2899        Block Output Operations             264
2900
2901
2902  18098  data EMWS3.Tree2_EMINFO;
2903  18099  length TARGET KEY $32 DATA $43;
2904  18100  input TARGET KEY DATA $;
2905  18101  cards;
2906
2907  NOTE: The data set EMWS3.TREE2_EMINFO has 3 observations an
      d 3 variables.
2908  NOTE: DATA statement used (Total process time):
2909        real time           0.00 seconds
2910        user cpu time       0.00 seconds
2911        system cpu time     0.00 seconds
2912        memory              309005.43k
2913        OS Memory           320880.00k
2914        Timestamp           07/01/2024 05:58:57 AM
2915        Step Count                          1  Switch Count  0
2916        Page Faults                         0
2917        Page Reclaims                       98
2918        Page Swaps                          0
2919        Voluntary Context Switches          14
2920        Involuntary Context Switches        1
2921        Block Input Operations              0
2922        Block Output Operations             264
2923
2924
2925  18105  run;
2926  18106  data EMWS3.Tree2_EMINFO;
2927  18107  set EMWS3.Tree2_EMINFO WORK.MODELTEMP_INFO;
2928  18108  run;
```

```
2929
2930 NOTE: There were 3 observations read from the data set EMWS
     3.TREE2_EMINFO.
2931 NOTE: There were 0 observations read from the data set WORK
     .MODELTEMP_INFO.
2932 NOTE: The data set EMWS3.TREE2_EMINFO has 3 observations an
     d 3 variables.
2933 NOTE: DATA statement used (Total process time):
2934       real time           0.01 seconds
2935       user cpu time       0.00 seconds
2936       system cpu time     0.00 seconds
2937       memory              309005.43k
2938       OS Memory           320880.00k
2939       Timestamp           07/01/2024 05:58:57 AM
2940       Step Count                        1  Switch Count  0
2941       Page Faults                       0
2942       Page Reclaims                     168
2943       Page Swaps                        0
2944       Voluntary Context Switches        36
2945       Involuntary Context Switches      0
2946       Block Input Operations            288
2947       Block Output Operations           264
2948
2949
2950 18109  proc sort data = EMWS3.Tree2_EMINFO NOTHREADS;
2951 18110  by TARGET KEY;
2952 18111  run;
2953
2954 NOTE: There were 3 observations read from the data set EMWS
     3.TREE2_EMINFO.
2955 NOTE: The data set EMWS3.TREE2_EMINFO has 3 observations an
     d 3 variables.
2956 NOTE: PROCEDURE SORT used (Total process time):
2957       real time           0.01 seconds
2958       user cpu time       0.00 seconds
2959       system cpu time     0.00 seconds
```

```
2960       memory              309005.43k
2961       OS Memory           320880.00k
2962       Timestamp           07/01/2024 05:58:57 AM
2963       Step Count                        1  Switch Count  0
2964       Page Faults                       0
2965       Page Reclaims                     116
2966       Page Swaps                        0
2967       Voluntary Context Switches        39
2968       Involuntary Context Switches      1
2969       Block Input Operations            288
2970       Block Output Operations           264
2971
2972
2973 18112  proc sort data = EMWS3.Ids_EMINFO OUT=WORK.SORTEDEMI
     NFO NOTHREADS;
2974 18113  by TARGET KEY;
2975 18114  run;
2976
2977 NOTE: There were 4 observations read from the data set EMWS
     3.IDS_EMINFO.
2978 NOTE: The data set WORK.SORTEDEMINFO has 4 observations and
      3 variables.
2979 NOTE: PROCEDURE SORT used (Total process time):
2980       real time           0.00 seconds
2981       user cpu time       0.00 seconds
2982       system cpu time     0.01 seconds
2983       memory              309005.43k
2984       OS Memory           320880.00k
2985       Timestamp           07/01/2024 05:58:57 AM
2986       Step Count                        1  Switch Count  0
2987       Page Faults                       0
2988       Page Reclaims                     153
2989       Page Swaps                        0
2990       Voluntary Context Switches        2
2991       Involuntary Context Switches      0
2992       Block Input Operations            0
```

```
2993       Block Output Operations          272
2994
2995
2996 18115  proc sort data = EMWS3.Tree2_EMINFO OUT=WORK.TEMP_IN
     FO NOTHREADS;
2997 18116  by TARGET KEY;
2998 18117  run;
2999
3000 NOTE: Input data set is already sorted; it has been copied
     to the output data set.
3001 NOTE: There were 3 observations read from the data set EMWS
     3.TREE2_EMINFO.
3002 NOTE: The data set WORK.TEMP_INFO has 3 observations and 3
     variables.
3003 NOTE: PROCEDURE SORT used (Total process time):
3004       real time           0.00 seconds
3005       user cpu time       0.00 seconds
3006       system cpu time     0.00 seconds
3007       memory              309005.43k
3008       OS Memory           320880.00k
3009       Timestamp           07/01/2024 05:58:57 AM
3010       Step Count                       1  Switch Count  0
3011       Page Faults                      0
3012       Page Reclaims                    118
3013       Page Swaps                       0
3014       Voluntary Context Switches       10
3015       Involuntary Context Switches     0
3016       Block Input Operations           288
3017       Block Output Operations          264
3018
3019
3020 18118  data EMWS3.Tree2_EMINFO;
3021 18119  merge WORK.SORTEDEMINFO WORK.TEMP_INFO;
3022 18120  by TARGET KEY;
3023 18121  run;
3024
```

```
3025 NOTE: There were 4 observations read from the data set WORK
     .SORTEDEMINFO.
3026 NOTE: There were 3 observations read from the data set WORK
     .TEMP_INFO.
3027 NOTE: The data set EMWS3.TREE2_EMINFO has 7 observations an
     d 3 variables.
3028 NOTE: DATA statement used (Total process time):
3029       real time           0.01 seconds
3030       user cpu time       0.00 seconds
3031       system cpu time     0.00 seconds
3032       memory              309005.43k
3033       OS Memory           320880.00k
3034       Timestamp           07/01/2024 05:58:57 AM
3035       Step Count                        1  Switch Count  0
3036       Page Faults                       0
3037       Page Reclaims                     168
3038       Page Swaps                        0
3039       Voluntary Context Switches        28
3040       Involuntary Context Switches      0
3041       Block Input Operations            0
3042       Block Output Operations           264
3043
3044
3045 18122  proc datasets lib=work nolist;
3046 18123  delete TEMP_INFO SORTEDEMINFO;
3047 18124  run;
3048
3049 NOTE: Deleting WORK.TEMP_INFO (memtype=DATA).
3050 NOTE: Deleting WORK.SORTEDEMINFO (memtype=DATA).
3051 18125  quit;
3052
3053 NOTE: PROCEDURE DATASETS used (Total process time):
3054       real time           0.00 seconds
3055       user cpu time       0.01 seconds
3056       system cpu time     0.00 seconds
3057       memory              309005.43k
```

```
3058        OS Memory           320880.00k
3059        Timestamp           07/01/2024 05:58:57 AM
3060        Step Count                      1  Switch Count  0
3061        Page Faults                     0
3062        Page Reclaims                   49
3063        Page Swaps                      0
3064        Voluntary Context Switches      0
3065        Involuntary Context Switches    3
3066        Block Input Operations          0
3067        Block Output Operations         8
3068
3069
3070  NOTE: View EMWS3.TREE2_TRAIN.VIEW used (Total process time)
      :
3071        real time           0.04 seconds
3072        user cpu time       0.01 seconds
3073        system cpu time     0.03 seconds
3074        memory              309005.43k
3075        OS Memory           320880.00k
3076        Timestamp           07/01/2024 05:58:57 AM
3077        Step Count                      1  Switch Count  5
3078        Page Faults                     0
3079        Page Reclaims                   16445
3080        Page Swaps                      0
3081        Voluntary Context Switches      13
3082        Involuntary Context Switches    0
3083        Block Input Operations          0
3084        Block Output Operations         0
3085
3086  NOTE: View EMWS3.TREE2_VALIDATE.VIEW used (Total process ti
      me):
3087        real time           0.03 seconds
3088        user cpu time       0.01 seconds
3089        system cpu time     0.02 seconds
3090        memory              309005.43k
3091        OS Memory           320880.00k
```

```
3092       Timestamp           07/01/2024 05:58:57 AM
3093       Step Count                        1  Switch Count  5
3094       Page Faults                       0
3095       Page Reclaims                     16442
3096       Page Swaps                        0
3097       Voluntary Context Switches        12
3098       Involuntary Context Switches      0
3099       Block Input Operations            0
3100       Block Output Operations           0
3101
3102  *-------------------------------------------------------
     --*
3103  * Report Log
3104  Date:                07 January 2024
3105  Time:                05:58:58
3106  *-------------------------------------------------------
     --*
3107  18149  data EMWS3.Tree2_EMOUTFIT;
3108  18150  set EMWS3.Tree2_EMOUTFIT;
3109  18151  length TargetLabel $200;
3110  18152  label targetLabel = "%sysfunc(sasmsg(sashelp.dmine,
     meta_targetlabel_vlabel, NOQUOTE))";
3111  18153  if upcase(TARGET) eq "IMP_CHURN" then TargetLabel =
     'Imputed Churn';
3112  18154  run;
3113
3114  NOTE: There were 1 observations read from the data set EMWS
     3.TREE2_EMOUTFIT.
3115  NOTE: The data set EMWS3.TREE2_EMOUTFIT has 1 observations
     and 17 variables.
3116  NOTE: DATA statement used (Total process time):
3117       real time           0.02 seconds
3118       user cpu time       0.00 seconds
3119       system cpu time     0.00 seconds
3120       memory              309005.43k
3121       OS Memory           320880.00k
```

```
3122        Timestamp           07/01/2024 05:58:57 AM
3123        Step Count                        1  Switch Count  0
3124        Page Faults                       0
3125        Page Reclaims                     243
3126        Page Swaps                        0
3127        Voluntary Context Switches        48
3128        Involuntary Context Switches      1
3129        Block Input Operations            288
3130        Block Output Operations           264
3131
3132
3133 18155  proc sort data=EMWS3.Tree2_EMREPORTFIT nothreads;
3134 18156  by TARGET;
3135 18157  run;
3136
3137 NOTE: There were 8 observations read from the data set EMWS
     3.TREE2_EMREPORTFIT.
3138 NOTE: The data set EMWS3.TREE2_EMREPORTFIT has 8 observatio
     ns and 7 variables.
3139 NOTE: PROCEDURE SORT used (Total process time):
3140        real time           0.01 seconds
3141        user cpu time       0.00 seconds
3142        system cpu time     0.00 seconds
3143        memory              309005.43k
3144        OS Memory           320880.00k
3145        Timestamp           07/01/2024 05:58:57 AM
3146        Step Count                        1  Switch Count  0
3147        Page Faults                       0
3148        Page Reclaims                     118
3149        Page Swaps                        0
3150        Voluntary Context Switches        31
3151        Involuntary Context Switches      0
3152        Block Input Operations            0
3153        Block Output Operations           264
3154
3155
```

```
3156 18158  %let _EMwarndup = 0;
3157 18159  %let _EMtargetdup =;
3158 18160  %let _EMASEtargetdup =;
3159 18161  data _null_;
3160 18162  set EMWS3.Tree2_EMOUTFIT;
3161 18163  if ._ASE_<0.000001 then do;
3162 18164  call symput('_EMwarndup', '1');
3163 18165  call symput('_EMtargetdup', target);
3164 18166  call symput('_EMASEtargetdup', put(_ASE_, best.));
3165 18167  end;
3166 18168  run;
3167
3168 NOTE: There were 1 observations read from the data set EMWS
     3.TREE2_EMOUTFIT.
3169 NOTE: DATA statement used (Total process time):
3170       real time           0.00 seconds
3171       user cpu time       0.00 seconds
3172       system cpu time     0.00 seconds
3173       memory              309005.43k
3174       OS Memory           320880.00k
3175       Timestamp           07/01/2024 05:58:57 AM
3176       Step Count                        1  Switch Count  0
3177       Page Faults                       0
3178       Page Reclaims                     62
3179       Page Swaps                        0
3180       Voluntary Context Switches        3
3181       Involuntary Context Switches      0
3182       Block Input Operations            0
3183       Block Output Operations           0
3184
3185
3186 18169  %let EMEXCEPTIONSTRING=;
3187 18170  *-------------------------------------------------
     ---------*;
3188 18171  * REPORT: Tree2;
3189 18172  *-------------------------------------------------
```

```
     ---------*;
3190 18173  %let EM_ACTION = REPORT;
3191 18174  %let syscc = 0;
3192 18175  %macro main;
3193 18176
3194 18177    %if %upcase(&EM_ACTION) = CREATE %then %do;
3195 18178      filename temp catalog 'sashelp.emmodl.tree_creat
     e.source';
3196 18179      %include temp;
3197 18180      filename temp;
3198 18181
3199 18182      %em_tree_create;
3200 18183    %end;
3201 18184
3202 18185     %else
3203 18186     %if %upcase(&EM_ACTION) = TRAIN %then %do;
3204 18187
3205 18188         filename temp catalog 'sashelp.emmodl.tree_tr
     ain.source';
3206 18189         %include temp;
3207 18190         filename temp;
3208 18191         %em_tree_train;
3209 18192     %end;
3210 18193
3211 18194    %else
3212 18195    %if %upcase(&EM_ACTION) = SCORE %then %do;
3213 18196      filename temp catalog 'sashelp.emmodl.tree_score
     .source';
3214 18197      %include temp;
3215 18198      filename temp;
3216 18199
3217 18200      %em_tree_score;
3218 18201
3219 18202    %end;
3220 18203
3221 18204    %else
```

```
3222 18205    %if %upcase(&EM_ACTION) = REPORT %then %do;
3223 18206
3224 18207         filename temp catalog 'sashelp.emmodl.tree_re
     port.source';
3225 18208         %include temp;
3226 18209         filename temp;
3227 18210
3228 18211         %em_tree_report;
3229 18212     %end;
3230 18213
3231 18214    %else
3232 18215    %if %upcase(&EM_ACTION) = OPENINT %then %do;
3233 18216
3234 18217         filename temp catalog 'sashelp.emmodl.tree_ac
     tions.source';
3235 18218         %include temp;
3236 18219         filename temp;
3237 18220         %EM_TREE_OPENTREEVIEWER;
3238 18221
3239 18222     %end;
3240 18223
3241 18224    %else
3242 18225    %if %upcase(&EM_ACTION) = CLOSEINT %then %do;
3243 18226
3244 18227         filename temp catalog 'sashelp.emmodl.tree_ac
     tions.source';
3245 18228         %include temp;
3246 18229         filename temp;
3247 18230         %EM_TREE_CLOSETREEVIEWER;
3248 18231
3249 18232     %end;
3250 18233
3251 18234
3252 18235     %doendm:
3253 18236  %mend main;
3254 18237
```

```
3255 18238  %main;
3256 NOTE: %INCLUDE (level 1) file TEMP is file SASHELP.EMMODL.T
     REE_REPORT.SOURCE.
3257 18240 +%macro em_tree_makePlotDs( multipleTar= );
3258 18242 +  %EM_GETNAME(key=OUTSTATS, type=DATA);
3259 18243 +  %EM_GETNAME(key=OUTNODES, type=DATA);
3260 18244 +  %EM_GETNAME(key=TREE_PLOT, type=DATA);
3261 18245 +  %EM_GETNAME(key=OUTRULES, type=DATA);
3262 18247 +  /* determine if validation statistics will be disp
     layed */
3263 18248 +  %let validflag=N;
3264 18249 +  %if "&EM_PROPERTY_SHOWVALID" eq "Y" %then %do;
3265 18250 +    /* determine if validation data exists */
3266 18251 +    %if &validexist AND ("&EM_PROPERTY_CV" ne "Y") %
     then %do;
3267 18252 +      %let validflag=Y;
3268 18253 +    %end;
3269 18254 +  %end;
3270 18256 +   /* retrieve name of decmeta even in presence of m
     ultiple targets */
3271 18257 +   %let decmeta = ;
3272 18258 +   %if &EM_DEC_DECMETA eq %then %do;
3273 18259 +     data _Target;
3274 18260 +       set &em_data_variableset;
3275 18261 +       where ROLE='TARGET' and USE in('D', 'Y');
3276 18262 +       keep NAME;
3277 18263 +     run;
3278 18264 +     proc sort data=_Target;
3279 18265 +       by NAME;
3280 18266 +     run;
3281 18267 +     proc sort data=EM_TARGETDECINFO;
3282 18268 +       by TARGET;
3283 18269 +     run;
3284 18270 +     data _Target;
3285 18271 +       merge _Target(in=_a) EM_TARGETDECINFO(rename=
     (TARGET=NAME) );
```

```
3286 18272 +       by NAME;
3287 18273 +       if _a then do;
3288 18274 +         call symput('decmeta', trim(DECMETA));
3289 18275 +       end;
3290 18276 +     run;
3291 18277 +     proc delete data=_Target;run;
3292 18278 +   %end;
3293 18279 +   %else %let decmeta = &EM_DEC_DECMETA;
3294 18282 +  /* retrieve targetEvent from decmeta */
3295 18283 +  %let targetEvent=;
3296 18284 +  %if "%EM_TARGET_LEVEL" ne "INTERVAL" %then %do;
3297 18285 +    %if %sysfunc(exist(&DECMETA)) %then %do;
3298 18286 +      data _null_;
3299 18287 +       set &DECMETA(where=(_TYPE_="TARGET"));
3300 18288 +       call symput('targetEvent', strip(tranwrd(EVEN
     T,'"',''''')));
3301 18289 +      run;
3302 18290 +    %end;
3303 18291 +  %end;
3304 18293 +  /* retrieve predicted var for targetEvent from dec
     meta */
3305 18294 +  %let predTarget=;
3306 18295 +  %let predLvl=;
3307 18296 +  %if "%EM_TARGET_LEVEL" ne "INTERVAL" %then %do;
3308 18297 +    %if %sysfunc(exist(&DECMETA)) %then %do;
3309 18298 +      data _null_;
3310 18299 +       set &DECMETA(where=(_TYPE_="PREDICTED" AND LE
     VEL="&targetEvent"));
3311 18300 +       call symput('predTarget', strip(VARIABLE));
3312 18301 +       call symput('predLvl', strip(LEVEL));
3313 18302 +      run;
3314 18303 +    %end;
3315 18304 +  %end;
3316 18305 +  %else %do;
3317 18306 +    %if %sysfunc(exist(&DECMETA)) %then %do;
3318 18307 +      data _null_;
```

```
3319 18308 +       set &DECMETA(where=(_TYPE_="PREDICTED"));
3320 18309 +       call symput('predTarget', strip(VARIABLE));
3321 18310 +      run;
3322 18311 +    %end;
3323 18312 +  %end;
3324 18314 +  /* create BelowText value */
3325 18315 +  data belowtext;
3326 18316 +    set &EM_USER_OUTRULES(where=(ROLE="PRIMARY" AND
     STAT="VARIABLE") rename=(character_value=belowtext));
3327 18317 +    keep node belowtext;
3328 18318 +  run;
3329 18320 +  /* replace belowtext with variable label if it exi
     sts */
3330 18321 +  data belowtext2;
3331 18322 +    set &EM_USER_OUTRULES(where=(ROLE="PRIMARY" AND
     STAT="LABEL") rename=(character_value=belowtextlbl));
3332 18323 +    keep node belowtextlbl;
3333 18324 +  run;
3334 18326 +  proc sort data=belowtext; by node; run;
3335 18327 +  proc sort data=belowtext2; by node; run;
3336 18329 +  data belowtext;
3337 18330 +    merge belowtext belowtext2(in=_a);
3338 18331 +    by node;
3339 18332 +    if _a then belowtext=belowtextlbl;
3340 18333 +    keep node belowtext;
3341 18334 +  run;
3342 18336 +  /* create AboveText value */
3343 18337 +  data abovetext;
3344 18338 +    set &EM_USER_OUTRULES(where=(ROLE="PRIMARY" AND
     STAT in ("INTERVAL", "ORDINAL", "NOMINAL")) );
3345 18339 +  run;
3346 18340 +  proc sort data=abovetext; by node numeric_value; r
     un;
3347 18342 +  %let sp_precision = %sysevalf(1 / 10**&EM_PROPERTY
     _SPLITPRECISION);
3348 18343 +  data abovetext;
```

```
3349 18344 +    set abovetext(rename=(node=parent));
3350 18345 +    by parent numeric_value;
3351 18346 +    retain abovetext tempstring flag branch origval
     origchar ;
3352 18347 +    length abovetext $256;
3353 18348 +    length tempstring origchar $64;
3354 18350 +    if STAT in ("INTERVAL", "ORDINAL") then do;
3355 18351 +      if first.parent then do;
3356 18352 +        if missing(character_value) then do;
3357 18353 +          numeric_value = round(numeric_value, &sp_p
     recision);
3358 18354 +          abovetext = "< "||strip(NUMERIC_VALUE);
3359 18355 +          branch = 1;
3360 18356 +          origval = numeric_value;
3361 18357 +          output;
3362 18358 +        end;
3363 18359 +        else do;
3364 18360 +          abovetext = "< "||strip(CHARACTER_VALUE);
3365 18361 +          branch = 1;
3366 18362 +          origchar = character_value;
3367 18363 +          output;
3368 18364 +        end;
3369 18366 +        if first.parent AND last.parent then do;
3370 18367 +          if missing(character_value) then do;
3371 18368 +            numeric_value = round(numeric_value, &sp
     _precision);
3372 18369 +            branch = branch + 1;
3373 18370 +            abovetext = ">= "||strip(NUMERIC_VALUE);
3374 18371 +            output;
3375 18372 +          end;
3376 18373 +          else do;
3377 18374 +            branch = branch + 1;
3378 18375 +            abovetext = ">= "||strip(CHARACTER_VALUE
     );
3379 18376 +            output;
3380 18377 +          end;
```

```
3381 18378 +        end;
3382 18379 +      end;
3383 18380 +      else if last.parent then do;
3384 18381 +        if ( missing(character_value) AND (origval n
     e numeric_value)) or ( ^missing(character_value) AND (origc
     har ne character_value)) then do;
3385 18382 +          if missing(character_value) then do;
3386 18383 +            numeric_value = round(numeric_value, &sp
     _precision);
3387 18384 +            abovetext= "[ "||strip(origval)||", "||
     strip(numeric_value)||" )";
3388 18385 +          end;
3389 18386 +          else do;
3390 18387 +            abovetext= ">= "||strip(origchar)||" AND
      < "|| strip(character_value);
3391 18388 +          end;
3392 18389 +          branch = branch + 1;
3393 18390 +          output;
3394 18392 +          if missing(character_value) then do;
3395 18393 +            numeric_value = round(numeric_value, &sp
     _precision);
3396 18394 +            abovetext = ">= "||strip(NUMERIC_VALUE);
3397 18395 +          end;
3398 18396 +          else do;
3399 18397 +            abovetext = ">= "||strip(CHARACTER_VALUE
     );
3400 18398 +          end;
3401 18399 +          branch = branch + 1;
3402 18400 +          output;
3403 18401 +        end;
3404 18402 +        else do;
3405 18403 +          if missing(character_value) then do;
3406 18404 +            numeric_value = round(numeric_value, &sp
     _precision);
3407 18405 +            abovetext = ">= "||strip(NUMERIC_VALUE);
3408 18406 +          end;
```

```
3409 18407 +          else do;
3410 18408 +            abovetext = ">= "||strip(CHARACTER_VALUE
     );
3411 18409 +          end;
3412 18410 +          branch = branch + 1;
3413 18411 +          output;
3414 18412 +        end;
3415 18413 +      end;
3416 18414 +      else do;
3417 18415 +        if ( missing(character_value) AND (origval n
     e numeric_value)) or ( ^missing(character_value) AND (origc
     har ne character_value)) then do;
3418 18416 +          if missing(character_value) then do;
3419 18417 +            numeric_value = round(numeric_value,&sp_
     precision);
3420 18418 +            abovetext= "[ "||strip(origval)||", "||
     strip(numeric_value)||" )";
3421 18419 +            origval = numeric_value;
3422 18420 +          end;
3423 18421 +          else do;
3424 18422 +            abovetext= ">= "||strip(origchar)||" AND
      < "|| strip(character_value);
3425 18423 +            origchar = character_value;
3426 18424 +          end;
3427 18425 +          branch = branch + 1;
3428 18426 +          output;
3429 18428 +        end;
3430 18429 +        else do;
3431 18430 +          if missing(character_value) then do;
3432 18431 +            numeric_value = round(numeric_value, &sp
     _precision);
3433 18432 +            abovetext = ">= "||strip(NUMERIC_VALUE);
3434 18433 +            origval = numeric_value;
3435 18434 +          end;
3436 18435 +          else do;
3437 18436 +            abovetext = ">= "||strip(CHARACTER_VALUE
```

```
     );
3438 18437 +            origval = character_value;
3439 18438 +          end;
3440 18439 +          branch = branch + 1;
3441 18440 +          output;
3442 18441 +        end;
3443 18442 +      end;
3444 18443 +    end;
3445 18444 +    else do;
3446 18445 +       if first.numeric_value then do;
3447 18446 +         flag = 0;
3448 18447 +         abovetext = strip(CHARACTER_VALUE);
3449 18448 +         branch = numeric_value;
3450 18449 +         if first.numeric_value AND last.numeric_val
     ue then do;
3451 18450 +           output;
3452 18451 +         end;
3453 18452 +       end;
3454 18453 +       else if last.numeric_value then do;
3455 18454 +         if flag=0 then do;
3456 18455 +           tempstring = strip(abovetext)||", "||stri
     p(CHARACTER_VALUE);
3457 18456 +           length = length(strip(tempstring));
3458 18457 +           if length < 32 then do;
3459 18458 +             abovetext = strip(tempstring);
3460 18459 +           end;
3461 18460 +           else do;
3462 18461 +             abovetext = strip(abovetext)||", ...";
3463 18462 +             flag = 1;
3464 18463 +           end;
3465 18464 +         end;
3466 18465 +         branch = numeric_value;
3467 18466 +         output;
3468 18467 +       end;
3469 18468 +       else do;
3470 18469 +         if flag=0 then do;
```

```
3471 18470 +           tempstring = strip(abovetext)||", "||stri
     p(CHARACTER_VALUE);
3472 18471 +           length = length(strip(tempstring));
3473 18472 +           if length < 32 then do;
3474 18473 +             abovetext = strip(tempstring);
3475 18474 +           end;
3476 18475 +           else do;
3477 18476 +             abovetext = strip(abovetext)||", ...";
3478 18477 +             flag=1;
3479 18478 +           end;
3480 18479 +         end;
3481 18480 +         branch = numeric_value;
3482 18481 +       end;
3483 18482 +    end;
3484 18483 +    keep parent branch abovetext;
3485 18484 +  run;
3486 18486 +  /* Missing value to abovetext */
3487 18487 +  data tempmissing;
3488 18488 +    set &EM_USER_OUTRULES;
3489 18489 +    if ((ROLE="PRIMARY") AND (STAT in ("MISSING")));
3490 18490 +    rename node=parent numeric_value=branch characte
     r_value=misschar;
3491 18491 +  run;
3492 18494 +  proc sort data=abovetext; by parent branch; run;
3493 18495 +  proc sort data=tempmissing; by parent branch; run;
3494 18496 +  proc sort data=&EM_USER_OUTNODES out=tempoutnodes;
      by parent branch; run;
3495 18498 +  data tempoutnodes;
3496 18499 +    merge abovetext tempoutNodes(drop=abovetext) tem
     pmissing(in=_a);
3497 18500 +    by parent branch;
3498 18501 +    length traintotal validtotal 8;
3499 18502 +    retain traintotal validtotal;
3500 18504 +    if _a then do;
3501 18505 +      if ^MISSING(abovetext) then do;
3502 18506 +        abovetext= strip(abovetext)||" %sysfunc(sasm
```

```
     sg(sashelp.dmine, tree_ormiss_vlabel, noquote))";
3503 18507 +      end;
3504 18508 +      else do;
3505 18509 +        abovetext = " %sysfunc(sasmsg(sashelp.dmine,
      tree_missonly_vlabel, noquote))";
3506 18510 +      end;
3507 18511 +    end;
3508 18512 +    if MISSING(abovetext) then abovetext="%sysfunc(s
     asmsg(sashelp.dmine, tree_nonmiss_vlabel, noquote))";
3509 18514 +    if node=1 then do;
3510 18515 +      traintotal = N;
3511 18516 +      validtotal=VN;
3512 18517 +    end;
3513 18519 +    drop role rank stat misschar belowtext;
3514 18520 +  run;
3515 18521 +  proc sort data=tempoutnodes; by node; run;
3516 18522 +  proc sort data=belowtext; by node; run;
3517 18524 +  data tempoutnodes;
3518 18525 +    merge tempoutnodes belowtext;
3519 18526 +    by node;
3520 18528 +  run;
3521 18530 +  /* determine if adjusted counts exists; if so, use
      these vs true counts */
3522 18531 +  %let adjusted = N;
3523 18532 +  %let npriors = 0;
3524 18533 +  data _null_ ;
3525 18534 +    set &EM_USER_outstats(where=(STATNAME="NPRIORS")
     ) end=eof ;
3526 18535 +    if eof then do ;
3527 18536 +      call symput("npriors" , strip(put(_N_,best.)))
      ;
3528 18537 +    end;
3529 18538 +  run;
3530 18539 +  %if &npriors gt 0 %then %let adjusted=Y;
3531 18542 +  /* create a table with targetUsed and targetLevel
     columns for each node */
```

```
3532  18543 +  data temptarmeta;
3533  18544 +    set &EM_DATA_VARIABLESET(where=(ROLE='TARGET' AN
      D LEVEL^='ORDINAL'
3534  18545 +    %if &multipleTar eq N %then %do;
3535  18546 +      AND USE in ('D', 'Y')
3536  18547 +    %end;
3537  18548 +    ));
3538  18549 +    length TARGET $32;
3539  18550 +    Target=name;
3540  18551 +    keep target level;
3541  18552 +  run;
3542  18554 +  %if &multipleTar eq Y %then %do;
3543  18555 +    data temptargetused;
3544  18556 +      set &EM_USER_OUTSTATS(where=(STATNAME="TARGET"
      ));
3545  18557 +      keep node target;
3546  18558 +    run;
3547  18559 +    proc sort data=temptargetused; by target; run;
3548  18560 +    proc sort data=temptarmeta; by target; run;
3549  18561 +    data temptargetused;
3550  18562 +      merge temptargetused(in=_a) temptarmeta(in=_b
      rename=(level=tarlevel));
3551  18563 +      by target;
3552  18564 +      if _a and _b;
3553  18565 +    run;
3554  18566 +  %end;
3555  18567 +  %else %do;
3556  18568 +    data temptargetused;
3557  18569 +      set &EM_USER_OUTSTATS;
3558  18570 +      length target $32 tarlevel $10;
3559  18571 +      target="%EM_TARGET";
3560  18572 +      tarlevel="%EM_TARGET_LEVEL";
3561  18573 +      keep node target tarlevel;
3562  18574 +    run;
3563  18575 +    proc sort data=temptargetused nodupkey; by node;
       run;
```

```
3564 18576 +  %end;
3565 18578 +  /* merge this information back into outstats, keep
     ing only stats for the target used in the tree */
3566 18579 +  proc sort data=&EM_USER_OUTSTATS out=tempoutstats;
      by node; run;
3567 18580 +  proc sort data=temptargetused; by node; run;
3568 18583 +  /* create tables for all interval targets as well
     as all class targets */
3569 18584 +  data tempinterval tempclass;
3570 18585 +    merge tempoutstats temptargetused( rename=(targe
     t=targetused));
3571 18586 +    by node;
3572 18587 +    %if "&multipleTar" eq "Y" %then %do;
3573 18588 +      if ((missing(Target)) OR (target=targetused ))
     ;
3574 18589 +    %end;
3575 18591 +    if tarlevel="INTERVAL" then output tempinterval;
3576 18592 +    else output tempclass;
3577 18593 +  run;
3578 18595 +  /* initialize intTarget and classTarget flags */
3579 18596 +  %let em_intNobs =0;
3580 18597 +  %let em_classNobs = 0;
3581 18598 +  %let em_intTarget= N;
3582 18599 +  %let em_classTarget= N;
3583 18601 +  proc sql;
3584 18602 +    reset noprint;
3585 18603 +    select count(*) into :em_intNobs from tempinterv
     al;
3586 18604 +  quit;
3587 18605 +  proc sql;
3588 18606 +    reset noprint;
3589 18607 +    select count(*) into :em_classNobs from tempclas
     s;
3590 18608 +  quit;
3591 18610 +  %if &em_intNobs gt 0 %then %let em_intTarget=Y;
3592 18611 +  %if &em_classNobs gt 0 %then %let em_classTarget=Y
```

```
     ;
3593 18613 +  /* retrieve all information for interval targets *
     /
3594 18614 +  %if &em_intTarget eq Y %then %do;
3595 18616 +    /* determine if leaf variable exists */
3596 18617 +    %let dsid=%sysfunc(open(tempinterval,i));
3597 18618 +    %let leafexists=%sysfunc(varnum(&dsid,LEAF));
3598 18619 +    %let rc=%sysfunc(close(&dsid));
3599 18621 +    proc transpose data=tempinterval
3600 18622 +      %if &leafexists %then %do;
3601 18623 +        (drop=leaf)
3602 18624 +      %end;
3603 18625 +      %if &validexist %then %do;
3604 18626 +       out=tempinterval(keep=NODE N VALID: N PREDICT
     ION VALID: PREDICTION RASE VALID: RASE rename=(VALID__N=VN
     VALID__PREDICTION=VPREDICTION VALID__RASE=VRASE)) ;
3605 18627 +      %end;
3606 18628 +      %else %do;
3607 18629 +         out=tempinterval(keep=NODE N PREDICTION RAS
     E ) ;
3608 18630 +      %end;
3609 18631 +      by node;
3610 18632 +      id statname;
3611 18633 +    run;
3612 18634 +    data tempinterval;
3613 18635 +      set tempinterval;
3614 18636 +      if missing(N) then delete;
3615 18637 +    run;
3616 18638 +  %end;
3617 18640 +  /* retrieve all information for class targets */
3618 18641 +  %if &em_classTarget eq Y %then %do;
3619 18642 +    proc sort data=tempclass; by node category; run;
3620 18643 +    %if &validflag eq N %then %do;
3621 18644 +      data tempn(keep=NODE STATVALUE) temppredict(Ke
     ep=NODE CATEGORY) tempprob(keep=NODE STATVALUE CATEGORY TAR
     GET )
```

```
3622 18645 +           tempprofit(KEEP=NODE STATVALUE CATEGORY
     ) temploss(KEEP=NODE STATVALUE CATEGORY  );
3623 18646 +    %end;
3624 18647 +    %else %do;
3625 18648 +     data tempn(keep=NODE STATVALUE STATNAME) temppr
     edict(Keep=NODE CATEGORY) tempprob(keep=NODE STATVALUE CATE
     GORY TARGET ) tempvprob(keep=NODE STATVALUE CATEGORY TARGET
      )
3626 18649 +          tempprofit(KEEP=NODE STATVALUE STATNAME CA
     TEGORY ) temploss(KEEP=NODE STATVALUE STATNAME CATEGORY );
3627 18650 +    %end;
3628 18651 +      set tempclass;
3629 18653 +      %if &validflag eq N %then %do;
3630 18654 +        %if "&adjusted" eq "N" %then %do;
3631 18655 +          if statname="N" then output tempn;
3632 18656 +        %end;
3633 18657 +        %else %do;
3634 18658 +          if statname="NPRIORS" then output tempn;
3635 18659 +        %end;
3636 18660 +        else if statname="PREDICTION" then output te
     mppredict;
3637 18661 +        else if statname="PROBABILITY" then output t
     empprob;
3638 18662 +        else if statname="ALTERNATIVE PROFIT" then o
     utput tempprofit;
3639 18663 +        else if statname="ALTERNATIVE LOSS" then out
     put temploss;
3640 18664 +      %end;
3641 18665 +      %else %do;
3642 18666 +        %if "&adjusted" eq "N" %then %do;
3643 18667 +          if ((statname="N") OR (statname="VALID: N"
     )) then output tempn;
3644 18668 +        %end;
3645 18669 +        %else %do;
3646 18670 +          if ((statname="NPRIORS") or (statname="VAL
     ID: NPRIORS") ) then output tempn;
```

```
3647 18671 +        %end;
3648 18672 +        else if statname="PREDICTION" then output te
     mppredict;
3649 18673 +        else if statname="PROBABILITY" then output t
     empprob;
3650 18674 +        else if statname="VALID: PROBABILITY" then o
     utput tempvprob;
3651 18675 +        else if ((statname="ALTERNATIVE PROFIT") or
     (statname="VALID: ALTERNATIVE PROFIT")) then output temppro
     fit;
3652 18676 +        else if ((statname="ALTERNATIVE LOSS") OR (s
     tatname="VALID: ALTERNATIVE LOSS")) then output temploss;
3653 18677 +      %end;
3654 18678 +    run;
3655 18681 +    /* determine if profit/loss exists in tempprofit
      */
3656 18682 +    %let em_profitflag=0;
3657 18683 +    %let em_lossflag=0;
3658 18684 +    proc sql;
3659 18685 +      reset noprint;
3660 18686 +      select count(*) into :em_profitflag from tempp
     rofit;
3661 18687 +    quit;
3662 18688 +    proc sql;
3663 18689 +      reset noprint;
3664 18690 +      select count(*) into :em_lossflag from templos
     s;
3665 18691 +    quit;
3666 18693 +    %if &validFlag eq Y %then %do;
3667 18694 +      proc transpose data=tempn
3668 18695 +        %if "&adjusted" eq "N" %then %do;
3669 18696 +           out=tempn(keep=node N VALID__N rename=(VA
     LID__N=VN));
3670 18697 +        %end;
3671 18698 +        %else %do;
3672 18699 +           out=tempn(keep=node NPRIORS VALID__NPRIOR
```

```
     S rename=( VALID__NPRIORS=VNPRIORS));
3673 18700 +        %end;
3674 18701 +        by node;
3675 18702 +        id statname;
3676 18703 +      run;
3677 18704 +      %if &em_profitflag ne 0 %then %do;
3678 18705 +        proc transpose data=tempprofit out=tempprofi
     t;
3679 18706 +          by node category;
3680 18707 +          id statname ;
3681 18708 +        run;
3682 18709 +      %end;
3683 18710 +      %if &em_lossflag ne 0 %then %do;
3684 18711 +        proc transpose data=temploss out=temploss;
3685 18712 +          by node category;
3686 18713 +          id statname ;
3687 18714 +        run;
3688 18715 +      %end;
3689 18716 +      data tempprob;
3690 18717 +        merge tempprob tempvprob(rename=(statvalue=v
     statvalue));
3691 18718 +        by node
3692 18719 +        %if &multipleTar eq Y %then %do;
3693 18720 +          target
3694 18721 +        %end;
3695 18722 +        category;
3696 18723 +      run;
3697 18724 +    %end;
3698 18726 +    /* store percentcorrect value */
3699 18727 +    data tempppredict;
3700 18728 +      merge tempprob tempppredict(in=_a);
3701 18729 +      by node category;
3702 18730 +      if _a then do;
3703 18731 +        percentCorrect = statvalue;
3704 18732 +        %if &validFlag eq Y %then %do;
3705 18733 +          vpercentCorrect= vstatvalue;
```

```
3706 18734 +        %end;
3707 18735 +      end;
3708 18736 +      label percentCorrect="%sysfunc(sasmsg(sashelp.
     dmine, rpt_percentcorrect_vlabel, noquote))"
3709 18737 +      %if &validFlag eq Y %then %do;
3710 18738 +         vpercentCorrect="%sysfunc(sasmsg(sashelp.dm
     ine, rpt_vpercentcorrect_vlabel, noquote))"
3711 18739 +      %end;
3712 18740 +      ;
3713 18741 +      if missing(percentCorrect) then delete;
3714 18742 +      drop target;
3715 18743 +    run;
3716 18745 +    /* build profittext */
3717 18746 +    %if ((&em_profitflag ne 0) OR (&em_lossflag ne 0
     )) %then %do;
3718 18747 +      data tempprofittext(keep= node profittext prof
     itloss);
3719 18748 +        length profittext $800 profitloss 8.;
3720 18749 +        retain profittext profitloss;
3721 18751 +        merge tempprob
3722 18752 +        %if &em_profitflag ne 0 %then %do;
3723 18753 +          tempprofit
3724 18754 +        %end;
3725 18755 +        %else %if &em_lossflag ne 0 %then %do;
3726 18756 +          temploss
3727 18757 +        %end;
3728 18758 +        ;
3729 18759 +        by node category;
3730 18761 +        /* EVENT ONLY IS NOT AVAILABLE FOR MULTIPLE
     TARGETS AS ONLY PRIMARY TARGET IS IN EM_TARGETDECINFO TO RE
     TRIEVE EVENT LEVEL */
3731 18762 +        %let profittype = &EM_PROPERTY_PROFITLOSS;
3732 18763 +        %if ((&multipleTar eq Y) AND ("&EM_PROPERTY_
     PROFITLOSS" eq "EVENT"))  %then %do;
3733 18764 +          %let profittype = ALL;
3734 18765 +        %end;
```

```
3735 18767 +        /* create the profitloss variable for nodeco
     lor if selected */
3736 18768 +        label profitloss="%sysfunc(sasmsg(sashelp.dm
     ine, rpt_profitloss_vlabel, noquote))";
3737 18770 +        %if "&profittype" eq "ALL" %then %do;
3738 18771 +          if strip(CATEGORY)="&targetEvent" then do;
3739 18772 +            profitloss=statvalue;
3740 18773 +          end;
3741 18774 +          if first.node then do;
3742 18775 +            %if &validFlag eq N %then %do;
3743 18776 +             %if &em_profitflag ne 0 %then %do;
3744 18777 +                 profittext="%sysfunc(sasmsg(sashelp
     .dmine, rpt_profit_vlabel, noquote )): "||strip(CATEGORY)||
     ": "||"09"x||put(STATVALUE, 14.&EM_PROPERTY_SPLITPRECISION)
     ;
3745 18778 +             %end;
3746 18779 +             %if &em_lossflag ne 0 %then %do;
3747 18780 +                 profittext="%sysfunc(sasmsg(sashelp
     .dmine, rpt_loss_vlabel, noquote )): "||strip(CATEGORY)||":
      "||"09"x||put(STATVALUE, 14.&EM_PROPERTY_SPLITPRECISION);
3748 18781 +             %end;
3749 18782 +            %end;
3750 18783 +            %else %do;
3751 18784 +             %if &em_profitflag ne 0 %then %do;
3752 18785 +                profittext="%sysfunc(sasmsg(sashelp.
     dmine, rpt_profit_vlabel, noquote )): "||strip(CATEGORY)||"
     : "||"09"x||put(ALTERNATIVE_PROFIT, 14.&EM_PROPERTY_SPLITPR
     ECISION)||"09"x||put(VALID__ALTERNATIVE_PROFIT, 14.&EM_PROP
     ERTY_SPLITPRECISION)
3753 18785!+;
3754 18786 +             %end;
3755 18787 +             %if &em_lossflag ne 0 %then %do;
3756 18788 +                profittext="%sysfunc(sasmsg(sashelp.
     dmine, rpt_loss_vlabel, noquote )): "||strip(CATEGORY)||":
     "||"09"x||put(ALTERNATIVE_LOSS, 14.&EM_PROPERTY_SPLITPRECIS
     ION)||"09"x||put(VALID__ALTERNATIVE_LOSS, 14.&EM_PROPERTY_S
```

```
     PLITPRECISION);
3757 18789 +             %end;
3758 18790 +            %end;
3759 18791 +          end;
3760 18792 +          else if last.node then do;
3761 18793 +            %if &validFlag eq N %then %do;
3762 18794 +             %if &em_profitflag ne 0 %then %do;
3763 18795 +                 profittext=strip(profittext)||"0A"x
     ||"%sysfunc(sasmsg(sashelp.dmine, rpt_profit_vlabel, noquot
     e )): "||strip(CATEGORY)||": "||"09"x||put(STATVALUE, 14.&E
     M_PROPERTY_SPLITPRECISION);
3764 18796 +             %end;
3765 18797 +             %if &em_lossflag ne 0 %then %do;
3766 18798 +                 profittext=strip(profittext)||"0A"x
     ||"%sysfunc(sasmsg(sashelp.dmine, rpt_loss_vlabel, noquote
     )): "||strip(CATEGORY)||": "||"09"x||put(STATVALUE, 14.&EM_
     PROPERTY_SPLITPRECISION);
3767 18799 +             %end;
3768 18800 +             /*if CATEGORY="&targetEvent" then do;
3769 18801 +               profitloss=statvalue;
3770 18802 +             end;*/
3771 18803 +            %end;
3772 18804 +            %else %do;
3773 18805 +             %if &em_profitflag ne 0 %then %do;
3774 18806 +                profittext=strip(profittext)||"0A"x|
     |"%sysfunc(sasmsg(sashelp.dmine, rpt_profit_vlabel, noquote
      )): "||strip(CATEGORY)||": "||"09"x||put(ALTERNATIVE_PROFI
     T, 14.&EM_PROPERTY_SPLITPRECISION)||"09"x||put(VALID__ALTER
     NATIVE_PROFIT,
3775 18806!+14.&EM_PROPERTY_SPLITPRECISION);
3776 18807 +                if CATEGORY="&targetEvent" then do;
3777 18808 +                 profitloss=ALTERNATIVE_PROFIT;
3778 18809 +                end;
3779 18810 +             %end;
3780 18811 +             %if &em_lossflag ne 0 %then %do;
3781 18812 +                profittext=strip(profittext)||"0A"x|
```

```
     |"%sysfunc(sasmsg(sashelp.dmine, rpt_loss_vlabel, noquote )
     ): "||strip(CATEGORY)||": "||"09"x||put(ALTERNATIVE_LOSS, 1
     4.&EM_PROPERTY_SPLITPRECISION)||"09"x||put(VALID__ALTERNATI
     VE_LOSS,
3782 18812!+14.&EM_PROPERTY_SPLITPRECISION);
3783 18813 +                if CATEGORY="&targetEvent" then do;
3784 18814 +                  profitloss=ALTERNATIVE_LOSS;
3785 18815 +                end;
3786 18816 +             %end;
3787 18817 +           %end;
3788 18818 +           output;
3789 18819 +         end;
3790 18820 +         else do;
3791 18821 +           %if &validFlag eq N %then %do;
3792 18822 +             %if &em_profitflag ne 0 %then %do;
3793 18823 +                 profittext=strip(profittext)||"0A"x
     ||"%sysfunc(sasmsg(sashelp.dmine, rpt_profit_vlabel, noquot
     e )): "||strip(CATEGORY)||": "||"09"x||put(STATVALUE, 14.&E
     M_PROPERTY_SPLITPRECISION);
3794 18824 +             %end;
3795 18825 +             %if &em_lossflag ne 0 %then %do;
3796 18826 +                 profittext=strip(profittext)||"0A"x
     ||"%sysfunc(sasmsg(sashelp.dmine, rpt_loss_vlabel, noquote
     )): "||strip(CATEGORY)||": "||"09"x||put(STATVALUE, 14.&EM_
     PROPERTY_SPLITPRECISION);
3797 18827 +             %end;
3798 18828 +           %end;
3799 18829 +           %else %do;
3800 18830 +             %if &em_profitflag ne 0 %then %do;
3801 18831 +                profittext=strip(profittext)||"0A"x|
     |"%sysfunc(sasmsg(sashelp.dmine, rpt_profit_vlabel, noquote
      )): "||strip(CATEGORY)||": "||"09"x||put(ALTERNATIVE_PROFI
     T, 14.&EM_PROPERTY_SPLITPRECISION)||"09"x||put(VALID__ALTER
     NATIVE_PROFIT,
3802 18831!+14.&EM_PROPERTY_SPLITPRECISION);
3803 18832 +             %end;
```

```
3804 18833 +             %if &em_lossflag ne 0 %then %do;
3805 18834 +                profittext=strip(profittext)||"0A"x|
     |"%sysfunc(sasmsg(sashelp.dmine, rpt_loss_vlabel, noquote )
     ): "||strip(CATEGORY)||": "||"09"x||put(ALTERNATIVE_LOSS, 1
     4.&EM_PROPERTY_SPLITPRECISION)||"09"x||put(VALID__ALTERNATI
     VE_LOSS,
3806 18834!+14.&EM_PROPERTY_SPLITPRECISION);
3807 18835 +             %end;
3808 18836 +           %end;
3809 18837 +         end;
3810 18838 +       %end;
3811 18839 +       %else %if (("&profittype" eq "EVENT") AND ("
     &targetEvent" ne "" )) %then %do;
3812 18840 +         if strip(CATEGORY) = "&targetevent" then d
     o;
3813 18841 +           %if &validFlag eq N %then %do;
3814 18842 +             %if &em_profitflag ne 0 %then %do;
3815 18843 +                 profittext="%sysfunc(sasmsg(sashelp
     .dmine, rpt_profit_vlabel, noquote )): "||strip(CATEGORY)||
     ": "||"09"x||put(STATVALUE, 14.&EM_PROPERTY_SPLITPRECISION)
     ;
3816 18844 +             %end;
3817 18845 +             %if &em_lossflag ne 0 %then %do;
3818 18846 +                 profittext="%sysfunc(sasmsg(sashelp
     .dmine, rpt_loss_vlabel, noquote )): "||strip(CATEGORY)||":
      "||"09"x||put(STATVALUE, 14.&EM_PROPERTY_SPLITPRECISION);
3819 18847 +             %end;
3820 18848 +             profitloss=statvalue;
3821 18849 +           %end;
3822 18850 +           %else %do;
3823 18851 +             %if &em_profitflag ne 0 %then %do;
3824 18852 +                profittext="%sysfunc(sasmsg(sashelp.
     dmine, rpt_profit_vlabel, noquote )): "||strip(CATEGORY)||"
     : "||"09"x||put(ALTERNATIVE_PROFIT, 14.&EM_PROPERTY_SPLITPR
     ECISION)||"09"x||put(VALID__ALTERNATIVE_PROFIT, 14.&EM_PROP
     ERTY_SPLITPRECISION)
```

```
3825 18852!+;
3826 18853 +                profitloss=ALTERNATIVE_PROFIT;
3827 18854 +              %end;
3828 18855 +              %if &em_lossflag ne 0 %then %do;
3829 18856 +                profittext="%sysfunc(sasmsg(sashelp.
     dmine, rpt_loss_vlabel, noquote )): "||strip(CATEGORY)||":
     "||"09"x||put(ALTERNATIVE_LOSS, 14.&EM_PROPERTY_SPLITPRECIS
     ION)||"09"x||put(VALID__ALTERNATIVE_LOSS, 14.&EM_PROPERTY_S
     PLITPRECISION);
3830 18857 +                profitloss=ALTERNATIVE_LOSS;
3831 18858 +              %end;
3832 18859 +            %end;
3833 18860 +            output;
3834 18861 +          end;
3835 18862 +        %end;
3836 18863 +        %else %if (("&profittype" eq "NONE") AND ("&
     targetEvent" ne "" )) %then %do;
3837 18864 +          if strip(CATEGORY) = "&targetevent" then d
     o;
3838 18865 +            %if &validFlag eq N %then %do;
3839 18866 +             profitloss=statvalue;
3840 18867 +            %end;
3841 18868 +            %else %do;
3842 18869 +             %if &em_profitflag ne 0 %then %do;
3843 18870 +                profitloss=ALTERNATIVE_PROFIT;
3844 18871 +             %end;
3845 18872 +             %if &em_lossflag ne 0 %then %do;
3846 18873 +                profitloss=ALTERNATIVE_LOSS;
3847 18874 +             %end;
3848 18875 +            %end;
3849 18876 +            output;
3850 18877 +          end;
3851 18878 +        %end;
3852 18879 +      run;
3853 18880 +    %end;
3854 18882 +    data tempprob(keep= node probtext);
```

```
3855 18883 +      length probtext $800;
3856 18884 +      retain probtext;
3857 18885 +      set tempprob ;
3858 18886 +      by node;
3859 18888 +      /* EVENT ONLY IS NOT AVAILABLE FOR MULTIPLE TA
     RGETS AS ONLY PRIMARY TARGET IS IN EM_TARGETDECINFO TO RETR
     IEVE EVENT LEVEL */
3860 18889 +      %let probtype = &EM_PROPERTY_TARGET;
3861 18890 +      %if ((&multipleTar eq Y) AND ("&EM_PROPERTY_TA
     RGET" eq "EVENT"))  %then %do;
3862 18891 +        %let probtype = ALL;
3863 18892 +      %end;
3864 18894 +      %if "&probtype" eq "ALL" %then %do;
3865 18895 +        if first.node then do;
3866 18896 +          %if &validFlag eq N %then %do;
3867 18897 +            probtext=strip(CATEGORY)||": "||"09"x||p
     ut(statvalue, percent10.2);
3868 18898 +          %end;
3869 18899 +          %else %do;
3870 18900 +            probtext=strip(CATEGORY)||": "||"09"x||p
     ut(statvalue, percent10.2)||"09"x||put(vstatvalue, percent1
     0.2);
3871 18901 +          %end;
3872 18902 +        end;
3873 18903 +        else if last.node then do;
3874 18904 +          %if &validFlag eq N %then %do;
3875 18905 +            probtext=strip(probtext)||"0A"x||strip(C
     ATEGORY)||": "||"09"x||put(statvalue, percent10.2);
3876 18906 +          %end;
3877 18907 +          %else %do;
3878 18908 +            probtext=strip(probtext)||"0A"x||strip(C
     ATEGORY)||": "||"09"x||put(statvalue, percent10.2)||"09"x||
     put(vstatvalue, percent10.2);
3879 18909 +          %end;
3880 18910 +          output;
3881 18911 +        end;
```

```
3882  18912 +        else do;
3883  18913 +          %if &validFlag eq N %then %do;
3884  18914 +            probtext=strip(probtext)||"0A"x||strip(C
      ATEGORY)||": "||"09"x||put(statvalue, percent10.2);
3885  18915 +          %end;
3886  18916 +          %else %do;
3887  18917 +            probtext=strip(probtext)||"0A"x||strip(C
      ATEGORY)||": "||"09"x||put(statvalue, percent10.2)||"09"x||
      put(vstatvalue, percent10.2);
3888  18918 +          %end;
3889  18919 +        end;
3890  18920 +      %end;
3891  18921 +      %else %if (("&probtype" eq "EVENT") AND ("&tar
      getEvent" ne "" )) %then %do;
3892  18922 +        if strip(CATEGORY) = "&targetevent" then do;
3893  18923 +          %if &validFlag eq N %then %do;
3894  18924 +            probtext=strip(CATEGORY)||": "||"09"x||p
      ut(statvalue, percent10.2);
3895  18925 +          %end;
3896  18926 +          %else %do;
3897  18927 +            probtext=strip(CATEGORY)||": "||"09"x||p
      ut(statvalue, percent10.2)||"09"x||put(vstatvalue, percent1
      0.2);
3898  18928 +          %end;
3899  18929 +          output;
3900  18930 +        end;
3901  18931 +      %end;
3902  18932 +      %else %if "&probtype" eq "NONE" %then %do;
3903  18933 +        if last.node then do;
3904  18934 +          output;
3905  18935 +        end;
3906  18936 +      %end;
3907  18937 +    run;
3908  18938 +  %end;
3909  18940 +  proc sort data=tempoutnodes out=tempoutnodes; by n
      ode; run;
```

```
3910 18942 +  %let oldexists=0;
3911 18943 +  %if %sysfunc(exist(&EM_USER_TREE_PLOT)) %then %do;
3912 18944 +     data old_tree_plot;
3913 18945 +        set &EM_USER_TREE_PLOT(keep=node nodecolor);
3914 18946 +        rename nodecolor=oldnodecolor;
3915 18947 +     run;
3916 18949 +     proc sort data=old_tree_plot;
3917 18950 +        by node;
3918 18951 +     run;
3919 18953 +     %let oldexists=1;
3920 18954 +  %end;
3921 18956 +  data &EM_USER_TREE_PLOT;
3922 18957 +    length textall $800;
3923 18958 +    merge tempoutnodes temptargetused
3924 18960 +    %if &em_intTarget eq Y %then %do;
3925 18961 +      tempinterval
3926 18962 +    %end;
3927 18964 +    %if &em_classTarget eq Y %then %do;
3928 18966 +      %if &validFlag eq N %then %do;
3929 18967 +        tempn(rename=(statvalue=N))
3930 18968 +      %end;
3931 18969 +      %else %do;
3932 18970 +        tempn
3933 18971 +      %end;
3934 18973 +      tempppredict tempprob
3935 18975 +      %if ((&em_profitflag ne 0) OR (&em_lossflag ne
      0)) %then %do;
3936 18976 +        tempprofittext
3937 18977 +      %end;
3938 18978 +    %end;
3939 18979 +    ;
3940 18980 +    by node;
3941 18982 +    /* build nodetext based on user selection */
3942 18983 +    textall="";
3943 18985 +    %if &em_intTarget eq Y %then %do;
3944 18986 +    if tarlevel="INTERVAL" then do;
```

```
3945 18987 +      /* Nodeid */
3946 18988 +      %if "&EM_PROPERTY_SHOWNODEID" eq "Y" %then %do
     ;
3947 18989 +        textall=strip(textall)||"0A"x||"%sysfunc(sas
     msg(sashelp.dmine, rpt_nodeId_vlabel, noquote )): "||"09"x|
     |strip(Node);
3948 18990 +      %end;
3949 18992 +      /* Target identifier if multiple targets are u
     sed */
3950 18993 +      %if "&multipleTar" eq "Y" %then %do;
3951 18994 +        textall=strip(textall)||"0A"x||"%sysfunc(sas
     msg(sashelp.dmine, rpt_target_title, noquote, )) "||"09"x||
     strip(target);
3952 18995 +      %end;
3953 18997 +      %if &validFlag eq Y %then %do;
3954 18998 +         /* Column labels displayed in validflag eq
     Y only */
3955 18999 +         %if (("&EM_PROPERTY_AVG" eq "Y") OR ("&EM_P
     ROPERTY_RASE" eq "Y") OR ("&EM_PROPERTY_COUNT" eq "Y")) %th
     en %do;
3956 19000 +           textall=strip(textall)||"0A"x||"%sysfunc(
     sasmsg(sashelp.dmine, rpt_rptstatistic_vlabel, noquote)) "|
     |"09"x||"%sysfunc(sasmsg(sashelp.dmine, rpt_train_vlabel ,
     noquote ))" ||"09"x|| "%sysfunc(sasmsg(sashelp.dmine, rpt_v
     alidate_vlabel ,
3957 19000!+noquote ))";
3958 19001 +         %end;
3959 19003 +         /* Average values */
3960 19004 +         %if "&EM_PROPERTY_AVG" eq "Y" %then %do;
3961 19005 +           textall=strip(textall)||"0A"x||"%sysfunc(
     sasmsg(sashelp.dmine, rpt_average_vlabel, noquote)): "||"09
     "x||put(PREDICTION, 14.&EM_PROPERTY_SPLITPRECISION)||"09"x|
     |put(VPREDICTION, 14.&EM_PROPERTY_SPLITPRECISION);
3962 19006 +         %end;
3963 19008 +         /* RASE */
3964 19009 +         %if "&EM_PROPERTY_RASE" eq "Y" %then %do;
```

```
3965 19010 +           textall=strip(textall)||"0A"x||"%sysfunc(
     sasmsg(sashelp.dmine, rpt_rase_vlabel, noquote)): "||"09"x|
     |put(RASE, 14.&EM_PROPERTY_SPLITPRECISION)||"09"x||put(VRAS
     E, 14.&EM_PROPERTY_SPLITPRECISION);
3966 19011 +         %end;
3967 19013 +         /* Count */
3968 19014 +         %if "&EM_PROPERTY_COUNT" eq "Y" %then %do;
3969 19015 +           textall=strip(textall)||"0A"x||" %sysfunc
     (sasmsg(sashelp.dmine, rpt_rptcount_vlabel, noquote )): "||
     "09"x||strip(N)||"09"x||strip(VN);
3970 19016 +         %end;
3971 19017 +      %end;
3972 19018 +      %else %do;
3973 19019 +         /* Average values */
3974 19020 +         %if "&EM_PROPERTY_AVG" eq "Y" %then %do;
3975 19021 +           textall=strip(textall)||"0A"x||"%sysfunc(
     sasmsg(sashelp.dmine, rpt_average_vlabel, noquote)): "||"09
     "x||put(PREDICTION, 14.&EM_PROPERTY_SPLITPRECISION);
3976 19022 +         %end;
3977 19024 +         /* RASE */
3978 19025 +         %if "&EM_PROPERTY_RASE" eq "Y" %then %do;
3979 19026 +           textall=strip(textall)||"0A"x||"%sysfunc(
     sasmsg(sashelp.dmine, rpt_rase_vlabel, noquote)): "||"09"x|
     |put(RASE, 14.&EM_PROPERTY_SPLITPRECISION);
3980 19027 +         %end;
3981 19029 +         /* Count */
3982 19030 +         %if "&EM_PROPERTY_COUNT" eq "Y" %then %do;
3983 19031 +           textall=strip(textall)||"0A"x||" %sysfunc
     (sasmsg(sashelp.dmine, rpt_rptcount_vlabel, noquote )): "||
     "09"x||strip(N);
3984 19032 +         %end;
3985 19033 +      %end;
3986 19035 +      /* nodecolor */
3987 19036 +      %if "&EM_PROPERTY_INTCOLORBY" eq "AVG" %then %
     do;
3988 19037 +        nodecolor=PREDICTION;
```

```
3989 19038 +      %end;
3990 19039 +      %else %if "&EM_PROPERTY_INTCOLORBY" eq "RASE"
     %then %do;
3991 19040 +        nodecolor=RASE;
3992 19041 +      %end;
3993 19042 +      %else %if "&EM_PROPERTY_INTCOLORBY" eq "SINGLE
     " %then %do;
3994 19043 +        nodecolor=1;
3995 19044 +      %end;
3996 19046 +    end;
3997 19047 +    %end;
3998 19048 +    %if &em_classTarget eq Y %then %do;
3999 19049 +    if tarlevel^="INTERVAL" then  do;
4000 19051 +      /* Nodeid */
4001 19052 +      %if "&EM_PROPERTY_SHOWNODEID" eq "Y" %then %do
     ;
4002 19053 +        textall=strip(textall)||"0A"x||"%sysfunc(sas
     msg(sashelp.dmine, rpt_nodeId_vlabel, noquote )): "||"09"x|
     |strip(Node);
4003 19054 +      %end;
4004 19055 +      /* Target identifier if multiple targets are u
     sed */
4005 19056 +      %if "&multipleTar" eq "Y" %then %do;
4006 19057 +        textall=strip(textall)||"0A"x||"%sysfunc(sas
     msg(sashelp.dmine, rpt_target_title, noquote, )) "||"09"x||
     strip(target);
4007 19058 +      %end;
4008 19060 +      /* Predicted values */
4009 19061 +      %if "&EM_PROPERTY_PRED" eq "Y" %then %do;
4010 19062 +        textall=strip(textall)||"0A"x||"%sysfunc(sas
     msg(sashelp.dmine, rpt_pls_score_predvalue, noquote, )): "|
     |"09"x||strip(CATEGORY);
4011 19063 +      %end;
4012 19065 +      /* Column labels displayed in validflag eq Y o
     nly */
4013 19066 +      %if "&ValidFlag" eq "Y" %then %do;
```

```
4014 19067 +        %if (("&EM_PROPERTY_TARGET" ne "NONE") OR ("
     &EM_PROPERTY_PROFITLOSS" ne "NONE") OR ("&EM_PROPERTY_PERCE
     NTCORRECT" eq "Y") OR ("&EM_PROPERTY_COUNT" eq "Y")) %then
     %do;
4015 19068 +          textall=strip(textall)||"0A"x||"%sysfunc(
     sasmsg(sashelp.dmine, rpt_rptstatistic_vlabel, noquote)) "|
     |"09"x||"%sysfunc(sasmsg(sashelp.dmine, rpt_train_vlabel ,
     noquote ))" ||"09"x|| "%sysfunc(sasmsg(sashelp.dmine, rpt_v
     alidate_vlabel ,
4016 19068!+noquote ))";
4017 19069 +        %end;
4018 19070 +      %end;
4019 19072 +      /* Target Values */
4020 19073 +      %if "&EM_PROPERTY_TARGET" ne "NONE" %then %do;
4021 19074 +        textall=strip(textall)||"0A"x||strip(probtex
     t);
4022 19075 +      %end;
4023 19077 +      /* include profit or loss for all target level
     s */
4024 19078 +      %if ( "&EM_PROPERTY_PROFITLOSS" ne "NONE" AND
     ((&em_profitflag ne 0) OR (&em_lossflag ne 0))) %then %do;
4025 19079 +        textall=strip(textall)||"0A"x||strip(profitt
     ext);
4026 19080 +      %end;
4027 19082 +      %if &validFlag eq N %then %do;
4028 19083 +        /* Percent Correct */
4029 19084 +        %if "&EM_PROPERTY_PERCENTCORRECT" eq "Y" %th
     en %do;
4030 19085 +          textall=strip(textall)||"0A"x||"Percent Co
     rrect: "||"09"x||strip(put(percentcorrect, percent10.2));
4031 19086 +        %end;
4032 19088 +         /* Count */
4033 19089 +         %if "&EM_PROPERTY_COUNT" eq "Y" %then %do;
4034 19090 +          %if "&adjusted" eq "N" %then %do;
4035 19091 +            textall=strip(textall)||"0A"x||" %sysfun
     c(sasmsg(sashelp.dmine, rpt_rptcount_vlabel, noquote )): "|
```

```
     |"09"x||strip(put(N, best12.));
4036 19092 +          %end;
4037 19093 +          %else %do;
4038 19094 +            textall=strip(textall)||"0A"x||" %sysfun
     c(sasmsg(sashelp.dmine, rpt_rptcount_vlabel, noquote )): "|
     |"09"x||strip(put(NPRIORS, 15.&EM_PROPERTY_SPLITPRECISION))
     ;
4039 19095 +          %end;
4040 19096 +         %end;
4041 19097 +      %end;
4042 19098 +      %else %do;
4043 19099 +        /* Percent Correct */
4044 19100 +        %if "&EM_PROPERTY_PERCENTCORRECT" eq "Y" %th
     en %do;
4045 19101 +          textall=strip(textall)||"0A"x||"Percent Co
     rrect: "||"09"x||strip(put(percentcorrect, percent10.2))||"
     09"x||strip(put(vpercentcorrect, percent10.2));
4046 19102 +        %end;
4047 19104 +         /* Count */
4048 19105 +         %if "&EM_PROPERTY_COUNT" eq "Y" %then %do;
4049 19106 +          %if "&adjusted" eq "N" %then %do;
4050 19107 +           textall=strip(textall)||"0A"x||" %sysfunc
     (sasmsg(sashelp.dmine, rpt_rptcount_vlabel, noquote )): "||
     "09"x||strip(put(N, best12.))||"09"x||strip(put(VN, best12.
     ));
4051 19108 +          %end;
4052 19109 +          %else %do;
4053 19110 +           textall=strip(textall)||"0A"x||" %sysfunc
     (sasmsg(sashelp.dmine, rpt_rptcount_vlabel, noquote )): "||
     "09"x||strip(put(NPRIORS,15.&EM_PROPERTY_SPLITPRECISION))||
     "09"x||strip(put(VNPRIORS,15.&EM_PROPERTY_SPLITPRECISION));
4054 19111 +          %end;
4055 19112 +         %end;
4056 19113 +      %end;
4057 19115 +      /* nodecolor */
4058 19116 +      %if "&EM_PROPERTY_CLASSCOLORBY" eq "PERCENTEVE
```

```
     NT" %then %do;
4059 19117 +       %if &multipleTar ne Y %then %do;
4060 19118 +        nodecolor=&predTarget;
4061 19119 +       %end;
4062 19120 +       %else %do;
4063 19121 +         nodecolor=percentcorrect;
4064 19122 +       %end;
4065 19123 +      %end;
4066 19124 +      %else %if "&EM_PROPERTY_CLASSCOLORBY" eq "PERC
     ENTCORRECT" %then %do;
4067 19125 +        nodecolor=percentcorrect;
4068 19126 +      %end;
4069 19127 +      %else %if "&EM_PROPERTY_CLASSCOLORBY" eq "SING
     LE" %then %do;
4070 19128 +        nodecolor=1;
4071 19129 +      %end;
4072 19130 +      %else %if "&EM_PROPERTY_CLASSCOLORBY" eq "PROF
     ITLOSS" %then %do;
4073 19131 +        %if ((&em_profitflag eq 0) AND (&em_lossflag
      eq 0)) %then %do;
4074 19132 +          nodecolor=percentcorrect;
4075 19133 +        %end;
4076 19134 +        %else %do;
4077 19135 +          nodecolor=profitloss;
4078 19136 +        %end;
4079 19137 +      %end;
4080 19139 +    end;
4081 19140 +    %end;
4082 19141 +    %if &em_intTarget eq Y %then %do;
4083 19142 +     drop  PREDICTION  TARGET TARLEVEL
4084 19143 +     %if &ValidFlag eq Y %then %do;
4085 19144 +         VPREDICTION
4086 19145 +     %end;
4087 19146 +     ;
4088 19147 +    %end;
4089 19148 +    %if &em_classTarget eq Y %then %do;
```

```
4090 19149 +     drop CATEGORY PROBTEXT  TARGET TARLEVEL STATVAL
     UE
4091 19150 +     %if &ValidFlag eq Y %then %do;
4092 19151 +         VSTATVALUE
4093 19152 +     %end;
4094 19153 +     ;
4095 19154 +    %end;
4096 19156 +  run;
4097 19158 +  /* add leaf index information to plotds - based on
      primary target only*/
4098 19159 +  %if "%EM_TARGET_LEVEL" ne "INTERVAL" %then %do;
4099 19160 +    data tempprob(keep=node statname statvalue renam
     e=(statvalue=&predTarget));
4100 19161 +      set &EM_USER_OUTSTATS;
4101 19162 +      if ((statname="PROBABILITY"
4102 19163 +      %if &validexist %then %do;
4103 19164 +       or statname="VALID: PROBABILITY"
4104 19165 +      %end;
4105 19166 +      ) AND (CATEGORY="&TARGETEVENT")
4106 19167 +      %if "&multipleTar" eq "Y" %then %do;
4107 19168 +        AND (Target="%EM_TARGET")
4108 19169 +      %end;
4109 19170 +      );
4110 19171 +    run;
4111 19173 +    %if &validexist %then %do;
4112 19174 +      proc sort data=tempprob; by node; run;
4113 19175 +      %let vpredTarget = V%substr(&predTarget, 2);
4114 19176 +      proc transpose data=tempprob out=tempprob(keep
     =NODE PROBABILITY VALID__PROBABILITY rename=(PROBABILITY=&p
     redTarget VALID__PROBABILITY=&vpredTarget));
4115 19177 +         by node;
4116 19178 +         id statname;
4117 19179 +      run;
4118 19180 +    %end;
4119 19181 +  %end;
4120 19182 +  %else %do;
```

```
4121 19183 +    data tempprob(keep=node statname statvalue renam
     e=(statvalue=&predTarget));
4122 19184 +      set &EM_USER_OUTSTATS;
4123 19185 +      if ((statname="PREDICTION"
4124 19186 +      %if &validexist %then %do;
4125 19187 +       or statname="VALID: PREDICTION"
4126 19188 +      %end;
4127 19189 +      )
4128 19190 +      %if "&multipleTar" eq "Y" %then %do;
4129 19191 +        AND (Target="%EM_TARGET")
4130 19192 +      %end;
4131 19193 +      );
4132 19194 +    run;
4133 19195 +    %if &validexist %then %do;
4134 19196 +      proc sort data=tempprob; by node; run;
4135 19197 +      %let vpredTarget = V%substr(&predTarget, 2);
4136 19198 +      proc transpose data=tempprob out=tempprob(keep
     =NODE PREDICTION VALID__PREDICTION rename=(PREDICTION=&pred
     Target VALID__PREDICTION=&vpredTarget));
4137 19199 +         by node;
4138 19200 +         id statname;
4139 19201 +      run;
4140 19202 +    %end;
4141 19203 +  %end;
4142 19205 +  proc sort data=tempprob; by node; run;
4143 19206 +  data tempoutnodes;
4144 19207 +    merge tempoutnodes tempprob;
4145 19208 +    by node;
4146 19209 +  run;
4147 19211 +  proc sort data=tempoutnodes out=tempnodes; by desc
     ending &predTarget; run;
4148 19212 +  data tempnodes;
4149 19213 +    retain traintotal validtotal;
4150 19214 +    set tempnodes(where=(leaf ne . ));
4151 19215 +    tprob=round(&predTarget, .01);
4152 19216 +    %if "%EM_TARGET_LEVEL" ne "INTERVAL" %then %do;
```

```
4153 19217 +      percevent_train=round(tprob*100, .01);
4154 19218 +    %end;
4155 19219 +    %else %do;
4156 19220 +      percevent_train=tprob;
4157 19221 +    %end;
4158 19223 +    perc_train=round((n/traintotal)*100, 0.01);
4159 19224 +    /* leafwidth already has a *10 multiplier */
4160 19225 +    if missing(perc_train) then perc_train = round(l
     inkwidth*10, 0.01);
4161 19227 +    %if &validexist %then %do;
4162 19228 +      %let vpredTarget = V%substr(&predTarget,2);
4163 19229 +      vprob=round(&vpredTarget, .01);
4164 19230 +      %if "%EM_TARGET_LEVEL" ne "INTERVAL" %then %do
     ;
4165 19231 +        percevent_valid=round(vprob*100, .01);
4166 19232 +      %end;
4167 19233 +      %else %do;
4168 19234 +        percevent_valid=vprob;
4169 19235 +      %end;
4170 19236 +      perc_valid=round((vn/validtotal)*100, .01);
4171 19237 +    %end;
4172 19239 +    index=_N_;
4173 19240 +    keep node index tprob perc_train percevent_train
4174 19241 +    %if &validexist %then %do;
4175 19242 +        vprob percevent_valid perc_valid
4176 19243 +    %end;
4177 19244 +    ;
4178 19245 +  run;
4179 19246 +  proc sort data=tempnodes; by node; run;
4180 19247 +  data &EM_USER_TREE_PLOT;
4181 19248 +    merge &EM_USER_TREE_PLOT tempnodes %if &oldexist
     s %then old_tree_plot;;
4182 19249 +    by node;
4183 19250 +    if missing(node) then delete;
4184 19251 +    %if &oldexists %then %do;
4185 19252 +      if missing(nodecolor) then nodecolor=oldnodeco
```

```
     lor;
4186 19253 +      drop oldnodecolor;
4187 19254 +    %end;
4188 19255 +    abovetext = compbl(abovetext);
4189 19257 +    /* add variable labels */
4190 19258 +    label textall      = "%sysfunc(sasmsg(sashelp.dm
     ine, rpt_textall_vlabel, noquote))"
4191 19259 +          parent       = "%sysfunc(sasmsg(sashelp.dm
     ine, rpt_parentId_vlabel, noquote))"
4192 19260 +          node         = "%sysfunc(sasmsg(sashelp.dm
     ine, rpt_nodeid_vlabel, noquote))"
4193 19261 +          abovetext    = "%sysfunc(sasmsg(sashelp.dm
     ine, rpt_abovetext_vlabel, noquote))"
4194 19262 +          traintotal   = "%sysfunc(sasmsg(sashelp.dm
     ine, rpt_traintotal_vlabel, noquote))"
4195 19263 +          nodecolor    = "%sysfunc(sasmsg(sashelp.dm
     ine, rpt_nodecolor_vlabel, noquote))"
4196 19265 +          %if "%EM_TARGET_LEVEL" ne "INTERVAL" %then
      %do;
4197 19266 +            tprob        = "%sysfunc(sasmsg(sashelp.
     dmine, rpt_prob_vlabel, noquote, %nrbquote(&targetEvent)))"
4198 19267 +            percevent_train = "%sysfunc(sasmsg(sashe
     lp.dmine, rpt_percevent_train_vlabel, noquote))"
4199 19268 +            perc_train      = "%sysfunc(sasmsg(sashe
     lp.dmine, rpt_perc_train_vlabel, noquote))"
4200 19269 +          %end;
4201 19270 +          %else %do;
4202 19271 +            tprob          = "%sysfunc(sasmsg(sashe
     lp.dmine, rpt_average_vlabel, noquote))"
4203 19272 +            percevent_train = "%sysfunc(sasmsg(sashe
     lp.dmine, rpt_perc_int_train_vlabel, noquote))"
4204 19273 +            perc_train = "%sysfunc(sasmsg(sashelp.dm
     ine, rpt_perc_train_vlabel, noquote))"
4205 19274 +          %end;
4206 19275 +          index           = "%sysfunc(sasmsg(sashelp
     .dmine, meta_index_vlabel, noquote))"
```

```
4207 19277 +          validtotal      = "%sysfunc(sasmsg(sashelp
     .dmine, rpt_validtotal_vlabel, noquote))"
4208 19278 +          VN              = "%sysfunc(sasmsg(sashelp
     .dmine, rpt_validn_vlabel, noquote))"
4209 19279 +          %if "%EM_TARGET_LEVEL" ne "INTERVAL" %then
      %do;
4210 19280 +            vprob           = "%sysfunc(sasmsg(sashe
     lp.dmine, rpt_vprob_vlabel, noquote, %nrbquote(&targetEvent
     )))"
4211 19281 +            perc_valid      = "%sysfunc(sasmsg(sashe
     lp.dmine, rpt_perc_valid_vlabel, noquote))"
4212 19282 +            percevent_valid = "%sysfunc(sasmsg(sashe
     lp.dmine, rpt_percevent_valid_vlabel, noquote))"
4213 19283 +          %end;
4214 19284 +          %else %do;
4215 19285 +            vprob           = "%sysfunc(sasmsg(sashe
     lp.dmine, rpt_validaverage_vlabel, noquote))"
4216 19286 +            perc_valid = "%sysfunc(sasmsg(sashelp.dm
     ine, rpt_perc_valid_vlabel, noquote))"
4217 19287 +            percevent_valid = "%sysfunc(sasmsg(sashe
     lp.dmine, rpt_perc_int_valid_vlabel, noquote))"
4218 19288 +          %end;
4219 19289 +    ;
4220 19290 +  run;
4221 19292 +  /* delete temporary tables */
4222 19293 +  proc datasets lib=work nolist;
4223 19294 +    delete abovetext belowtext tempoutnodes tempmiss
     ing temp tempnodes tempstats;
4224 19295 +  run;
4225 19297 +%mend em_tree_makePlotDs;
4226 19301 +%macro em_tree_report;
4227 19303 +   /* report properties */
4228 19304 +   %em_checkmacro(name=EM_PROPERTY_Precision, value=
     4, global=Y);
4229 19305 +   %em_checkmacro(name=EM_PROPERTY_SplitPrecision, v
     alue=4, global=Y);
```

```
4230 19306 +   %em_checkmacro(name=EM_PROPERTY_ClassColorBy, val
     ue=PERCENTCORRECT, global=Y);
4231 19307 +   %em_checkmacro(name=EM_PROPERTY_IntColorBy, value
     =AVG, global=Y);
4232 19308 +   %em_checkmacro(name=EM_PROPERTY_ShowNodeId, value
     =Y, global=Y);
4233 19309 +   %em_checkmacro(name=EM_PROPERTY_ShowValid, value=
     Y, global=Y);
4234 19310 +   %em_checkmacro(name=EM_PROPERTY_Pred, value=N, gl
     obal=Y);
4235 19311 +   %em_checkmacro(name=EM_PROPERTY_Target, value=ALL
     , global=Y);
4236 19312 +   %em_checkmacro(name=EM_PROPERTY_Count, value=Y, g
     lobal=Y);
4237 19313 +   %em_checkmacro(name=EM_PROPERTY_PercentCorrect, v
     alue=N, global=Y);
4238 19314 +   %em_checkmacro(name=EM_PROPERTY_ProfitLoss, value
     =NONE, global=Y);
4239 19315 +   %em_checkmacro(name=EM_PROPERTY_AVG, value=Y, glo
     bal=Y);
4240 19316 +   %em_checkmacro(name=EM_PROPERTY_RASE, value=N, gl
     obal=Y);
4241 19318 +   %let validexist=0;
4242 19319 +   %if (("&EM_IMPORT_VALIDATE" ne "") AND (%sysfunc(
     exist(&EM_IMPORT_VALIDATE)) or %sysfunc(exist(&EM_IMPORT_VA
     LIDATE,VIEW)))) %then %do;
4243 19320 +     %let validexist=1;
4244 19321 +   %end;
4245 19323 +   /* determine if multiple targets will be processe
     d */
4246 19324 +   %let em_tree_multipleTargets=N;
4247 19325 +   %let em_tree_numTarget=1;
4248 19326 +   %if "&EM_PROPERTY_USEMULTIPLETARGET" eq "Y" %then
      %do;
4249 19327 +     /* determine if there are any ordinal target v
     ariables - if so, multiple targets are not supported */
```

```
4250 19328 +      %if &EM_NUM_ORDINAL_TARGET gt 0 %then %do;
4251 19329 +         %let em_tree_multipleTargets=N;
4252 19330 +      %end;
4253 19331 +      %else %do;
4254 19332 +        data _null_;
4255 19333 +          set &EM_DATA_VARIABLESET(where=(ROLE='TARG
     ET' AND LEVEL^='ORDINAL')) end=eof;
4256 19334 +          if eof then
4257 19335 +            call symput('em_tree_numTarget', strip(p
     ut(_N_, BEST.)));
4258 19336 +        run;
4259 19338 +        %if &em_tree_numTarget gt 1 %then %do;
4260 19339 +           %let em_tree_multipleTargets=Y;
4261 19340 +        %end;
4262 19341 +     %end;
4263 19342 +   %end;
4264 19344 +  %if "&em_tree_multipleTargets" eq "N" %then %do;
4265 19346 +   /* variable importance */
4266 19347 +   %EM_GETNAME(key=OUTIMPORT, type=DATA);
4267 19348 +   %if %sysfunc(exist(&EM_USER_OUTIMPORT)) eq 1 %the
     n %do;
4268 19350 +     /* determine if vars exists - properties could
     indicate they are they but freeze=Y would mean the node was
     n't retrained */
4269 19351 +     /* and the columns may not be generated

                 */
4270 19352 +     %let em_tree_cvexists=;
4271 19353 +     %let em_tree_surrexists=.;
4272 19354 +     data _null_;
4273 19355 +       set &EM_USER_OUTIMPORT (obs=2) end=eof;
4274 19356 +       if eof then do ;
4275 19357 +        call symput("em_tree_cvexists" , strip(put(c
     vimportance,best.))) ;
4276 19358 +        call symput("em_tree_surrexists", strip(put(
     nsurrogates, best.)));
```

```
4277 19359 +       end;
4278 19360 +     run;
4279 19362 +     data &EM_USER_OUTIMPORT;
4280 19363 +         set &EM_USER_OUTIMPORT;
4281 19364 +         /* format columns based on Precison value s
     pecified */
4282 19365 +         format importance 15.&EM_PROPERTY_PRECISION
4283 19366 +              %if &validexist %then %do;
4284 19367 +                vimportance ratio 15.&EM_PROPERTY_PR
     ECISION
4285 19368 +              %end;
4286 19369 +              %if "&EM_TREE_CVEXISTS" ne "." %then %
     do;
4287 19370 +                cvimportance vimportance ratio 15.&E
     M_PROPERTY_PRECISION
4288 19371 +              %end;
4289 19372 +         ;
4290 19373 +     run;
4291 19375 +     title10 "%sysfunc(sasmsg(sashelp.dmine, rpt_var
     iableImportance_title  , NOQUOTE))";
4292 19376 +     proc print data=&EM_USER_OUTIMPORT
4293 19377 +        %if "&EM_TREE_SURREXISTS" ne "." %then %do;
4294 19378 +          (where=((nrules>0) OR (nsurrogates>0)))
4295 19379 +        %end;
4296 19380 +        %else %do;
4297 19381 +           (where=(nrules>0))
4298 19382 +        %end;
4299 19383 +        label noobs
4300 19384 +        ;
4301 19385 +     run;
4302 19386 +     title10;
4303 19388 +   %end;
4304 19390 +   /* Sequence */
4305 19391 +   %EM_GETNAME(key=OUTSEQ, type=DATA);
4306 19392 +   %EM_GETNAME(key=OUTOBSIMP, type=DATA);
4307 19393 +   data _null_ ;
```

```
4308 19394 +      set &EM_USER_outseq (obs=2) end=eof ;
4309 19395 +      if eof then do ;
4310 19396 +        call symput("em_tree_xase" , strip(put(_XASE
     _,best.))) ;
4311 19397 +        call symput("em_tree_vase" , strip(put(_VASE
     _, best.)));
4312 19398 +        call symput("em_tree_seq"  , strip(put(_SEQU
     ENCE_, best.)));
4313 19399 +        call symput("em_tree_vseq"  , strip(put(_VSE
     QUENCE_, best.)));
4314 19400 +        call symput("em_tree_aprof" , strip(put(_APR
     OF_, best.)));
4315 19401 +        call symput("em_tree_aloss" , strip(put(_ALO
     SS_, best.)));
4316 19402 +        call symput("em_tree_prior" , strip(put(_PAS
     E_, best.)));
4317 19403 +      end;
4318 19404 +    run;
4319 19406 +   %if %sysfunc(exist(&EM_USER_OUTSEQ)) eq 1 %then %
     do;
4320 19407 +      data &EM_USER_OUTSEQ;
4321 19408 +      %if (("&EM_PROPERTY_CV" eq "Y") AND ("&em_tree
     _xase" ne ".")) %then %do;
4322 19409 +        set &EM_USER_OUTSEQ(rename=(_XASE_=_VASE_ _X
     MAX_=_VMAX_ _XSSE_=_VSSE_ _XRASE_=_VRASE_
4323 19410 +        %if "%EM_TARGET_LEVEL" ne "INTERVAL" %then %
     do;
4324 19411 +           _XMISC_=_VMISC_
4325 19412 +        %end;
4326 19413 +        %if "&em_tree_aprof" ne "."  %then %do;
4327 19414 +           _XAPROF_=_VAPROF_
4328 19415 +           _XPROF_ = _VPROF_
4329 19416 +        %end;
4330 19417 +        %if "&em_tree_aloss" ne "."  %then %do;
4331 19418 +           _XALOSS_=_VALOSS_
4332 19419 +        %end;
```

```
4333 19420 +        %if "&EM_TREE_PRIOR" ne "." %then %do;
4334 19421 +           _XPASE_ = _VPASE_
4335 19422 +           _XPMISC_ = _VPMISC_
4336 19423 +        %end;
4337 19425 +        ));
4338 19426 +     %end;
4339 19427 +     %else %do;
4340 19428 +        set &EM_USER_OUTSEQ;
4341 19429 +     %end;
4342 19431 +     format _ASE_  _ASSESS_ _MAX_ _SSE_ _RASE_  15.&
     EM_PROPERTY_PRECISION
4343 19432 +         %if "%EM_TARGET_LEVEL" ne "INTERVAL" %then
     %do;
4344 19433 +           _MISC_   15.&EM_PROPERTY_PRECISION
4345 19434 +         %end;
4346 19435 +         %if "&EM_TREE_PRIOR" ne "." %then %do;
4347 19436 +           _PASE_  15.&EM_PROPERTY_PRECISION
4348 19437 +           _PMISC_ 15.&EM_PROPERTY_PRECISION
4349 19438 +         %end;
4350 19439 +         %if (("&EM_PROPERTY_CV" eq "Y") AND (("&em_
     tree_xase" ne ".") or ("&em_tree_vase" ne "."))) %then %do;
4351 19440 +           _VASE_  _VASSESS_ _VMAX_ _VSSE_ _VRASE_
     _COST_COMPLEXITY_ 15.&EM_PROPERTY_PRECISION
4352 19441 +           %if "%EM_TARGET_LEVEL" ne "INTERVAL" %th
     en %do;
4353 19442 +              _VMISC_ 15.&EM_PROPERTY_PRECISION
4354 19443 +           %end;
4355 19444 +           %if "&EM_TREE_PRIOR" ne "." %then %do;
4356 19445 +             _VPASE_  15.&EM_PROPERTY_PRECISION
4357 19446 +             _VPMISC_ 15.&EM_PROPERTY_PRECISION
4358 19447 +           %end;
4359 19448 +         %end;
4360 19449 +         %if (("&EM_PROPERTY_CV" eq "N") AND &valide
     xist) %then %do;
4361 19450 +           _VASE_  _VASSESS_ _VMAX_ _VSSE_ _VRASE_
      15.&EM_PROPERTY_PRECISION
```

```
4362 19451 +            %if "%EM_TARGET_LEVEL" ne "INTERVAL" %th
     en %do;
4363 19452 +               _VMISC_ 15.&EM_PROPERTY_PRECISION
4364 19453 +            %end;
4365 19454 +         %end;
4366 19455 +         %if "&em_tree_seq" ne "." %then %do;
4367 19456 +           _SEQUENCE_ 15.&EM_PROPERTY_PRECISION
4368 19457 +         %end;
4369 19458 +         %if "&em_tree_vseq" ne "." %then %do;
4370 19459 +           _VSEQUENCE_  15.&EM_PROPERTY_PRECISION
4371 19460 +         %end;
4372 19461 +         %if "&em_tree_aprof" ne "." %then %do;
4373 19462 +           _APROF_ 15.&EM_PROPERTY_PRECISION
4374 19463 +           _PROF_ 15.&EM_PROPERTY_PRECISION
4375 19464 +           %if (("&EM_PROPERTY_CV" eq "Y") OR &valid
     exist) %then %do;
4376 19465 +             _VAPROF_ 15.&EM_PROPERTY_PRECISION
4377 19466 +             _VPROF_ 15.&EM_PROPERTY_PRECISION
4378 19467 +           %end;
4379 19468 +         %end;
4380 19469 +         %else %if "&em_tree_aloss" ne "." %then %do
     ;
4381 19470 +           _ALOSS_  15.&EM_PROPERTY_PRECISION
4382 19471 +           %if (("&EM_PROPERTY_CV" eq "Y") OR &valid
     exist) %then %do;
4383 19472 +             _VALOSS_ 15.&EM_PROPERTY_PRECISION
4384 19473 +           %end;
4385 19474 +         %end;
4386 19475 +      ;
4387 19476 +    run;
4388 19477 +   %end;
4389 19479 +   /* Observation Based Importance */
4390 19480 +   %if (  ("&EM_PROPERTY_OBSIMPORTANCE" eq "Y") AND
     ( %sysfunc(exist(&EM_USER_OUTOBSIMP)) eq 1)) %then %do;
4391 19482 +      /* need to check for 0 obs */
4392 19483 +      %let dsid = %sysfunc(open(&EM_USER_OUTOBSIMP))
```

```
     ;
4393 19484 +      %let onobs=%sysfunc(attrn(&dsid,NOBS));
4394 19485 +      %let rc=%sysfunc(close(&dsid));
4395 19487 +      %if &onobs %then %do;
4396 19488 +         proc sort data=&EM_USER_OUTOBSIMP; by _INPU
     T1_; run;
4397 19489 +         proc sort data=&em_data_variableset out=_te
     mpvars; by NAME; run;
4398 19491 +         data &EM_USER_OUTOBSIMP;
4399 19492 +           merge _tempvars(rename=(NAME=_INPUT1_) ke
     ep=NAME LABEL) &EM_USER_OUTOBSIMP(in=_a)  ;
4400 19493 +           if _a;
4401 19494 +           by _INPUT1_;
4402 19495 +           format  _ASE_ _MAX_ _SSE_ _RASE_ 15.&EM_P
     ROPERTY_PRECISION
4403 19496 +                   %if "%EM_TARGET_LEVEL" ne "INTERV
     AL" %then %do;
4404 19497 +                     _MISC_ 15.&EM_PROPERTY_PRECISIO
     N
4405 19498 +                   %end;
4406 19499 +                   ;
4407 19500 +         run;
4408 19501 +         %EM_REPORT(key=OUTOBSIMP, viewtype=DATA, bl
     ock=MODEL, description=OBSIMPFIT, autodisplay=N);
4409 19502 +      %end;
4410 19503 +   %end;
4411 19505 +  %end;
4412 19507 +  /* create dataset to support tree diagram and icic
     le plot */
4413 19508 +  %EM_GETNAME(key=TREE_PLOT, type=DATA);
4414 19509 +  %em_tree_makePlotDs(multipleTar = &em_tree_multipl
     eTargets);
4415 19511 +  /* display tree diagram */
4416 19512 +  %em_report(key=TREE_PLOT, viewtype=DTree, id=NODE,
      parent=PARENT, nodetext=NODETEXT, tipText=TEXTALL, abovete
     xt=ABOVETEXT, belowText=BELOWTEXT,
```

```
4417 19513 +             nodesize=N, nodecolor=NODECOLOR, linkwi
     dth=LINKWIDTH,  block=MODEL, description=TREE, autodisplay=
     Y);
4418 19515 +  /* display icicle diagram */
4419 19516 +  %em_report(key=TREE_PLOT, viewtype=Icicle, id=NODE
     , parent=PARENT, nodetext=NODETEXT, tipText=TEXTALL,
4420 19517 +             nodesize=N, nodecolor=NODECOLOR, block=
     MODEL, description=ICICLE, autodisplay=Y);
4421 19519 +  /* Leaf Statistics Plot */
4422 19520 +  %em_report(key=TREE_PLOT, viewtype=AREABAR, x=NODE
     , y=PERCEVENT_TRAIN, WIDTH=PERC_TRAIN,block=MODEL, descript
     ion=VARWIDTH, autodisplay=N);
4423 19522 +  /* print leaf information to output window */
4424 19523 +  %if %sysfunc(exist(&EM_USER_TREE_PLOT)) eq 1 %then
      %do;
4425 19525 +     proc sort data=&EM_USER_TREE_PLOT out=t;
4426 19526 +       by descending N;
4427 19527 +     run;
4428 19529 +     /* determine if vn is present in the data -- co
     mbinations of decisions/partition/cv cause the proc not to
     generate this stat */
4429 19530 +     %local vn;
4430 19531 +     data _null_;
4431 19532 +       set t (obs=2) end=eof;
4432 19533 +       if eof then do;
4433 19534 +         call symput("vn", strip(put(vn, best.)));
4434 19535 +       end;
4435 19536 +     run;
4436 19538 +     data t;
4437 19539 +       set t;
4438 19540 +       label N="%sysfunc(sasmsg(sashelp.dmine, rpt_t
     rainingobs_vlabel  , NOQUOTE))"
4439 19541 +             DEPTH="%sysfunc(sasmsg(sashelp.dmine, r
     pt_depth_vlabel  , NOQUOTE))"
4440 19542 +       %if "%EM_TARGET_LEVEL" eq "INTERVAL" %then %d
     o;
```

```
4441 19543 +            tprob = "%sysfunc(sasmsg(sashelp.dmine,
     rpt_trainaverage_vlabel  , NOQUOTE))"
4442 19544 +            RASE="%sysfunc(sasmsg(sashelp.dmine, rpt
     _trainrase_vlabel  , NOQUOTE))"
4443 19545 +       %end;
4444 19546 +       %if (("&EM_IMPORT_VALIDATE" ne "") AND (%sysf
     unc(exist(&EM_IMPORT_VALIDATE)) eq 1)) %then %do;
4445 19547 +            VN="%sysfunc(sasmsg(sashelp.dmine, rpt_v
     alidobs_vlabel  , NOQUOTE))"
4446 19548 +          %if "%EM_TARGET_LEVEL" eq "INTERVAL" %the
     n %do;
4447 19549 +              vprob = "%sysfunc(sasmsg(sashelp.dmine
     , rpt_validaverage_vlabel  , NOQUOTE))"
4448 19550 +              VRASE="%sysfunc(sasmsg(sashelp.dmine,
     rpt_validrase_vlabel  , NOQUOTE))"
4449 19551 +          %end;
4450 19552 +       %end;
4451 19553 +       ;
4452 19554 +     run;
4453 19556 +     /* determine if rase is found in t */
4454 19557 +    %let dsid=%sysfunc(open(t,i));
4455 19558 +    %let raseexists=%sysfunc(varnum(&dsid,RASE));
4456 19559 +    %let rc=%sysfunc(close(&dsid));
4457 19561 +     title10 "%sysfunc(sasmsg(sashelp.dmine, rpt_tre
     eleafreport_title  , NOQUOTE))";
4458 19562 +     proc print data=t noobs label;
4459 19563 +       where tprob ne .;
4460 19564 +       var node depth N tprob
4461 19565 +       %if (("&EM_IMPORT_VALIDATE" ne "") AND (%sysf
     unc(exist(&EM_IMPORT_VALIDATE)) eq 1)) %then %do;
4462 19566 +         %if "&vn" ne "." %then %do;
4463 19567 +           VN
4464 19568 +         %end;
4465 19569 +         vprob
4466 19570 +       %end;
4467 19571 +       %if &raseexists %then %do;
```

```
4468 19572 +            RASE
4469 19573 +            %if ( ("&EM_IMPORT_VALIDATE" ne "") AND
     (%sysfunc(exist(&EM_IMPORT_VALIDATE)) eq 1) AND ("&EM_PROPE
     RTY_CV" eq "N")) %then %do;
4470 19574 +              VRASE
4471 19575 +            %end;
4472 19576 +       %end;
4473 19577 +       ;
4474 19578 +     run;
4475 19579 +     title10;
4476 19580 +  %end;
4477 19582 +  /* create plots that are done during training of n
     ode */
4478 19583 +  /* display iterative plot, including reference lin
     e */
4479 19584 +  %if "&em_Tree_multipleTargets" eq "N" %then %do;
4480 19585 +   /* %if &nleaves eq  %then %do; */
4481 19586 +      %EM_GETNAME(key=OUTTOPOLOGY, type=DATA);
4482 19587 +      data _null_;
4483 19588 +        set &EM_USER_OUTTOPOLOGY end=eof;
4484 19589 +        if eof then do;
4485 19590 +          call symput('nleaves', LEAF);
4486 19591 +        end;
4487 19592 +      run;
4488 19593 +   /* %end; */
4489 19595 +    %EM_REPORT(KEY=OUTSEQ, VIEWTYPE=ITERATIONPLOT, b
     lock=MODEL,  X=_NW_, XRef=&Nleaves, autodisplay=N, Descript
     ion=SUBTREE);
4490 19596 +    /*%EM_REPORT(view=1, Y=_ASE_); */
4491 19597 +  %end;
4492 19599 +  /* display leaf statistics */
4493 19600 +  %EM_REPORT(KEY=TREE_PLOT, VIEWTYPE=RESPONSEBAR, bl
     ock=MODEL, view=1, X=INDEX, Y1=tprob, y2=vprob, where=%nrbq
     uote(INDEX ne .), autodisplay=Y, Description=LEAFSTATS);
4494 19602 +  /* stats by node if multiple targets = Y */
4495 19603 +  %EM_GETNAME(key=OUTSTATS, type=DATA);
```

```
4496  19604 +  %if "&em_tree_multipleTargets" eq "Y" %then %do;
4497  19605 +    data &EM_USER_OUTSTATS;
4498  19606 +      set &EM_USER_OUTSTATS;
4499  19608 +     * if STATNAME="TARGET" then delete;
4500  19609 +     * if STATNAME="PREDICTION" and STATVALUE=. then
       delete;
4501  19610 +      drop leaf;
4502  19611 +    run;
4503  19612 +    %EM_REPORT(key=OUTSTATS, viewtype=DATA, block=MO
      DEL, description=OUTSTATS, autodisplay=N);
4504  19614 +  %end;
4505  19615 +  %else %do;
4506  19616 +    /* add outstats and outdescribe to spk but not r
      esults */
4507  19617 +    %EM_REPORT(viewtype=, key=OUTSTATS);
4508  19618 +  %end;
4509  19620 +%mend em_tree_report;
4510  NOTE: %INCLUDE (level 1) ending.
4511  NOTE: Fileref TEMP has been deassigned.
4512
4513  NOTE: Variable cvimportance is uninitialized.
4514  NOTE: Variable nsurrogates is uninitialized.
4515  NOTE: There were 2 observations read from the data set EMWS
      3.TREE2_OUTIMPORT.
4516  NOTE: DATA statement used (Total process time):
4517        real time           0.00 seconds
4518        user cpu time       0.00 seconds
4519        system cpu time     0.00 seconds
4520        memory              309005.43k
4521        OS Memory           320880.00k
4522        Timestamp           07/01/2024 05:58:57 AM
4523        Step Count                        1  Switch Count  0
4524        Page Faults                       0
4525        Page Reclaims                     61
4526        Page Swaps                        0
4527        Voluntary Context Switches        7
```

```
4528       Involuntary Context Switches      0
4529       Block Input Operations            288
4530       Block Output Operations           0
4531
4532
4533
4534 NOTE: There were 6 observations read from the data set EMWS
     3.TREE2_OUTIMPORT.
4535 NOTE: The data set EMWS3.TREE2_OUTIMPORT has 6 observations
      and 6 variables.
4536 NOTE: DATA statement used (Total process time):
4537       real time           0.01 seconds
4538       user cpu time       0.00 seconds
4539       system cpu time     0.00 seconds
4540       memory              309005.43k
4541       OS Memory           320880.00k
4542       Timestamp           07/01/2024 05:58:57 AM
4543       Step Count                        1  Switch Count  0
4544       Page Faults                       0
4545       Page Reclaims                     127
4546       Page Swaps                        0
4547       Voluntary Context Switches        30
4548       Involuntary Context Switches      0
4549       Block Input Operations            0
4550       Block Output Operations           264
4551
4552
4553
4554 NOTE: There were 2 observations read from the data set EMWS
     3.TREE2_OUTIMPORT.
4555       WHERE nrules>0;
4556 NOTE: The PROCEDURE PRINT printed page 4.
4557 NOTE: PROCEDURE PRINT used (Total process time):
4558       real time           0.00 seconds
4559       user cpu time       0.00 seconds
4560       system cpu time     0.00 seconds
```

```
4561        memory                309005.43k
4562        OS Memory             320880.00k
4563        Timestamp             07/01/2024 05:58:57 AM
4564        Step Count                        1  Switch Count  0
4565        Page Faults                       0
4566        Page Reclaims                     58
4567        Page Swaps                        0
4568        Voluntary Context Switches        9
4569        Involuntary Context Switches      0
4570        Block Input Operations            288
4571        Block Output Operations           0
4572
4573
4574
4575  NOTE: Variable _XASE_ is uninitialized.
4576  NOTE: Variable _SEQUENCE_ is uninitialized.
4577  NOTE: Variable _VSEQUENCE_ is uninitialized.
4578  NOTE: Variable _APROF_ is uninitialized.
4579  NOTE: Variable _ALOSS_ is uninitialized.
4580  NOTE: Variable _PASE_ is uninitialized.
4581  NOTE: There were 2 observations read from the data set EMWS
      3.TREE2_OUTSEQ.
4582  NOTE: DATA statement used (Total process time):
4583        real time             0.00 seconds
4584        user cpu time         0.00 seconds
4585        system cpu time       0.00 seconds
4586        memory                309005.43k
4587        OS Memory             320880.00k
4588        Timestamp             07/01/2024 05:58:58 AM
4589        Step Count                        1  Switch Count  0
4590        Page Faults                       0
4591        Page Reclaims                     63
4592        Page Swaps                        0
4593        Voluntary Context Switches        10
4594        Involuntary Context Switches      0
4595        Block Input Operations            288
```

```
4596       Block Output Operations           0
4597
4598
4599
4600 NOTE: There were 7 observations read from the data set EMWS
     3.TREE2_OUTSEQ.
4601 NOTE: The data set EMWS3.TREE2_OUTSEQ has 7 observations an
     d 20 variables.
4602 NOTE: DATA statement used (Total process time):
4603       real time           0.01 seconds
4604       user cpu time       0.00 seconds
4605       system cpu time     0.00 seconds
4606       memory              309005.43k
4607       OS Memory           320880.00k
4608       Timestamp           07/01/2024 05:58:58 AM
4609       Step Count                        1  Switch Count  0
4610       Page Faults                       0
4611       Page Reclaims                     127
4612       Page Swaps                        0
4613       Voluntary Context Switches        28
4614       Involuntary Context Switches      0
4615       Block Input Operations            0
4616       Block Output Operations           264
4617
4618
4619
4620 NOTE: There were 1 observations read from the data set EMWS
     3.TREE2_IMP_CHURN_DM.
4621       WHERE _TYPE_='TARGET';
4622 NOTE: DATA statement used (Total process time):
4623       real time           0.00 seconds
4624       user cpu time       0.00 seconds
4625       system cpu time     0.00 seconds
4626       memory              309005.43k
4627       OS Memory           320880.00k
4628       Timestamp           07/01/2024 05:58:58 AM
```

```
4629       Step Count                         1  Switch Count  0
4630       Page Faults                        0
4631       Page Reclaims                      62
4632       Page Swaps                         0
4633       Voluntary Context Switches         2
4634       Involuntary Context Switches       0
4635       Block Input Operations             0
4636       Block Output Operations            0
4637
4638
4639
4640 NOTE: There were 1 observations read from the data set EMWS
     3.TREE2_IMP_CHURN_DM.
4641       WHERE (_TYPE_='PREDICTED') and (LEVEL='1');
4642 NOTE: DATA statement used (Total process time):
4643       real time           0.00 seconds
4644       user cpu time       0.00 seconds
4645       system cpu time     0.00 seconds
4646       memory              309005.43k
4647       OS Memory           320880.00k
4648       Timestamp           07/01/2024 05:58:58 AM
4649       Step Count                         1  Switch Count  0
4650       Page Faults                        0
4651       Page Reclaims                      61
4652       Page Swaps                         0
4653       Voluntary Context Switches         1
4654       Involuntary Context Switches       0
4655       Block Input Operations             0
4656       Block Output Operations            0
4657
4658
4659
4660 NOTE: There were 2 observations read from the data set EMWS
     3.TREE2_OUTRULES.
4661       WHERE (ROLE='PRIMARY') and (STAT='VARIABLE');
4662 NOTE: The data set WORK.BELOWTEXT has 2 observations and 2
```

```
     variables.
4663 NOTE: DATA statement used (Total process time):
4664       real time           0.00 seconds
4665       user cpu time       0.00 seconds
4666       system cpu time     0.00 seconds
4667       memory              309005.43k
4668       OS Memory           320880.00k
4669       Timestamp           07/01/2024 05:58:58 AM
4670       Step Count                        1  Switch Count  0
4671       Page Faults                       0
4672       Page Reclaims                     127
4673       Page Swaps                        0
4674       Voluntary Context Switches        8
4675       Involuntary Context Switches      0
4676       Block Input Operations            288
4677       Block Output Operations           264
4678
4679
4680
4681 NOTE: There were 1 observations read from the data set EMWS
     3.TREE2_OUTRULES.
4682       WHERE (ROLE='PRIMARY') and (STAT='LABEL');
4683 NOTE: The data set WORK.BELOWTEXT2 has 1 observations and 2
      variables.
4684 NOTE: DATA statement used (Total process time):
4685       real time           0.00 seconds
4686       user cpu time       0.00 seconds
4687       system cpu time     0.00 seconds
4688       memory              309005.43k
4689       OS Memory           320880.00k
4690       Timestamp           07/01/2024 05:58:58 AM
4691       Step Count                        1  Switch Count  0
4692       Page Faults                       0
4693       Page Reclaims                     128
4694       Page Swaps                        0
4695       Voluntary Context Switches        4
```

```
4696       Involuntary Context Switches      0
4697       Block Input Operations            0
4698       Block Output Operations           264
4699
4700
4701
4702 NOTE: There were 2 observations read from the data set WORK
     .BELOWTEXT.
4703 NOTE: The data set WORK.BELOWTEXT has 2 observations and 2
     variables.
4704 NOTE: PROCEDURE SORT used (Total process time):
4705       real time           0.00 seconds
4706       user cpu time       0.00 seconds
4707       system cpu time     0.00 seconds
4708       memory              309005.43k
4709       OS Memory           320880.00k
4710       Timestamp           07/01/2024 05:58:58 AM
4711       Step Count                        1  Switch Count  0
4712       Page Faults                       0
4713       Page Reclaims                     117
4714       Page Swaps                        0
4715       Voluntary Context Switches        0
4716       Involuntary Context Switches      0
4717       Block Input Operations            0
4718       Block Output Operations           272
4719
4720
4721
4722 NOTE: There were 1 observations read from the data set WORK
     .BELOWTEXT2.
4723 NOTE: The data set WORK.BELOWTEXT2 has 1 observations and 2
      variables.
4724 NOTE: PROCEDURE SORT used (Total process time):
4725       real time           0.00 seconds
4726       user cpu time       0.00 seconds
4727       system cpu time     0.00 seconds
```

```
4728        memory                309005.43k
4729        OS Memory             320880.00k
4730        Timestamp             07/01/2024 05:58:58 AM
4731        Step Count                           1  Switch Count  0
4732        Page Faults                          0
4733        Page Reclaims                        117
4734        Page Swaps                           0
4735        Voluntary Context Switches           0
4736        Involuntary Context Switches         0
4737        Block Input Operations               0
4738        Block Output Operations              264
4739
4740
4741
4742 NOTE: There were 2 observations read from the data set WORK
     .BELOWTEXT.
4743 NOTE: There were 1 observations read from the data set WORK
     .BELOWTEXT2.
4744 NOTE: The data set WORK.BELOWTEXT has 2 observations and 2
     variables.
4745 NOTE: DATA statement used (Total process time):
4746        real time             0.00 seconds
4747        user cpu time         0.00 seconds
4748        system cpu time       0.00 seconds
4749        memory                309005.43k
4750        OS Memory             320880.00k
4751        Timestamp             07/01/2024 05:58:58 AM
4752        Step Count                           1  Switch Count  0
4753        Page Faults                          0
4754        Page Reclaims                        173
4755        Page Swaps                           0
4756        Voluntary Context Switches           0
4757        Involuntary Context Switches         0
4758        Block Input Operations               0
4759        Block Output Operations              264
4760
```

```
4761
4762
4763 NOTE: There were 2 observations read from the data set EMWS
     3.TREE2_OUTRULES.
4764       WHERE (ROLE='PRIMARY') and STAT in ('INTERVAL', 'NOMI
     NAL', 'ORDINAL');
4765 NOTE: The data set WORK.ABOVETEXT has 2 observations and 6
     variables.
4766 NOTE: DATA statement used (Total process time):
4767       real time           0.00 seconds
4768       user cpu time       0.01 seconds
4769       system cpu time     0.00 seconds
4770       memory              309005.43k
4771       OS Memory           320880.00k
4772       Timestamp           07/01/2024 05:58:58 AM
4773       Step Count                        1  Switch Count  0
4774       Page Faults                       0
4775       Page Reclaims                     132
4776       Page Swaps                        0
4777       Voluntary Context Switches        1
4778       Involuntary Context Switches      0
4779       Block Input Operations            0
4780       Block Output Operations           264
4781
4782
4783
4784 NOTE: There were 2 observations read from the data set WORK
     .ABOVETEXT.
4785 NOTE: The data set WORK.ABOVETEXT has 2 observations and 6
     variables.
4786 NOTE: PROCEDURE SORT used (Total process time):
4787       real time           0.00 seconds
4788       user cpu time       0.00 seconds
4789       system cpu time     0.00 seconds
4790       memory              309005.43k
4791       OS Memory           320880.00k
```

```
4792        Timestamp           07/01/2024 05:58:58 AM
4793        Step Count                        1  Switch Count  0
4794        Page Faults                       0
4795        Page Reclaims                     120
4796        Page Swaps                        0
4797        Voluntary Context Switches        0
4798        Involuntary Context Switches      0
4799        Block Input Operations            0
4800        Block Output Operations           264
4801
4802
4803
4804 NOTE: Numeric values have been converted to character value
     s at the places given by: (Line):(Column).
4805        172:103   221:136   264:102   264:125   296:104   330
     :104   372:103   372:126   415:104
4806 NOTE: Character values have been converted to numeric value
     s at the places given by: (Line):(Column).
4807        431:99
4808 NOTE: There were 2 observations read from the data set WORK
     .ABOVETEXT.
4809 NOTE: The data set WORK.ABOVETEXT has 4 observations and 3
     variables.
4810 NOTE: DATA statement used (Total process time):
4811        real time           0.00 seconds
4812        user cpu time       0.00 seconds
4813        system cpu time     0.00 seconds
4814        memory              309005.43k
4815        OS Memory           320880.00k
4816        Timestamp           07/01/2024 05:58:58 AM
4817        Step Count                        1  Switch Count  0
4818        Page Faults                       0
4819        Page Reclaims                     145
4820        Page Swaps                        0
4821        Voluntary Context Switches        0
4822        Involuntary Context Switches      0
```

```
4823       Block Input Operations            0
4824       Block Output Operations           264
4825
4826
4827
4828 NOTE: There were 59 observations read from the data set EMW
     S3.TREE2_OUTRULES.
4829 NOTE: The data set WORK.TEMPMISSING has 2 observations and
     6 variables.
4830 NOTE: DATA statement used (Total process time):
4831       real time           0.00 seconds
4832       user cpu time       0.00 seconds
4833       system cpu time     0.00 seconds
4834       memory              309005.43k
4835       OS Memory           320880.00k
4836       Timestamp           07/01/2024 05:58:58 AM
4837       Step Count                        1  Switch Count  0
4838       Page Faults                       0
4839       Page Reclaims                     128
4840       Page Swaps                        0
4841       Voluntary Context Switches        1
4842       Involuntary Context Switches      0
4843       Block Input Operations            0
4844       Block Output Operations           264
4845
4846
4847
4848 NOTE: There were 4 observations read from the data set WORK
     .ABOVETEXT.
4849 NOTE: The data set WORK.ABOVETEXT has 4 observations and 3
     variables.
4850 NOTE: PROCEDURE SORT used (Total process time):
4851       real time           0.00 seconds
4852       user cpu time       0.00 seconds
4853       system cpu time     0.00 seconds
4854       memory              309005.43k
```

```
4855        OS Memory           320880.00k
4856        Timestamp           07/01/2024 05:58:58 AM
4857        Step Count                      1  Switch Count  0
4858        Page Faults                     0
4859        Page Reclaims                   117
4860        Page Swaps                      0
4861        Voluntary Context Switches      0
4862        Involuntary Context Switches    0
4863        Block Input Operations          0
4864        Block Output Operations         264
4865
4866
4867
4868 NOTE: There were 2 observations read from the data set WORK
     .TEMPMISSING.
4869 NOTE: The data set WORK.TEMPMISSING has 2 observations and
     6 variables.
4870 NOTE: PROCEDURE SORT used (Total process time):
4871        real time           0.00 seconds
4872        user cpu time       0.00 seconds
4873        system cpu time     0.00 seconds
4874        memory              309005.43k
4875        OS Memory           320880.00k
4876        Timestamp           07/01/2024 05:58:58 AM
4877        Step Count                      1  Switch Count  0
4878        Page Faults                     0
4879        Page Reclaims                   117
4880        Page Swaps                      0
4881        Voluntary Context Switches      0
4882        Involuntary Context Switches    0
4883        Block Input Operations          0
4884        Block Output Operations         264
4885
4886
4887
4888 NOTE: There were 5 observations read from the data set EMWS
```

```
     3.TREE2_OUTNODES.
4889 NOTE: The data set WORK.TEMPOUTNODES has 5 observations and
      24 variables.
4890 NOTE: PROCEDURE SORT used (Total process time):
4891       real time           0.00 seconds
4892       user cpu time       0.00 seconds
4893       system cpu time     0.00 seconds
4894       memory              309005.43k
4895       OS Memory           320880.00k
4896       Timestamp           07/01/2024 05:58:58 AM
4897       Step Count                        1  Switch Count  0
4898       Page Faults                       0
4899       Page Reclaims                     154
4900       Page Swaps                        0
4901       Voluntary Context Switches        2
4902       Involuntary Context Switches      0
4903       Block Input Operations            0
4904       Block Output Operations           272
4905
4906
4907
4908 NOTE: There were 4 observations read from the data set WORK
     .ABOVETEXT.
4909 NOTE: There were 5 observations read from the data set WORK
     .TEMPOUTNODES.
4910 NOTE: There were 2 observations read from the data set WORK
     .TEMPMISSING.
4911 NOTE: The data set WORK.TEMPOUTNODES has 5 observations and
      25 variables.
4912 NOTE: DATA statement used (Total process time):
4913       real time           0.00 seconds
4914       user cpu time       0.00 seconds
4915       system cpu time     0.00 seconds
4916       memory              309005.43k
4917       OS Memory           320880.00k
4918       Timestamp           07/01/2024 05:58:58 AM
```

```
4919       Step Count                         1  Switch Count  0
4920       Page Faults                        0
4921       Page Reclaims                      601
4922       Page Swaps                         0
4923       Voluntary Context Switches         0
4924       Involuntary Context Switches       0
4925       Block Input Operations             0
4926       Block Output Operations            264
4927
4928
4929
4930 NOTE: There were 5 observations read from the data set WORK
     .TEMPOUTNODES.
4931 NOTE: The data set WORK.TEMPOUTNODES has 5 observations and
      25 variables.
4932 NOTE: PROCEDURE SORT used (Total process time):
4933       real time           0.00 seconds
4934       user cpu time       0.00 seconds
4935       system cpu time     0.00 seconds
4936       memory              309005.43k
4937       OS Memory           320880.00k
4938       Timestamp           07/01/2024 05:58:58 AM
4939       Step Count                         1  Switch Count  0
4940       Page Faults                        0
4941       Page Reclaims                      117
4942       Page Swaps                         0
4943       Voluntary Context Switches         0
4944       Involuntary Context Switches       0
4945       Block Input Operations             0
4946       Block Output Operations            264
4947
4948
4949
4950 NOTE: There were 2 observations read from the data set WORK
     .BELOWTEXT.
4951 NOTE: The data set WORK.BELOWTEXT has 2 observations and 2
```

```
     variables.
4952 NOTE: PROCEDURE SORT used (Total process time):
4953       real time           0.00 seconds
4954       user cpu time       0.00 seconds
4955       system cpu time     0.00 seconds
4956       memory              309005.43k
4957       OS Memory           320880.00k
4958       Timestamp           07/01/2024 05:58:58 AM
4959       Step Count                        1  Switch Count  0
4960       Page Faults                       0
4961       Page Reclaims                     117
4962       Page Swaps                        0
4963       Voluntary Context Switches        0
4964       Involuntary Context Switches      0
4965       Block Input Operations            0
4966       Block Output Operations           264
4967
4968
4969
4970 NOTE: There were 5 observations read from the data set WORK
     .TEMPOUTNODES.
4971 NOTE: There were 2 observations read from the data set WORK
     .BELOWTEXT.
4972 NOTE: The data set WORK.TEMPOUTNODES has 5 observations and
      26 variables.
4973 NOTE: DATA statement used (Total process time):
4974       real time           0.00 seconds
4975       user cpu time       0.00 seconds
4976       system cpu time     0.00 seconds
4977       memory              309005.43k
4978       OS Memory           320880.00k
4979       Timestamp           07/01/2024 05:58:58 AM
4980       Step Count                        1  Switch Count  0
4981       Page Faults                       0
4982       Page Reclaims                     172
4983       Page Swaps                        0
```

```
4984        Voluntary Context Switches        0
4985        Involuntary Context Switches      0
4986        Block Input Operations            0
4987        Block Output Operations           264
4988
4989
4990
4991  NOTE: There were 0 observations read from the data set EMWS
      3.TREE2_OUTSTATS.
4992        WHERE STATNAME='NPRIORS';
4993  NOTE: DATA statement used (Total process time):
4994        real time           0.00 seconds
4995        user cpu time       0.00 seconds
4996        system cpu time     0.00 seconds
4997        memory              309005.43k
4998        OS Memory           320880.00k
4999        Timestamp           07/01/2024 05:58:58 AM
5000        Step Count                        1  Switch Count  0
5001        Page Faults                       0
5002        Page Reclaims                     61
5003        Page Swaps                        0
5004        Voluntary Context Switches        11
5005        Involuntary Context Switches      0
5006        Block Input Operations            288
5007        Block Output Operations           0
5008
5009
5010
5011  NOTE: There were 1 observations read from the data set EMWS
      3.TREE2_VARIABLESET.
5012        WHERE (ROLE='TARGET') and (LEVEL not = 'ORDINAL') and
       USE in ('D', 'Y');
5013  NOTE: The data set WORK.TEMPTARMETA has 1 observations and
      2 variables.
5014  NOTE: DATA statement used (Total process time):
5015        real time           0.00 seconds
```

```
5016        user cpu time       0.00 seconds
5017        system cpu time     0.00 seconds
5018        memory              309005.43k
5019        OS Memory           320880.00k
5020        Timestamp           07/01/2024 05:58:58 AM
5021        Step Count                        1  Switch Count  0
5022        Page Faults                       0
5023        Page Reclaims                     129
5024        Page Swaps                        0
5025        Voluntary Context Switches        4
5026        Involuntary Context Switches      0
5027        Block Input Operations            0
5028        Block Output Operations           264
5029
5030
5031
5032 NOTE: There were 35 observations read from the data set EMW
     S3.TREE2_OUTSTATS.
5033 NOTE: The data set WORK.TEMPTARGETUSED has 35 observations
     and 3 variables.
5034 NOTE: DATA statement used (Total process time):
5035        real time           0.00 seconds
5036        user cpu time       0.00 seconds
5037        system cpu time     0.00 seconds
5038        memory              309005.43k
5039        OS Memory           320880.00k
5040        Timestamp           07/01/2024 05:58:58 AM
5041        Step Count                        1  Switch Count  0
5042        Page Faults                       0
5043        Page Reclaims                     128
5044        Page Swaps                        0
5045        Voluntary Context Switches        4
5046        Involuntary Context Switches      0
5047        Block Input Operations            0
5048        Block Output Operations           264
5049
```

```
5050
5051
5052 NOTE: There were 35 observations read from the data set WOR
     K.TEMPTARGETUSED.
5053 NOTE: 30 observations with duplicate key values were delete
     d.
5054 NOTE: The data set WORK.TEMPTARGETUSED has 5 observations a
     nd 3 variables.
5055 NOTE: PROCEDURE SORT used (Total process time):
5056       real time           0.00 seconds
5057       user cpu time       0.00 seconds
5058       system cpu time     0.00 seconds
5059       memory              309005.43k
5060       OS Memory           320880.00k
5061       Timestamp           07/01/2024 05:58:58 AM
5062       Step Count                        1  Switch Count  0
5063       Page Faults                       0
5064       Page Reclaims                     124
5065       Page Swaps                        0
5066       Voluntary Context Switches        0
5067       Involuntary Context Switches      0
5068       Block Input Operations            0
5069       Block Output Operations           264
5070
5071
5072
5073 NOTE: There were 35 observations read from the data set EMW
     S3.TREE2_OUTSTATS.
5074 NOTE: The data set WORK.TEMPOUTSTATS has 35 observations an
     d 5 variables.
5075 NOTE: PROCEDURE SORT used (Total process time):
5076       real time           0.00 seconds
5077       user cpu time       0.00 seconds
5078       system cpu time     0.00 seconds
5079       memory              309005.43k
5080       OS Memory           320880.00k
```

```
5081        Timestamp           07/01/2024 05:58:58 AM
5082        Step Count                        1  Switch Count  0
5083        Page Faults                       0
5084        Page Reclaims                     152
5085        Page Swaps                        0
5086        Voluntary Context Switches        1
5087        Involuntary Context Switches      0
5088        Block Input Operations            0
5089        Block Output Operations           272
5090
5091
5092
5093  NOTE: Input data set is already sorted, no sorting done.
5094  NOTE: PROCEDURE SORT used (Total process time):
5095        real time           0.00 seconds
5096        user cpu time       0.00 seconds
5097        system cpu time     0.00 seconds
5098        memory              309005.43k
5099        OS Memory           320880.00k
5100        Timestamp           07/01/2024 05:58:58 AM
5101        Step Count                        1  Switch Count  0
5102        Page Faults                       0
5103        Page Reclaims                     51
5104        Page Swaps                        0
5105        Voluntary Context Switches        0
5106        Involuntary Context Switches      0
5107        Block Input Operations            0
5108        Block Output Operations           0
5109
5110
5111
5112  NOTE: There were 35 observations read from the data set WOR
      K.TEMPOUTSTATS.
5113  NOTE: There were 5 observations read from the data set WORK
      .TEMPTARGETUSED.
5114  NOTE: The data set WORK.TEMPINTERVAL has 0 observations and
```

```
      7 variables.
5115 NOTE: The data set WORK.TEMPCLASS has 35 observations and 7
      variables.
5116 NOTE: DATA statement used (Total process time):
5117       real time           0.00 seconds
5118       user cpu time       0.00 seconds
5119       system cpu time     0.00 seconds
5120       memory              309005.43k
5121       OS Memory           320880.00k
5122       Timestamp           07/01/2024 05:58:58 AM
5123       Step Count                        1  Switch Count  0
5124       Page Faults                       0
5125       Page Reclaims                     236
5126       Page Swaps                        0
5127       Voluntary Context Switches        0
5128       Involuntary Context Switches      0
5129       Block Input Operations            0
5130       Block Output Operations           528
5131
5132
5133 NOTE: PROCEDURE SQL used (Total process time):
5134       real time           0.00 seconds
5135       user cpu time       0.00 seconds
5136       system cpu time     0.00 seconds
5137       memory              309005.43k
5138       OS Memory           320880.00k
5139       Timestamp           07/01/2024 05:58:58 AM
5140       Step Count                        1  Switch Count  0
5141       Page Faults                       0
5142       Page Reclaims                     64
5143       Page Swaps                        0
5144       Voluntary Context Switches        0
5145       Involuntary Context Switches      0
5146       Block Input Operations            0
5147       Block Output Operations           0
5148
```

```
5149
5150 NOTE: PROCEDURE SQL used (Total process time):
5151       real time           0.00 seconds
5152       user cpu time       0.00 seconds
5153       system cpu time     0.00 seconds
5154       memory              309005.43k
5155       OS Memory           320880.00k
5156       Timestamp           07/01/2024 05:58:58 AM
5157       Step Count                        1  Switch Count  0
5158       Page Faults                       0
5159       Page Reclaims                     60
5160       Page Swaps                        0
5161       Voluntary Context Switches        0
5162       Involuntary Context Switches      0
5163       Block Input Operations            0
5164       Block Output Operations           0
5165
5166
5167
5168 NOTE: There were 35 observations read from the data set WOR
     K.TEMPCLASS.
5169 NOTE: The data set WORK.TEMPCLASS has 35 observations and 7
      variables.
5170 NOTE: PROCEDURE SORT used (Total process time):
5171       real time           0.00 seconds
5172       user cpu time       0.00 seconds
5173       system cpu time     0.00 seconds
5174       memory              309005.43k
5175       OS Memory           320880.00k
5176       Timestamp           07/01/2024 05:58:58 AM
5177       Step Count                        1  Switch Count  0
5178       Page Faults                       0
5179       Page Reclaims                     117
5180       Page Swaps                        0
5181       Voluntary Context Switches        0
5182       Involuntary Context Switches      0
```

```
5183       Block Input Operations            0
5184       Block Output Operations           264
5185
5186
5187
5188 WARNING: The variable TARGET in the DROP, KEEP, or RENAME l
     ist has never been referenced.
5189 WARNING: The variable TARGET in the DROP, KEEP, or RENAME l
     ist has never been referenced.
5190 NOTE: There were 35 observations read from the data set WOR
     K.TEMPCLASS.
5191 NOTE: The data set WORK.TEMPN has 10 observations and 3 var
     iables.
5192 NOTE: The data set WORK.TEMPPREDICT has 5 observations and
     2 variables.
5193 NOTE: The data set WORK.TEMPPROB has 10 observations and 3
     variables.
5194 NOTE: The data set WORK.TEMPVPROB has 10 observations and 3
      variables.
5195 NOTE: The data set WORK.TEMPPROFIT has 0 observations and 4
      variables.
5196 NOTE: The data set WORK.TEMPLOSS has 0 observations and 4 v
     ariables.
5197 NOTE: DATA statement used (Total process time):
5198       real time           0.00 seconds
5199       user cpu time       0.01 seconds
5200       system cpu time     0.01 seconds
5201       memory              309005.43k
5202       OS Memory           320880.00k
5203       Timestamp           07/01/2024 05:58:58 AM
5204       Step Count                        1  Switch Count  0
5205       Page Faults                       0
5206       Page Reclaims                     462
5207       Page Swaps                        0
5208       Voluntary Context Switches        0
5209       Involuntary Context Switches      0
```

```
5210       Block Input Operations            0
5211       Block Output Operations           1584
5212
5213
5214  NOTE: PROCEDURE SQL used (Total process time):
5215       real time           0.00 seconds
5216       user cpu time       0.00 seconds
5217       system cpu time     0.00 seconds
5218       memory              309005.43k
5219       OS Memory           320880.00k
5220       Timestamp           07/01/2024 05:58:58 AM
5221       Step Count                        1  Switch Count  0
5222       Page Faults                       0
5223       Page Reclaims                     57
5224       Page Swaps                        0
5225       Voluntary Context Switches        0
5226       Involuntary Context Switches      0
5227       Block Input Operations            0
5228       Block Output Operations           0
5229
5230
5231  NOTE: PROCEDURE SQL used (Total process time):
5232       real time           0.00 seconds
5233       user cpu time       0.00 seconds
5234       system cpu time     0.00 seconds
5235       memory              309005.43k
5236       OS Memory           320880.00k
5237       Timestamp           07/01/2024 05:58:58 AM
5238       Step Count                        1  Switch Count  0
5239       Page Faults                       0
5240       Page Reclaims                     60
5241       Page Swaps                        0
5242       Voluntary Context Switches        0
5243       Involuntary Context Switches      0
5244       Block Input Operations            0
5245       Block Output Operations           0
```

```
5246
5247
5248
5249 NOTE: There were 10 observations read from the data set WOR
     K.TEMPN.
5250 NOTE: The data set WORK.TEMPN has 5 observations and 3 vari
     ables.
5251 NOTE: PROCEDURE TRANSPOSE used (Total process time):
5252       real time           0.00 seconds
5253       user cpu time       0.00 seconds
5254       system cpu time     0.00 seconds
5255       memory              309005.43k
5256       OS Memory           320880.00k
5257       Timestamp           07/01/2024 05:58:58 AM
5258       Step Count                        1  Switch Count  0
5259       Page Faults                       0
5260       Page Reclaims                     223
5261       Page Swaps                        0
5262       Voluntary Context Switches        0
5263       Involuntary Context Switches      0
5264       Block Input Operations            0
5265       Block Output Operations           528
5266
5267
5268
5269 NOTE: There were 10 observations read from the data set WOR
     K.TEMPPROB.
5270 NOTE: There were 10 observations read from the data set WOR
     K.TEMPVPROB.
5271 NOTE: The data set WORK.TEMPPROB has 10 observations and 4
     variables.
5272 NOTE: DATA statement used (Total process time):
5273       real time           0.00 seconds
5274       user cpu time       0.00 seconds
5275       system cpu time     0.00 seconds
5276       memory              309005.43k
```

```
5277        OS Memory           320880.00k
5278        Timestamp           07/01/2024 05:58:58 AM
5279        Step Count                       1  Switch Count  0
5280        Page Faults                      0
5281        Page Reclaims                    174
5282        Page Swaps                       0
5283        Voluntary Context Switches       0
5284        Involuntary Context Switches     0
5285        Block Input Operations           0
5286        Block Output Operations          264
5287
5288
5289
5290 WARNING: The variable target in the DROP, KEEP, or RENAME l
     ist has never been referenced.
5291 NOTE: There were 10 observations read from the data set WOR
     K.TEMPPROB.
5292 NOTE: There were 5 observations read from the data set WORK
     .TEMPPREDICT.
5293 NOTE: The data set WORK.TEMPPREDICT has 5 observations and
     6 variables.
5294 NOTE: DATA statement used (Total process time):
5295        real time           0.00 seconds
5296        user cpu time       0.00 seconds
5297        system cpu time     0.00 seconds
5298        memory              309005.43k
5299        OS Memory           320880.00k
5300        Timestamp           07/01/2024 05:58:58 AM
5301        Step Count                       1  Switch Count  0
5302        Page Faults                      0
5303        Page Reclaims                    402
5304        Page Swaps                       0
5305        Voluntary Context Switches       0
5306        Involuntary Context Switches     0
5307        Block Input Operations           0
5308        Block Output Operations          264
```

```
5309
5310
5311
5312 NOTE: There were 10 observations read from the data set WOR
     K.TEMPPROB.
5313 NOTE: The data set WORK.TEMPPROB has 5 observations and 2 v
     ariables.
5314 NOTE: DATA statement used (Total process time):
5315       real time           0.00 seconds
5316       user cpu time       0.01 seconds
5317       system cpu time     0.00 seconds
5318       memory              309005.43k
5319       OS Memory           320880.00k
5320       Timestamp           07/01/2024 05:58:58 AM
5321       Step Count                        1  Switch Count  0
5322       Page Faults                       0
5323       Page Reclaims                     144
5324       Page Swaps                        0
5325       Voluntary Context Switches        0
5326       Involuntary Context Switches      1
5327       Block Input Operations            0
5328       Block Output Operations           272
5329
5330
5331
5332 NOTE: There were 5 observations read from the data set WORK
     .TEMPOUTNODES.
5333 NOTE: The data set WORK.TEMPOUTNODES has 5 observations and
      26 variables.
5334 NOTE: PROCEDURE SORT used (Total process time):
5335       real time           0.00 seconds
5336       user cpu time       0.00 seconds
5337       system cpu time     0.00 seconds
5338       memory              309005.43k
5339       OS Memory           320880.00k
5340       Timestamp           07/01/2024 05:58:58 AM
```

```
5341        Step Count                         1  Switch Count  0
5342        Page Faults                        0
5343        Page Reclaims                      152
5344        Page Swaps                         0
5345        Voluntary Context Switches         0
5346        Involuntary Context Switches       0
5347        Block Input Operations             0
5348        Block Output Operations            272
5349
5350
5351
5352 NOTE: Numeric values have been converted to character value
     s at the places given by: (Line):(Column).
5353        1141:196
5354 NOTE: There were 5 observations read from the data set WORK
     .TEMPOUTNODES.
5355 NOTE: There were 5 observations read from the data set WORK
     .TEMPTARGETUSED.
5356 NOTE: There were 5 observations read from the data set WORK
     .TEMPN.
5357 NOTE: There were 5 observations read from the data set WORK
     .TEMPPREDICT.
5358 NOTE: There were 5 observations read from the data set WORK
     .TEMPPROB.
5359 NOTE: The data set EMWS3.TREE2_TREE_PLOT has 5 observations
      and 30 variables.
5360 NOTE: DATA statement used (Total process time):
5361        real time           0.01 seconds
5362        user cpu time       0.00 seconds
5363        system cpu time     0.00 seconds
5364        memory              309005.43k
5365        OS Memory           320880.00k
5366        Timestamp           07/01/2024 05:58:58 AM
5367        Step Count                         1  Switch Count  0
5368        Page Faults                        0
5369        Page Reclaims                      982
```

```
5370        Page Swaps                          0
5371        Voluntary Context Switches          20
5372        Involuntary Context Switches        1
5373        Block Input Operations              0
5374        Block Output Operations             264
5375
5376
5377
5378 NOTE: There were 35 observations read from the data set EMW
     S3.TREE2_OUTSTATS.
5379 NOTE: The data set WORK.TEMPPROB has 10 observations and 3
     variables.
5380 NOTE: DATA statement used (Total process time):
5381        real time           0.00 seconds
5382        user cpu time       0.00 seconds
5383        system cpu time     0.00 seconds
5384        memory              309005.43k
5385        OS Memory           320880.00k
5386        Timestamp           07/01/2024 05:58:58 AM
5387        Step Count                          1  Switch Count  0
5388        Page Faults                         0
5389        Page Reclaims                       128
5390        Page Swaps                          0
5391        Voluntary Context Switches          3
5392        Involuntary Context Switches        0
5393        Block Input Operations              0
5394        Block Output Operations             264
5395
5396
5397
5398 NOTE: There were 10 observations read from the data set WOR
     K.TEMPPROB.
5399 NOTE: The data set WORK.TEMPPROB has 10 observations and 3
     variables.
5400 NOTE: PROCEDURE SORT used (Total process time):
5401        real time           0.00 seconds
```

```
5402        user cpu time       0.00 seconds
5403        system cpu time     0.01 seconds
5404        memory              309005.43k
5405        OS Memory           320880.00k
5406        Timestamp           07/01/2024 05:58:58 AM
5407        Step Count                        1  Switch Count  0
5408        Page Faults                       0
5409        Page Reclaims                     117
5410        Page Swaps                        0
5411        Voluntary Context Switches        0
5412        Involuntary Context Switches      0
5413        Block Input Operations            0
5414        Block Output Operations           264
5415
5416
5417
5418 NOTE: There were 10 observations read from the data set WOR
     K.TEMPPROB.
5419 NOTE: The data set WORK.TEMPPROB has 5 observations and 3 v
     ariables.
5420 NOTE: PROCEDURE TRANSPOSE used (Total process time):
5421        real time           0.00 seconds
5422        user cpu time       0.00 seconds
5423        system cpu time     0.00 seconds
5424        memory              309005.43k
5425        OS Memory           320880.00k
5426        Timestamp           07/01/2024 05:58:58 AM
5427        Step Count                        1  Switch Count  0
5428        Page Faults                       0
5429        Page Reclaims                     197
5430        Page Swaps                        0
5431        Voluntary Context Switches        0
5432        Involuntary Context Switches      0
5433        Block Input Operations            0
5434        Block Output Operations           528
5435
```

```
5436
5437
5438 NOTE: There were 5 observations read from the data set WORK
     .TEMPPROB.
5439 NOTE: The data set WORK.TEMPPROB has 5 observations and 3 v
     ariables.
5440 NOTE: PROCEDURE SORT used (Total process time):
5441       real time           0.00 seconds
5442       user cpu time       0.00 seconds
5443       system cpu time     0.00 seconds
5444       memory              309005.43k
5445       OS Memory           320880.00k
5446       Timestamp           07/01/2024 05:58:58 AM
5447       Step Count                        1  Switch Count  0
5448       Page Faults                       0
5449       Page Reclaims                     115
5450       Page Swaps                        0
5451       Voluntary Context Switches        0
5452       Involuntary Context Switches      0
5453       Block Input Operations            0
5454       Block Output Operations           264
5455
5456
5457
5458 NOTE: There were 5 observations read from the data set WORK
     .TEMPOUTNODES.
5459 NOTE: There were 5 observations read from the data set WORK
     .TEMPPROB.
5460 NOTE: The data set WORK.TEMPOUTNODES has 5 observations and
      26 variables.
5461 NOTE: DATA statement used (Total process time):
5462       real time           0.00 seconds
5463       user cpu time       0.00 seconds
5464       system cpu time     0.00 seconds
5465       memory              309005.43k
5466       OS Memory           320880.00k
```

```
5467        Timestamp           07/01/2024 05:58:58 AM
5468        Step Count                        1  Switch Count  0
5469        Page Faults                       0
5470        Page Reclaims                     171
5471        Page Swaps                        0
5472        Voluntary Context Switches        0
5473        Involuntary Context Switches      0
5474        Block Input Operations            0
5475        Block Output Operations           264
5476
5477
5478
5479 NOTE: There were 5 observations read from the data set WORK
     .TEMPOUTNODES.
5480 NOTE: The data set WORK.TEMPNODES has 5 observations and 26
      variables.
5481 NOTE: PROCEDURE SORT used (Total process time):
5482        real time           0.00 seconds
5483        user cpu time       0.00 seconds
5484        system cpu time     0.00 seconds
5485        memory              309005.43k
5486        OS Memory           320880.00k
5487        Timestamp           07/01/2024 05:58:58 AM
5488        Step Count                        1  Switch Count  0
5489        Page Faults                       0
5490        Page Reclaims                     150
5491        Page Swaps                        0
5492        Voluntary Context Switches        0
5493        Involuntary Context Switches      0
5494        Block Input Operations            0
5495        Block Output Operations           272
5496
5497
5498
5499 NOTE: There were 3 observations read from the data set WORK
     .TEMPNODES.
```

```
5500        WHERE leaf not = .;
5501  NOTE: The data set WORK.TEMPNODES has 3 observations and 8
      variables.
5502  NOTE: DATA statement used (Total process time):
5503        real time           0.00 seconds
5504        user cpu time       0.00 seconds
5505        system cpu time     0.00 seconds
5506        memory              309005.43k
5507        OS Memory           320880.00k
5508        Timestamp           07/01/2024 05:58:58 AM
5509        Step Count                        1  Switch Count  0
5510        Page Faults                       0
5511        Page Reclaims                     133
5512        Page Swaps                        0
5513        Voluntary Context Switches        0
5514        Involuntary Context Switches      0
5515        Block Input Operations            0
5516        Block Output Operations           264
5517
5518
5519
5520  NOTE: There were 3 observations read from the data set WORK
      .TEMPNODES.
5521  NOTE: The data set WORK.TEMPNODES has 3 observations and 8
      variables.
5522  NOTE: PROCEDURE SORT used (Total process time):
5523        real time           0.00 seconds
5524        user cpu time       0.00 seconds
5525        system cpu time     0.00 seconds
5526        memory              309005.43k
5527        OS Memory           320880.00k
5528        Timestamp           07/01/2024 05:58:58 AM
5529        Step Count                        1  Switch Count  0
5530        Page Faults                       0
5531        Page Reclaims                     115
5532        Page Swaps                        0
```

```
5533       Voluntary Context Switches        0
5534       Involuntary Context Switches      0
5535       Block Input Operations            0
5536       Block Output Operations           264
5537
5538
5539
5540 NOTE: There were 5 observations read from the data set EMWS
     3.TREE2_TREE_PLOT.
5541 NOTE: There were 3 observations read from the data set WORK
     .TEMPNODES.
5542 NOTE: The data set EMWS3.TREE2_TREE_PLOT has 5 observations
      and 37 variables.
5543 NOTE: DATA statement used (Total process time):
5544       real time           0.02 seconds
5545       user cpu time       0.01 seconds
5546       system cpu time     0.01 seconds
5547       memory              309005.43k
5548       OS Memory           320880.00k
5549       Timestamp           07/01/2024 05:58:58 AM
5550       Step Count                        1  Switch Count  0
5551       Page Faults                       0
5552       Page Reclaims                     1877
5553       Page Swaps                        0
5554       Voluntary Context Switches        40
5555       Involuntary Context Switches      0
5556       Block Input Operations            288
5557       Block Output Operations           264
5558
5559
5560
5561 NOTE: The file WORK.TEMP (memtype=DATA) was not found, but
     appears on a DELETE statement.
5562 NOTE: The file WORK.TEMPSTATS (memtype=DATA) was not found,
      but appears on a DELETE statement.
5563 NOTE: Deleting WORK.ABOVETEXT (memtype=DATA).
```

```
5564 NOTE: Deleting WORK.BELOWTEXT (memtype=DATA).
5565 NOTE: Deleting WORK.TEMPOUTNODES (memtype=DATA).
5566 NOTE: Deleting WORK.TEMPMISSING (memtype=DATA).
5567 NOTE: Deleting WORK.TEMPNODES (memtype=DATA).
5568
5569 NOTE: PROCEDURE DATASETS used (Total process time):
5570       real time           0.00 seconds
5571       user cpu time       0.00 seconds
5572       system cpu time     0.00 seconds
5573       memory              309005.43k
5574       OS Memory           320880.00k
5575       Timestamp           07/01/2024 05:58:58 AM
5576       Step Count                        1  Switch Count  0
5577       Page Faults                       0
5578       Page Reclaims                     54
5579       Page Swaps                        0
5580       Voluntary Context Switches        0
5581       Involuntary Context Switches      0
5582       Block Input Operations            0
5583       Block Output Operations           8
5584
5585
5586
5587 NOTE: The data set WORK.EM_USER_REPORT has 132 observations
      and 4 variables.
5588 NOTE: DATA statement used (Total process time):
5589       real time           0.02 seconds
5590       user cpu time       0.03 seconds
5591       system cpu time     0.00 seconds
5592       memory              309005.43k
5593       OS Memory           320880.00k
5594       Timestamp           07/01/2024 05:58:58 AM
5595       Step Count                        1  Switch Count  0
5596       Page Faults                       0
5597       Page Reclaims                     176
5598       Page Swaps                        0
```

```
5599       Voluntary Context Switches        0
5600       Involuntary Context Switches      0
5601       Block Input Operations            0
5602       Block Output Operations           264
5603
5604
5605
5606 NOTE: There were 132 observations read from the data set WO
     RK.EM_USER_REPORT.
5607 NOTE: The data set WORK.EM_USER_REPORT has 264 observations
      and 4 variables.
5608 NOTE: DATA statement used (Total process time):
5609       real time           0.02 seconds
5610       user cpu time       0.02 seconds
5611       system cpu time     0.00 seconds
5612       memory              309005.43k
5613       OS Memory           320880.00k
5614       Timestamp           07/01/2024 05:58:58 AM
5615       Step Count                        1  Switch Count  0
5616       Page Faults                       0
5617       Page Reclaims                     196
5618       Page Swaps                        0
5619       Voluntary Context Switches        0
5620       Involuntary Context Switches      0
5621       Block Input Operations            0
5622       Block Output Operations           264
5623
5624
5625
5626 NOTE: There were 264 observations read from the data set WO
     RK.EM_USER_REPORT.
5627 NOTE: The data set WORK.EM_USER_REPORT has 397 observations
      and 4 variables.
5628 NOTE: DATA statement used (Total process time):
5629       real time           0.02 seconds
5630       user cpu time       0.03 seconds
```

```
5631        system cpu time     0.00 seconds
5632        memory              309005.43k
5633        OS Memory           320880.00k
5634        Timestamp           07/01/2024 05:58:58 AM
5635        Step Count                        1  Switch Count  0
5636        Page Faults                       0
5637        Page Reclaims                     197
5638        Page Swaps                        0
5639        Voluntary Context Switches        0
5640        Involuntary Context Switches      0
5641        Block Input Operations            0
5642        Block Output Operations           520
5643
5644
5645
5646 NOTE: There were 5 observations read from the data set EMWS
     3.TREE2_TREE_PLOT.
5647 NOTE: The data set WORK.T has 5 observations and 37 variabl
     es.
5648 NOTE: PROCEDURE SORT used (Total process time):
5649        real time           0.00 seconds
5650        user cpu time       0.00 seconds
5651        system cpu time     0.00 seconds
5652        memory              309005.43k
5653        OS Memory           320880.00k
5654        Timestamp           07/01/2024 05:58:58 AM
5655        Step Count                        1  Switch Count  0
5656        Page Faults                       0
5657        Page Reclaims                     151
5658        Page Swaps                        0
5659        Voluntary Context Switches        8
5660        Involuntary Context Switches      0
5661        Block Input Operations            288
5662        Block Output Operations           272
5663
5664
```

```
5665
5666 NOTE: There were 2 observations read from the data set WORK
     .T.
5667 NOTE: DATA statement used (Total process time):
5668       real time           0.00 seconds
5669       user cpu time       0.00 seconds
5670       system cpu time     0.00 seconds
5671       memory              309005.43k
5672       OS Memory           320880.00k
5673       Timestamp           07/01/2024 05:58:58 AM
5674       Step Count                        1  Switch Count  0
5675       Page Faults                       0
5676       Page Reclaims                     61
5677       Page Swaps                        0
5678       Voluntary Context Switches        0
5679       Involuntary Context Switches      0
5680       Block Input Operations            0
5681       Block Output Operations           0
5682
5683
5684
5685 NOTE: There were 5 observations read from the data set WORK
     .T.
5686 NOTE: The data set WORK.T has 5 observations and 37 variabl
     es.
5687 NOTE: DATA statement used (Total process time):
5688       real time           0.00 seconds
5689       user cpu time       0.00 seconds
5690       system cpu time     0.00 seconds
5691       memory              309005.43k
5692       OS Memory           320880.00k
5693       Timestamp           07/01/2024 05:58:58 AM
5694       Step Count                        1  Switch Count  0
5695       Page Faults                       0
5696       Page Reclaims                     467
5697       Page Swaps                        0
```

```
5698        Voluntary Context Switches        2
5699        Involuntary Context Switches      75
5700        Block Input Operations            0
5701        Block Output Operations           264
5702
5703
5704
5705  NOTE: There were 3 observations read from the data set WORK
      .T.
5706        WHERE tprob not = .;
5707  NOTE: The PROCEDURE PRINT printed page 5.
5708  NOTE: PROCEDURE PRINT used (Total process time):
5709        real time           0.00 seconds
5710        user cpu time       0.00 seconds
5711        system cpu time     0.00 seconds
5712        memory              309005.43k
5713        OS Memory           320880.00k
5714        Timestamp           07/01/2024 05:58:58 AM
5715        Step Count                        1  Switch Count  0
5716        Page Faults                       0
5717        Page Reclaims                     57
5718        Page Swaps                        0
5719        Voluntary Context Switches        0
5720        Involuntary Context Switches      0
5721        Block Input Operations            0
5722        Block Output Operations           0
5723
5724
5725
5726  NOTE: Numeric values have been converted to character value
      s at the places given by: (Line):(Column).
5727        306:141
5728  NOTE: There were 5 observations read from the data set EMWS
      3.TREE2_OUTTOPOLOGY.
5729  NOTE: DATA statement used (Total process time):
5730        real time           0.00 seconds
```

```
5731        user cpu time       0.01 seconds
5732        system cpu time     0.00 seconds
5733        memory              309005.43k
5734        OS Memory           320880.00k
5735        Timestamp           07/01/2024 05:58:58 AM
5736        Step Count                        1  Switch Count  0
5737        Page Faults                       0
5738        Page Reclaims                     60
5739        Page Swaps                        0
5740        Voluntary Context Switches        9
5741        Involuntary Context Switches      0
5742        Block Input Operations            288
5743        Block Output Operations           0
5744
5745
5746
5747 NOTE: There were 397 observations read from the data set WO
     RK.EM_USER_REPORT.
5748 NOTE: The data set WORK.EM_USER_REPORT has 529 observations
      and 4 variables.
5749 NOTE: DATA statement used (Total process time):
5750        real time           0.02 seconds
5751        user cpu time       0.02 seconds
5752        system cpu time     0.01 seconds
5753        memory              309005.43k
5754        OS Memory           320880.00k
5755        Timestamp           07/01/2024 05:58:58 AM
5756        Step Count                        1  Switch Count  0
5757        Page Faults                       0
5758        Page Reclaims                     196
5759        Page Swaps                        0
5760        Voluntary Context Switches        0
5761        Involuntary Context Switches      14
5762        Block Input Operations            0
5763        Block Output Operations           520
5764
```

```
5765
5766
5767 NOTE: There were 529 observations read from the data set WO
     RK.EM_USER_REPORT.
5768 NOTE: The data set WORK.EM_USER_REPORT has 662 observations
      and 4 variables.
5769 NOTE: DATA statement used (Total process time):
5770       real time           0.02 seconds
5771       user cpu time       0.03 seconds
5772       system cpu time     0.00 seconds
5773       memory              309005.43k
5774       OS Memory           320880.00k
5775       Timestamp           07/01/2024 05:58:58 AM
5776       Step Count                       1  Switch Count  0
5777       Page Faults                      0
5778       Page Reclaims                    197
5779       Page Swaps                       0
5780       Voluntary Context Switches       0
5781       Involuntary Context Switches     11
5782       Block Input Operations           0
5783       Block Output Operations          776
5784
5785
5786
5787 NOTE: There were 662 observations read from the data set WO
     RK.EM_USER_REPORT.
5788 NOTE: The data set WORK.EM_USER_REPORT has 794 observations
      and 4 variables.
5789 NOTE: DATA statement used (Total process time):
5790       real time           0.03 seconds
5791       user cpu time       0.03 seconds
5792       system cpu time     0.00 seconds
5793       memory              309005.43k
5794       OS Memory           320880.00k
5795       Timestamp           07/01/2024 05:58:58 AM
5796       Step Count                       1  Switch Count  0
```

```
5797        Page Faults                          0
5798        Page Reclaims                        227
5799        Page Swaps                           0
5800        Voluntary Context Switches           0
5801        Involuntary Context Switches         39
5802        Block Input Operations               0
5803        Block Output Operations              776
5804
5805
5806  19621
5807  19622  *-------------------------------------------------
      ---------*;
5808  19623  * End REPORT: Tree2;
5809  19624  *-------------------------------------------------
      ---------*;
5810
5811  19625  /* Reset EM Options */
5812  19626  options formchar="|----|+|---+=|-/\<>*";
5813  19627  options nocenter ls=256 ps=10000;
5814  19628  goptions reset=all device=GIF NODISPLAY;
5815
5816  19629  proc sort data=WORK.EM_USER_REPORT;
5817  19630  by ID VIEW;
5818  19631  run;
5819
5820  NOTE: There were 794 observations read from the data set WO
      RK.EM_USER_REPORT.
5821  NOTE: The data set WORK.EM_USER_REPORT has 794 observations
       and 4 variables.
5822  NOTE: PROCEDURE SORT used (Total process time):
5823        real time           0.00 seconds
5824        user cpu time       0.01 seconds
5825        system cpu time     0.00 seconds
5826        memory              309005.43k
5827        OS Memory           320880.00k
5828        Timestamp           07/01/2024 05:58:58 AM
```

```
5829       Step Count                         1  Switch Count  0
5830       Page Faults                        0
5831       Page Reclaims                      183
5832       Page Swaps                         0
5833       Voluntary Context Switches         0
5834       Involuntary Context Switches       0
5835       Block Input Operations             0
5836       Block Output Operations            776
5837
5838
5839 19632  proc sort data=EMWS3.Part2_CMeta_TRAIN out=WORK.SUBS
     ETINMETA;
5840 19633  by NAME;
5841 19634  run;
5842
5843 NOTE: There were 8 observations read from the data set EMWS
     3.PART2_CMETA_TRAIN.
5844 NOTE: The data set WORK.SUBSETINMETA has 8 observations and
      20 variables.
5845 NOTE: PROCEDURE SORT used (Total process time):
5846       real time           0.00 seconds
5847       user cpu time       0.00 seconds
5848       system cpu time     0.00 seconds
5849       memory              309005.43k
5850       OS Memory           320880.00k
5851       Timestamp           07/01/2024 05:58:58 AM
5852       Step Count                         1  Switch Count  0
5853       Page Faults                        0
5854       Page Reclaims                      150
5855       Page Swaps                         0
5856       Voluntary Context Switches         2
5857       Involuntary Context Switches       0
5858       Block Input Operations             0
5859       Block Output Operations            272
5860
5861
```

```
5862 19635  proc sort data=EMWS3.Tree2_VariableSet out=WORK.SUBS
     ETVARSET(keep=NAME REPORT);
5863 19636  by NAME;
5864 19637  run;
5865
5866 NOTE: There were 8 observations read from the data set EMWS
     3.TREE2_VARIABLESET.
5867 NOTE: The data set WORK.SUBSETVARSET has 8 observations and
      2 variables.
5868 NOTE: PROCEDURE SORT used (Total process time):
5869       real time           0.00 seconds
5870       user cpu time       0.00 seconds
5871       system cpu time     0.00 seconds
5872       memory              309005.43k
5873       OS Memory           320880.00k
5874       Timestamp           07/01/2024 05:58:58 AM
5875       Step Count                        1  Switch Count  0
5876       Page Faults                       0
5877       Page Reclaims                     150
5878       Page Swaps                        0
5879       Voluntary Context Switches        5
5880       Involuntary Context Switches      0
5881       Block Input Operations            0
5882       Block Output Operations           272
5883
5884
5885 19638  data WORK.ASSESS_META;
5886 19639  merge WORK.SUBSETINMETA WORK.SUBSETVARSET;
5887 19640  by NAME;
5888 19641  run;
5889
5890 NOTE: There were 8 observations read from the data set WORK
     .SUBSETINMETA.
5891 NOTE: There were 8 observations read from the data set WORK
     .SUBSETVARSET.
5892 NOTE: The data set WORK.ASSESS_META has 8 observations and
```

```
     20 variables.
5893 NOTE: DATA statement used (Total process time):
5894       real time           0.00 seconds
5895       user cpu time       0.00 seconds
5896       system cpu time     0.00 seconds
5897       memory              309005.43k
5898       OS Memory           320880.00k
5899       Timestamp           07/01/2024 05:58:58 AM
5900       Step Count                        1  Switch Count  0
5901       Page Faults                       0
5902       Page Reclaims                     173
5903       Page Swaps                        0
5904       Voluntary Context Switches        0
5905       Involuntary Context Switches      0
5906       Block Input Operations            0
5907       Block Output Operations           264
5908
5909
5910 19642  data EM_temp_assessMeta;
5911 19643  set EMWS3.Tree2_CMeta_TRAIN;
5912 19644  where role in('DECISION', 'PREDICT', 'RESIDUAL', 'CL
     ASSIFICATION', 'ASSESS', 'COST');
5913 19645  run;
5914
5915 NOTE: There were 12 observations read from the data set EMW
     S3.TREE2_CMETA_TRAIN.
5916       WHERE role in ('ASSESS', 'CLASSIFICATION', 'COST', 'D
     ECISION', 'PREDICT', 'RESIDUAL');
5917 NOTE: The data set WORK.EM_TEMP_ASSESSMETA has 12 observati
     ons and 21 variables.
5918 NOTE: DATA statement used (Total process time):
5919       real time           0.00 seconds
5920       user cpu time       0.00 seconds
5921       system cpu time     0.00 seconds
5922       memory              309005.43k
5923       OS Memory           320880.00k
```

```
5924        Timestamp           07/01/2024 05:58:58 AM
5925        Step Count                        1  Switch Count  0
5926        Page Faults                       0
5927        Page Reclaims                     125
5928        Page Swaps                        0
5929        Voluntary Context Switches        8
5930        Involuntary Context Switches      0
5931        Block Input Operations            288
5932        Block Output Operations           264
5933
5934
5935  19646  data EM_temp_assessdata;
5936  19647  set EMWS3.Tree2_TRAIN(keep=
5937  19648  F_IMP_Churn
5938  19649  I_IMP_Churn
5939  19650  P_IMP_Churn0
5940  19651  P_IMP_Churn1
5941  19652  Q_IMP_Churn0
5942  19653  Q_IMP_Churn1
5943  19654  R_IMP_Churn0
5944  19655  R_IMP_Churn1
5945  19656  U_IMP_Churn
5946  19657  V_IMP_Churn0
5947  19658  V_IMP_Churn1
5948  19659  _WARN_
5949  19660  IMP_Churn
5950  19661  );
5951  19662  run;
5952
5953  NOTE: Variable _WARN_ is uninitialized.
5954  NOTE: View EMWS3.TREE2_TRAIN.VIEW used (Total process time)
      :
5955        real time           0.04 seconds
5956        user cpu time       0.02 seconds
5957        system cpu time     0.03 seconds
5958        memory              309005.43k
```

```
5959        OS Memory           320880.00k
5960        Timestamp           07/01/2024 05:58:58 AM
5961        Step Count                      1  Switch Count  5
5962        Page Faults                     0
5963        Page Reclaims                   16913
5964        Page Swaps                      0
5965        Voluntary Context Switches      11
5966        Involuntary Context Switches    0
5967        Block Input Operations          0
5968        Block Output Operations         2568
5969
5970 NOTE: There were 17497 observations read from the data set
     EMWS3.PART2_TRAIN.
5971 NOTE: There were 17497 observations read from the data set
     EMWS3.TREE2_TRAIN.
5972 NOTE: The data set WORK.EM_TEMP_ASSESSDATA has 17497 observ
     ations and 13 variables.
5973 NOTE: DATA statement used (Total process time):
5974        real time           0.05 seconds
5975        user cpu time       0.02 seconds
5976        system cpu time     0.04 seconds
5977        memory              309005.43k
5978        OS Memory           320880.00k
5979        Timestamp           07/01/2024 05:58:58 AM
5980        Step Count                      1  Switch Count  6
5981        Page Faults                     0
5982        Page Reclaims                   16983
5983        Page Swaps                      0
5984        Voluntary Context Switches      14
5985        Involuntary Context Switches    0
5986        Block Input Operations          0
5987        Block Output Operations         4104
5988
5989
5990
5991
```

```
5992
5993
5994
5995
5996
5997
5998
5999
6000
6001
6002
6003
6004
6005 23944   data EM_temp_assessMeta;
6006 23945   set EMWS3.Tree2_CMeta_TRAIN;
6007 23946   where role in('DECISION', 'PREDICT', 'RESIDUAL', 'C
     LASSIFICATION', 'ASSESS', 'COST');
6008 23947   run;
6009
6010 NOTE: There were 12 observations read from the data set EMW
     S3.TREE2_CMETA_TRAIN.
6011       WHERE role in ('ASSESS', 'CLASSIFICATION', 'COST', 'D
     ECISION', 'PREDICT', 'RESIDUAL');
6012 NOTE: The data set WORK.EM_TEMP_ASSESSMETA has 12 observati
     ons and 21 variables.
6013 NOTE: DATA statement used (Total process time):
6014       real time           0.00 seconds
6015       user cpu time       0.00 seconds
6016       system cpu time     0.00 seconds
6017       memory              309005.43k
6018       OS Memory           320880.00k
6019       Timestamp           07/01/2024 05:58:58 AM
6020       Step Count                        1  Switch Count  0
6021       Page Faults                       0
6022       Page Reclaims                     125
6023       Page Swaps                        0
```

```
6024        Voluntary Context Switches        3
6025        Involuntary Context Switches      1
6026        Block Input Operations            0
6027        Block Output Operations           272
6028
6029
6030  23948   data EM_temp_assessdata;
6031  23949   set EMWS3.Tree2_VALIDATE(keep=
6032  23950   F_IMP_Churn
6033  23951   I_IMP_Churn
6034  23952   P_IMP_Churn0
6035  23953   P_IMP_Churn1
6036  23954   Q_IMP_Churn0
6037  23955   Q_IMP_Churn1
6038  23956   R_IMP_Churn0
6039  23957   R_IMP_Churn1
6040  23958   U_IMP_Churn
6041  23959   V_IMP_Churn0
6042  23960   V_IMP_Churn1
6043  23961   _WARN_
6044  23962   IMP_Churn
6045  23963   );
6046  23964   run;
6047
6048  NOTE: Variable _WARN_ is uninitialized.
6049  NOTE: View EMWS3.TREE2_VALIDATE.VIEW used (Total process ti
      me):
6050        real time           0.04 seconds
6051        user cpu time       0.02 seconds
6052        system cpu time     0.03 seconds
6053        memory              309005.43k
6054        OS Memory           320880.00k
6055        Timestamp           07/01/2024 05:58:58 AM
6056        Step Count                        1  Switch Count  5
6057        Page Faults                       0
6058        Page Reclaims                     16619
```

```
6059        Page Swaps                          0
6060        Voluntary Context Switches          11
6061        Involuntary Context Switches        0
6062        Block Input Operations              0
6063        Block Output Operations             8
6064
6065  NOTE: There were 7502 observations read from the data set E
      MWS3.PART2_VALIDATE.
6066  NOTE: There were 7502 observations read from the data set E
      MWS3.TREE2_VALIDATE.
6067  NOTE: The data set WORK.EM_TEMP_ASSESSDATA has 7502 observa
      tions and 13 variables.
6068  NOTE: DATA statement used (Total process time):
6069        real time           0.05 seconds
6070        user cpu time       0.02 seconds
6071        system cpu time     0.04 seconds
6072        memory              309005.43k
6073        OS Memory           320880.00k
6074        Timestamp           07/01/2024 05:58:58 AM
6075        Step Count                          1  Switch Count  6
6076        Page Faults                         0
6077        Page Reclaims                       16724
6078        Page Swaps                          0
6079        Voluntary Context Switches          19
6080        Involuntary Context Switches        0
6081        Block Input Operations              0
6082        Block Output Operations             1800
6083
6084
6085
6086
6087
6088
6089
6090
6091
```

```
6092
6093
6094
6095
6096
6097
6098
6099
6100 28255   %let _cn = %sysfunc(getoption(CENTER));
6101 28256   options nocenter;
6102 28257   proc print data=EMWS3.Tree2_EMREPORTFIT noobs label
     ;
6103 28258   var STAT LABEL TRAIN
6104 28259   VALIDATE
6105 28260   ;
6106 28261   by TARGET TARGETLABEL;
6107 28262   title9 ' ';
6108 28263   title10 "%sysfunc(sasmsg(sashelp.dmine, rpt_fitstat
     _title  , NOQUOTE))";
6109 28264   run;
6110
6111 NOTE: There were 8 observations read from the data set EMWS
     3.TREE2_EMREPORTFIT.
6112 NOTE: The PROCEDURE PRINT printed page 6.
6113 NOTE: PROCEDURE PRINT used (Total process time):
6114       real time           0.00 seconds
6115       user cpu time       0.01 seconds
6116       system cpu time     0.01 seconds
6117       memory              309005.43k
6118       OS Memory           320880.00k
6119       Timestamp           07/01/2024 05:58:59 AM
6120       Step Count                        1  Switch Count  1
6121       Page Faults                       0
6122       Page Reclaims                     181
6123       Page Swaps                        0
6124       Voluntary Context Switches        4
```

```
6125        Involuntary Context Switches      0
6126        Block Input Operations            0
6127        Block Output Operations           0
6128
6129
6130  28265   title10;
6131  28266   options &_cn;
6132
6133  28267   proc sort data=EMWS3.Tree2_EMCLASSIFICATION nothrea
      ds;
6134  28268   by DATAROLE TARGET TARGETLABEL;
6135  28269   run;
6136
6137  NOTE: There were 8 observations read from the data set EMWS
      3.TREE2_EMCLASSIFICATION.
6138  NOTE: The data set EMWS3.TREE2_EMCLASSIFICATION has 8 obser
      vations and 12 variables.
6139  NOTE: PROCEDURE SORT used (Total process time):
6140        real time           0.01 seconds
6141        user cpu time       0.00 seconds
6142        system cpu time     0.00 seconds
6143        memory              309005.43k
6144        OS Memory           320880.00k
6145        Timestamp           07/01/2024 05:58:59 AM
6146        Step Count                        1  Switch Count  0
6147        Page Faults                       0
6148        Page Reclaims                     116
6149        Page Swaps                        0
6150        Voluntary Context Switches        27
6151        Involuntary Context Switches      0
6152        Block Input Operations            0
6153        Block Output Operations           264
6154
6155
6156  28270   %let _cn = %sysfunc(getoption(CENTER));
6157  28271   options nocenter;
```

```
6158 28272   proc print data=EMWS3.Tree2_EMCLASSIFICATION noobs
     label;
6159 28273   var from into pct_row pct_col count percent
6160 28274   ;
6161 28275   by DATAROLE TARGET TARGETLABEL;
6162 28276   label FROM = "%sysfunc(sasmsg(sashelp.dmine, rpt_ta
     rget_vlabel ,     NOQUOTE))";
6163 28277   label INTO = "%sysfunc(sasmsg(sashelp.dmine, rpt_ou
     tcome_vlabel ,    NOQUOTE))";
6164 28278   label PCT_ROW = "%sysfunc(sasmsg(sashelp.dmine, rpt
     _targetpct_vlabel ,  NOQUOTE))";
6165 28279   label PCT_COL = "%sysfunc(sasmsg(sashelp.dmine, rpt
     _outcomepct_vlabel , NOQUOTE))";
6166 28280   label COUNT = "%sysfunc(sasmsg(sashelp.dmine, rpt_c
     ount_vlabel ,      NOQUOTE))";
6167 28281   label PERCENT = "%sysfunc(sasmsg(sashelp.dmine, rpt
     _totalpct_vlabel ,   NOQUOTE))";
6168 28282   where _TYPE_='PREDICTION';
6169 28283   title9 ' ';
6170 28284   title10 "%sysfunc(sasmsg(sashelp.dmine, rpt_classif
     ication_title    , NOQUOTE))";
6171 28285   run;
6172
6173 NOTE: There were 8 observations read from the data set EMWS
     3.TREE2_EMCLASSIFICATION.
6174       WHERE _TYPE_='PREDICTION';
6175 NOTE: The PROCEDURE PRINT printed page 7.
6176 NOTE: PROCEDURE PRINT used (Total process time):
6177       real time           0.00 seconds
6178       user cpu time       0.00 seconds
6179       system cpu time     0.00 seconds
6180       memory              309005.43k
6181       OS Memory           320880.00k
6182       Timestamp           07/01/2024 05:58:59 AM
6183       Step Count                        1  Switch Count  0
6184       Page Faults                       0
```

```
6185        Page Reclaims                       856
6186        Page Swaps                          0
6187        Voluntary Context Switches          11
6188        Involuntary Context Switches        0
6189        Block Input Operations              288
6190        Block Output Operations             0
6191
6192
6193  28286   title9;
6194  28287   title10;
6195  28288   options &_cn;
6196
6197  28289   %let _cn = %sysfunc(getoption(CENTER));
6198  28290   options nocenter;
6199  28291   data EMWS3.Tree2_EMEVENTREPORT;
6200  28292   length DATAROLE TARGET $32 TARGETLABEL $200 FALSENE
      VENT TRUENEVENT FALSEEVENT TRUEEVENT 8;
6201  28293   label DATAROLE = "%sysfunc(sasmsg(sashelp.dmine, rp
      t_datarole_vlabel ,    NOQUOTE))" TARGET = "%sysfunc(sasmsg
      (sashelp.dmine, rpt_target_vlabel ,      NOQUOTE))" TARGETL
      ABEL = "%sysfunc(sasmsg(sashelp.dmine, meta_targetlabel_vla
      bel, NOQUOTE))"
6202  28293 ! FALSEEVENT
6203  28294   = "%sysfunc(sasmsg(sashelp.dmine, rpt_falseevent_vl
      abel ,  NOQUOTE))" FALSENEVENT = "%sysfunc(sasmsg(sashelp.d
      mine, rpt_falsenevent_vlabel , NOQUOTE))" TRUEEVENT = "%sys
      func(sasmsg(sashelp.dmine, rpt_trueevent_vlabel ,   NOQUOTE
      ))" TRUENEVENT =
6204  28295       "%sysfunc(sasmsg(sashelp.dmine, rpt_truenevent_v
      label ,  NOQUOTE))";
6205  28296   FALSEEVENT=0;
6206  28297   FALSENEVENT=0;
6207  28298   TRUEEVENT=0;
6208  28299   TRUENEVENT=0;
6209  28300   set EMWS3.Tree2_EMEVENTREPORT;
6210  28301   run;
```

```
6211
6212 NOTE: There were 2 observations read from the data set EMWS
     3.TREE2_EMEVENTREPORT.
6213 NOTE: The data set EMWS3.TREE2_EMEVENTREPORT has 2 observat
     ions and 7 variables.
6214 NOTE: DATA statement used (Total process time):
6215       real time           0.01 seconds
6216       user cpu time       0.01 seconds
6217       system cpu time     0.00 seconds
6218       memory              309005.43k
6219       OS Memory           320880.00k
6220       Timestamp           07/01/2024 05:58:59 AM
6221       Step Count                        1  Switch Count  0
6222       Page Faults                       0
6223       Page Reclaims                     923
6224       Page Swaps                        0
6225       Voluntary Context Switches        39
6226       Involuntary Context Switches      0
6227       Block Input Operations            288
6228       Block Output Operations           264
6229
6230
6231 28302   proc print data=EMWS3.Tree2_EMEVENTREPORT noobs lab
     el;
6232 28303   title9 ' ';
6233 28304   title10 "%sysfunc(sasmsg(sashelp.dmine, rpt_eventta
     ble_title    , NOQUOTE))";
6234 28305   by notsorted DATAROLE notsorted TARGET notsorted TA
     RGETLABEL;
6235 28306   run;
6236
6237 NOTE: There were 2 observations read from the data set EMWS
     3.TREE2_EMEVENTREPORT.
6238 NOTE: The PROCEDURE PRINT printed page 8.
6239 NOTE: PROCEDURE PRINT used (Total process time):
6240       real time           0.00 seconds
```

```
6241        user cpu time       0.00 seconds
6242        system cpu time     0.01 seconds
6243        memory              309005.43k
6244        OS Memory           320880.00k
6245        Timestamp           07/01/2024 05:58:59 AM
6246        Step Count                        1  Switch Count  0
6247        Page Faults                       0
6248        Page Reclaims                     172
6249        Page Swaps                        0
6250        Voluntary Context Switches        12
6251        Involuntary Context Switches      0
6252        Block Input Operations            288
6253        Block Output Operations           0
6254
6255
6256 28307   title10;
6257 28308   options &_cn;
6258
6259 28309   proc datasets library=EMWS3 nolist;
6260 28310   modify Tree2_EMRANK;
6261 28311   label target = "%sysfunc(sasmsg(sashelp.dmine, rpt_
     targetvar_vlabel ,   NOQUOTE))";
6262 28312   label datarole = "%sysfunc(sasmsg(sashelp.dmine, rp
     t_datarole_vlabel ,    NOQUOTE))";
6263 28313   run;
6264
6265 NOTE: MODIFY was successful for EMWS3.TREE2_EMRANK.DATA.
6266 28314   quit;
6267
6268 NOTE: PROCEDURE DATASETS used (Total process time):
6269        real time           0.00 seconds
6270        user cpu time       0.00 seconds
6271        system cpu time     0.00 seconds
6272        memory              309005.43k
6273        OS Memory           320880.00k
6274        Timestamp           07/01/2024 05:58:59 AM
```

```
6275        Step Count                         1  Switch Count  0
6276        Page Faults                        0
6277        Page Reclaims                      350
6278        Page Swaps                         0
6279        Voluntary Context Switches         12
6280        Involuntary Context Switches       0
6281        Block Input Operations             0
6282        Block Output Operations            536
6283
6284
6285  28315   %let _cn = %sysfunc(getoption(CENTER));
6286  28316   options nocenter;
6287  28317   proc print data=EMWS3.Tree2_EMRANK label noobs;
6288  28318   var
6289  28319   decile gain lift liftc resp respc N _meanP_;
6290  28320   by
6291  28321   notsorted DATAROLE
6292  28322   notsorted TARGET
6293  28323   notsorted TARGETLABEL
6294  28324   ;
6295  28325   title9 ' ';
6296  28326   title10 "%sysfunc(sasmsg(sashelp.dmine, rpt_scorera
      nking_title , NOQUOTE))";
6297  28327   run;
6298
6299  NOTE: There were 40 observations read from the data set EMW
      S3.TREE2_EMRANK.
6300  NOTE: The PROCEDURE PRINT printed page 9.
6301  NOTE: PROCEDURE PRINT used (Total process time):
6302        real time           0.00 seconds
6303        user cpu time       0.01 seconds
6304        system cpu time     0.00 seconds
6305        memory              309005.43k
6306        OS Memory           320880.00k
6307        Timestamp           07/01/2024 05:58:59 AM
6308        Step Count                         1  Switch Count  0
```

```
6309        Page Faults                          0
6310        Page Reclaims                        173
6311        Page Swaps                           0
6312        Voluntary Context Switches           10
6313        Involuntary Context Switches         1
6314        Block Input Operations               544
6315        Block Output Operations              0
6316
6317
6318  28328   title10;
6319  28329   options &_cn;
6320
6321  28330   proc datasets library=EMWS3 nolist;
6322  28331   modify Tree2_EMSCOREDIST;
6323  28332   label target = "%sysfunc(sasmsg(sashelp.dmine, rpt_
      targetvar_vlabel ,      NOQUOTE))";
6324  28333   label datarole = "%sysfunc(sasmsg(sashelp.dmine, rp
      t_datarole_vlabel ,    NOQUOTE))";
6325  28334   run;
6326
6327  NOTE: MODIFY was successful for EMWS3.TREE2_EMSCOREDIST.DAT
      A.
6328  28335   quit;
6329
6330  NOTE: PROCEDURE DATASETS used (Total process time):
6331        real time           0.01 seconds
6332        user cpu time       0.00 seconds
6333        system cpu time     0.00 seconds
6334        memory              309005.43k
6335        OS Memory           320880.00k
6336        Timestamp           07/01/2024 05:58:59 AM
6337        Step Count                       1  Switch Count  0
6338        Page Faults                      0
6339        Page Reclaims                    352
6340        Page Swaps                       0
6341        Voluntary Context Switches       86
```

```
6342        Involuntary Context Switches      1
6343        Block Input Operations            0
6344        Block Output Operations           536
6345
6346
```