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/* CIND 119 Final Project */

/* Import Data */

PROC import DATAFILE= '/home/u63311549/TMU-CIND119/TMU-CIND119-Final/churn.csv'
    DBMS= CSV replace
    OUT= churn;
    GETNAMES= YES;

/* Examine data */
PROC print CONTENTS= 'Examine Data' data= churn(obs = 10);
title 'Show the first 10 rows for brief look';
RUN;
title; /*delete the title*/

/* Renaming columns -if needed */

/* rename time1=temp1 time2=temp2 time3=temp3; */

ods graphics on;

/* Decision Tree - All 20 vars + GINI + without pruning */

PROC hpsplit data= churn;
/* A SAS name literal is a name token that is expressed as a string within quotation marks, followed by the upper- or lowercase letter n. */
    class 'churn?'n "Int'l Plan"n 'VMail Plan'n
    /* The following are to be removed WITH Variable selection*/
    state 'Area Code'n Phone;
    model 'churn?'n = 'Account Length'n "Int'l Plan"n 'VMail Plan'n 'VMail Message'n
    'Day Mins'n 'Day Calls'n 'Eve Mins'n 'Eve Calls'n 'Night Mins'n 'Night Calls'n
    'Intl Mins'n 'Intl Calls'n 'CustServ Calls'n
    /* The following are to be removed WITH Variable selection */
    state 'Area Code'n Phone
    'Day Charge'n 'Eve Charge'n 'Night Charge'n 'Intl Charge'n;
    grow GINI;
    partition fraction(validate=0.3 seed=123);
    prune OFF;

RUN;

/* Decision Tree - 13 vars + GINI + without pruning */

PROC hpsplit data= churn;
/* A SAS name literal is a name token that is expressed as a string within quotation marks, followed by the upper- or lowercase letter n. */
    class 'churn?'n "Int'l Plan"n 'VMail Plan'n ;
    model 'churn?'n = 'Account Length'n "Int'l Plan"n 'VMail Plan'n 'VMail Message'n
    'Day Mins'n 'Day Calls'n 'Eve Mins'n 'Eve Calls'n 'Night Mins'n 'Night Calls'n
    'Intl Mins'n 'Intl Calls'n 'CustServ Calls'n ;
    grow GINI;
    partition fraction(validate=0.3 seed=123);
    prune OFF;
/* where is 'Vmail Massage' ? */
RUN;

/* Decision Tree - 13 vars + GINI + with costcomplexity pruning */

PROC hpsplit data= churn;
/* A SAS name literal is a name token that is expressed as a string within quotation marks, followed by the upper- or lowercase letter n. */
    class 'churn?'n "Int'l Plan"n 'VMail Plan'n ;
    model 'churn?'n = 'Account Length'n "Int'l Plan"n 'VMail Plan'n 'VMail Message'n
    'Day Mins'n 'Day Calls'n 'Eve Mins'n 'Eve Calls'n 'Night Mins'n 'Night Calls'n
    'Intl Mins'n 'Intl Calls'n 'CustServ Calls'n ;
    grow GINI;
    partition fraction(validate=0.3 seed=123);
    prune costcomplexity;
/* where is 'Vmail Massage' ? */
RUN;



/* Naive Bayes - All Vars except Phone Number; without prescreening and variable selection */
/* There can be more than one input statement, one for NOMinal vars and the other for INTerval vars */
PROC hpbnet data= churn structure=Naive maxparents=1 prescreening= 0 varselect= 0;
     target 'churn?'n;
     input "Int'l Plan"n 'VMail Plan'n
     /* The following are to be removed WITH Variable selection */
    state 'Area Code'n ;
     /* There can be more than one input statement, one for NOMinal vars and the other for INTerval vars */
     input 'Account Length'n 'VMail Message'n
    'Day Mins'n 'Day Calls'n 'Eve Mins'n 'Eve Calls'n 'Night Mins'n 'Night Calls'n
    'Intl Mins'n 'Intl Calls'n 'CustServ Calls'n
    /* The following are to be removed WITH Variable selection */
    'Day Charge'n 'Eve Charge'n 'Night Charge'n 'Intl Charge'n/level=INT;
     output network=network fit=fit PRED=prediction PARAMETER=parameter
     VARSELECT=varselect VARINFO=varinfo VARLEVEL=varlevel;
     partition fraction(validate=0.3 seed=123);

RUN;

proc print data=network noobs label;
RUN;

proc print data=fit noobs label;
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