ACADGILD

PROJECT-II

DATA ANALYTICS

Sandeep Challa | Churn Prediction | 22-11-2017

Basic Data Cleaning and Exploring the Data Set

For splitting the data set into a Train and Test Dataset, Package I used is “catools”

Thus,

- Train_DF has 2592 Observations
- Test_DF has 741 Observations

Hypothesis testing

Using T-test,

Null Hypo: There is no significant difference between average number of customer churns and Account_length

Alternate Hypo: There is a significant difference between average number of customer churns and Account_length

Therefore as the p-value is less than 0.05, “we will reject null hypothesis and establish the fact that there is significant difference between average customer churns and customer service calls”.

LOGISTIC REGRESSION MODELING

datafile_glm<- glm(Churn~.,train_DF,family = "binomial")

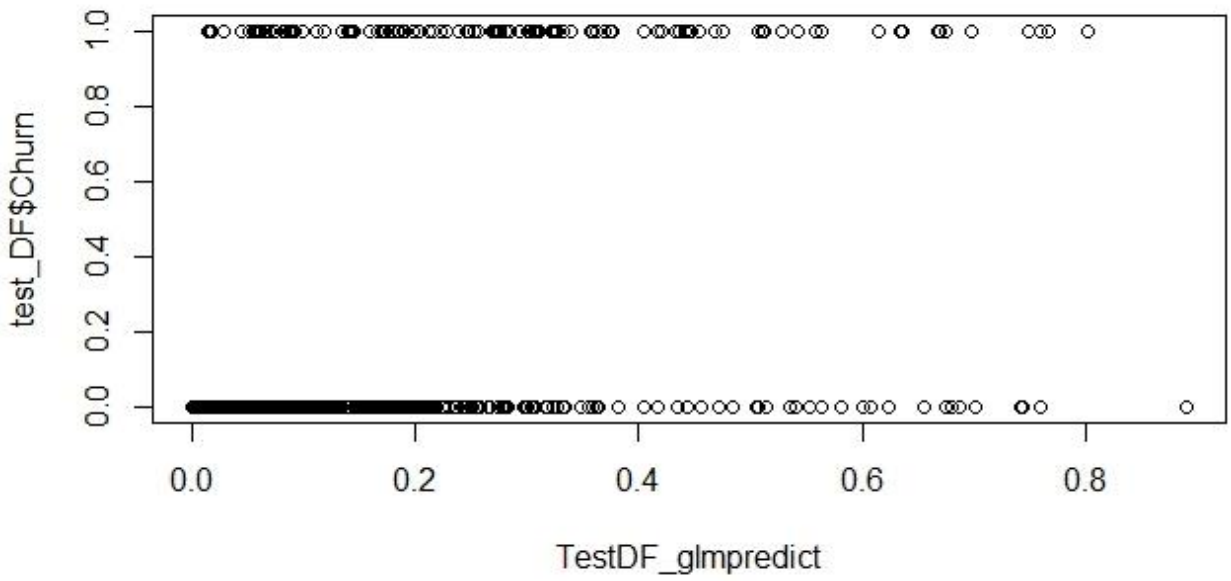
Independent variables with p-value <0.05 will be affecting the regression model relatively more than the ones with p-value>0.05

- Null Deviance is greater than Residual Deviance, which is better sign
- AIC value is also in control

Prediction of datafile_glm on Train_DF

TestDF_glmpredict<- predict(datafile_glm,test_DF,type = "response")

plot(test_DF$Churn~TestDF_glmpredict)



Checking with the threshold value of 0.50

table_testDF<- table(Actual=test_DF$Churn,Predicted=TestDF_glmpredict>0.5)

outcome1=floor(TestDF_glmpredict+0.50)

table(outcome1)

Accuracy of the Model

accuracy_testDF=(607+27)/(607+20+27+88)

Therefore,

Accuracy = **85.444% (test_DF)**

DECISION TREE MODELING

Using the packages

- Rpart
- Rpart.plot

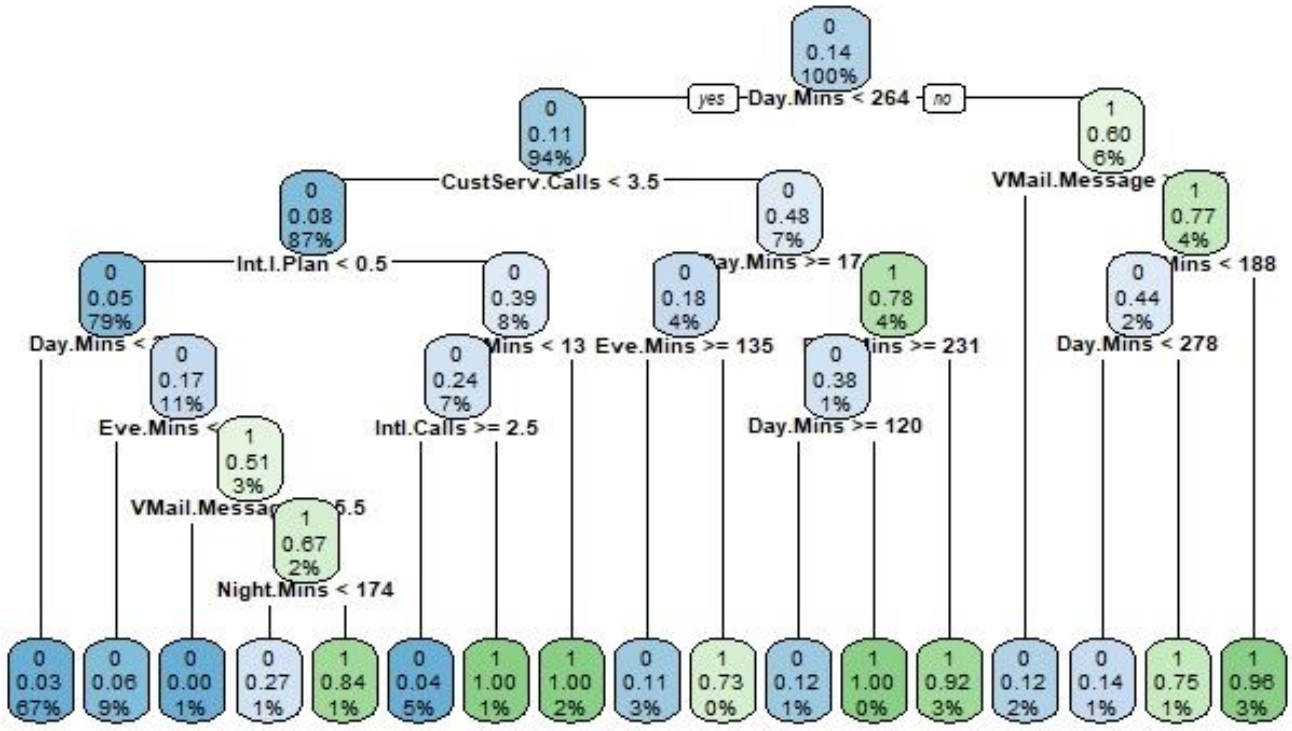
Running the model:

datafile_Decisiontree<- rpart(Churn~.,data = train_DF,method = "class")

plot(datafile_Decisiontree,cex=0.5)

text(datafile_Decisiontree,cex=0.5)

rpart.plot(datafile_Decisiontree,cex=0.6)



Predict Decision Tree Model on Test_DF

DecisionTree_Predict_TestDF<- predict(datafile_Decisiontree,test_DF,type = "class")

Confusion Matrix

confusionMatrix(DecisionTree_Predict_TestDF,test_DF$Churn)

Hence,

- Accuracy of Decision Tree Model on Test DF = **93**.13%
- Sensitivity= **0.9777**
- specificity= **0.6783**

ROC - AUC

Packages

- InformationValue
- pRoc

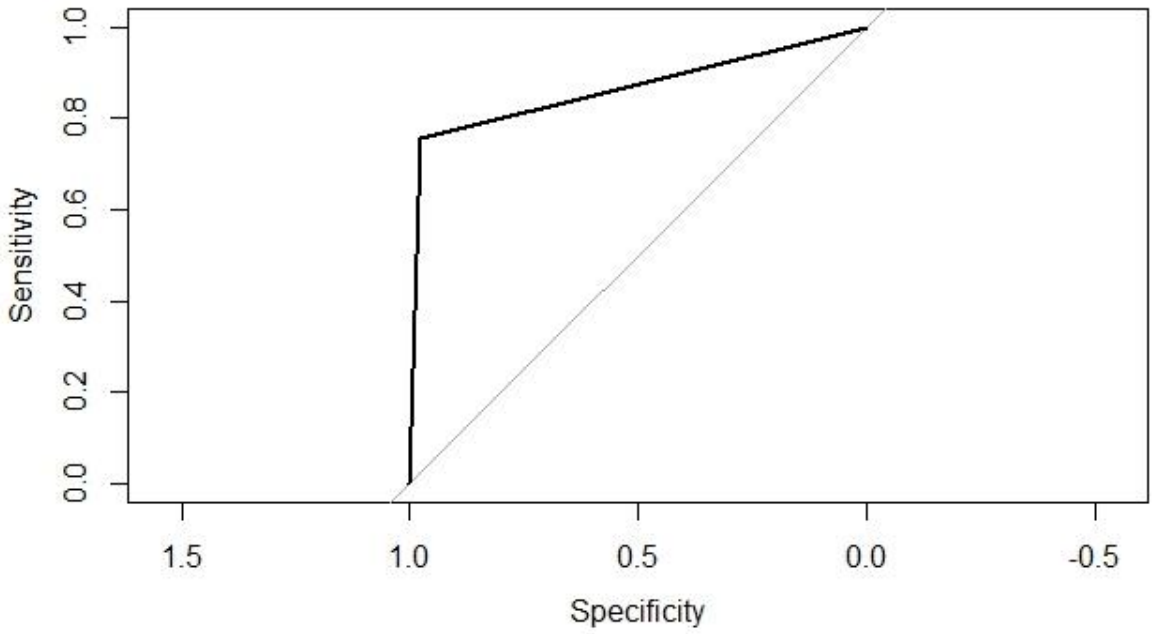
rpartpredict_TestDF<- predict(datafile_Decisiontree,test_DF,type = "vector")

AUC_TestDF<-auc(test_DF$Churn,rpartpredict_TestDF)

Thus,

- AUC is **82.8%**

plot(roc(test_DF$Churn,rpartpredict_TestDF))



RANDOM FOREST MODELING

Datafile_RF_TrainDF<-randomForest(Churn~.,data = train_DF,ntrees=500,do.trace=100)

Datafile_RF_TrainDF$predicted

Datafile_RF_TrainDF$importance

Prediction

RFpredict_TestDF<- predict(Datafile_RF_TrainDF,test_DF,type = "class")

table(Actual=test_DF$Churn,Predicted= RFpredict_TestDF>0.5)

RFpredict_TestDF$predicted

Accuracy

accuracy_RF_TestDF<- (620+78)/(620+7+78+37)

Accuracy of Random Forest Model on Test DF = **94.07008%**

Confusion Matrix

confusionMatrix(RFpredict_TestDF>0.50,test_DF$Churn)

getTree(Datafile_RF_TrainDF,k=40,labelVar = TRUE)

NEURAL NETWORKS MODELING

Packages used

- nnet
- neuralnet
- caret

Running the model:

datafile_nnet= nnet(Churn~.,data=train_DF,size=5,maxit=1000)

summary(datafile_nnet)

Predict Neural Networks Model on Test_DF

TestDF_nnetpredict=predict(datafile_nnet, type = "raw")

Confusion Matrix

confusionMatrix(TestDF_nnetpredict,test_DF$Churn)

Accuracy from Confusion Matrix = **85.26%**

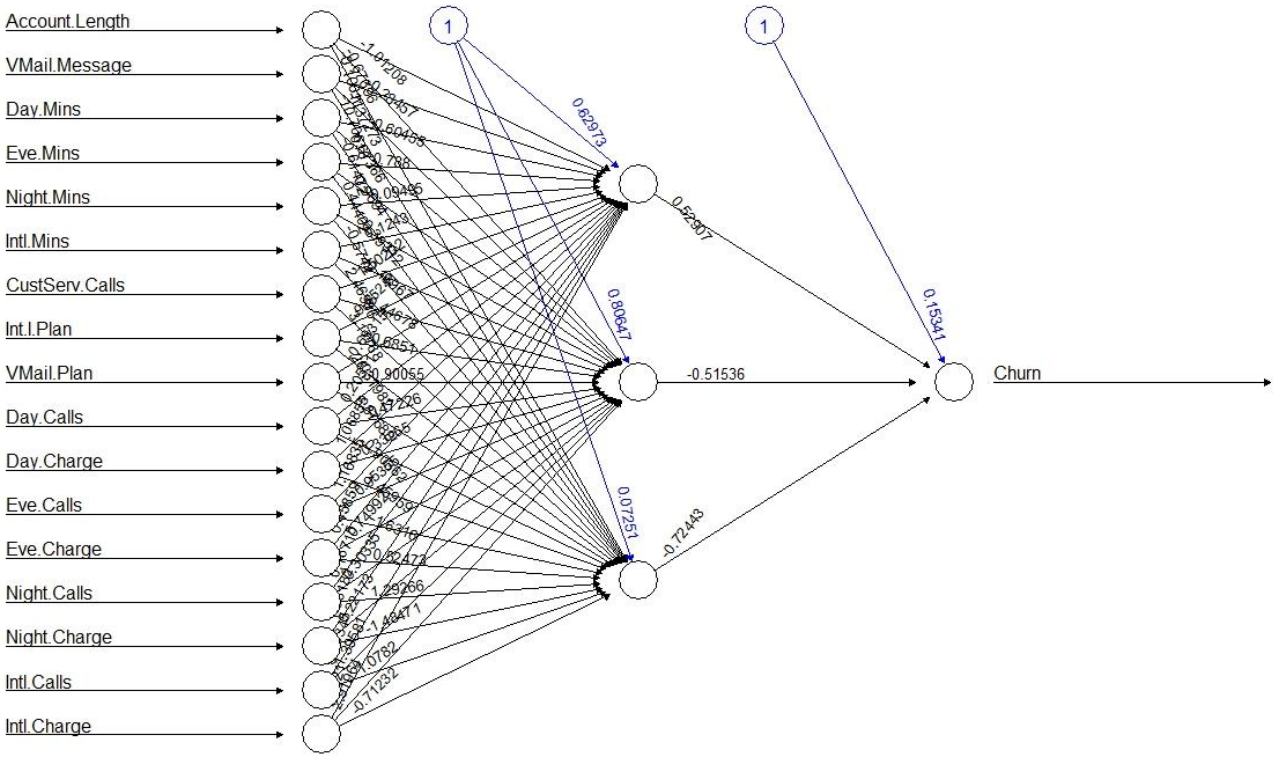
Plotting Neural Network

Datafile_neuralnet=neuralnet(Churn~Account.Length+VMail.Message+Day.Mins+Eve.Mins+Night.Mins+Intl.Mins+CustServ.Calls+Int.l.Plan+VMail.Plan+Day.Calls+Day.Charge+Eve.Calls+Eve.Charge+Night.Calls+Night.Charge+Intl.Calls+Intl.Charge, data=train_DF, hidden=3)

plot(Datafile_neuralnet)

Datafile_TestDF_neuralnet=neuralnet(Churn~Account.Length+VMail.Message+Day.Mins+Eve.Mins+Night.Mins+Intl.Mins+CustServ.Calls+Int.l.Plan+VMail.Plan+Day.Calls+Day.Charge+Eve.Calls+Eve.Charge+Night.Calls+Night.Charge+Intl.Calls+Intl.Charge, data=test_DF, hidden=3)

plot(Datafile_TestDF_neuralnet)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Night.Mins
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Int.l.Plan
VMail.Plan
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Eve.Charge
Night.Calls
Night.Charge
Intl.Calls
Intl.Charge
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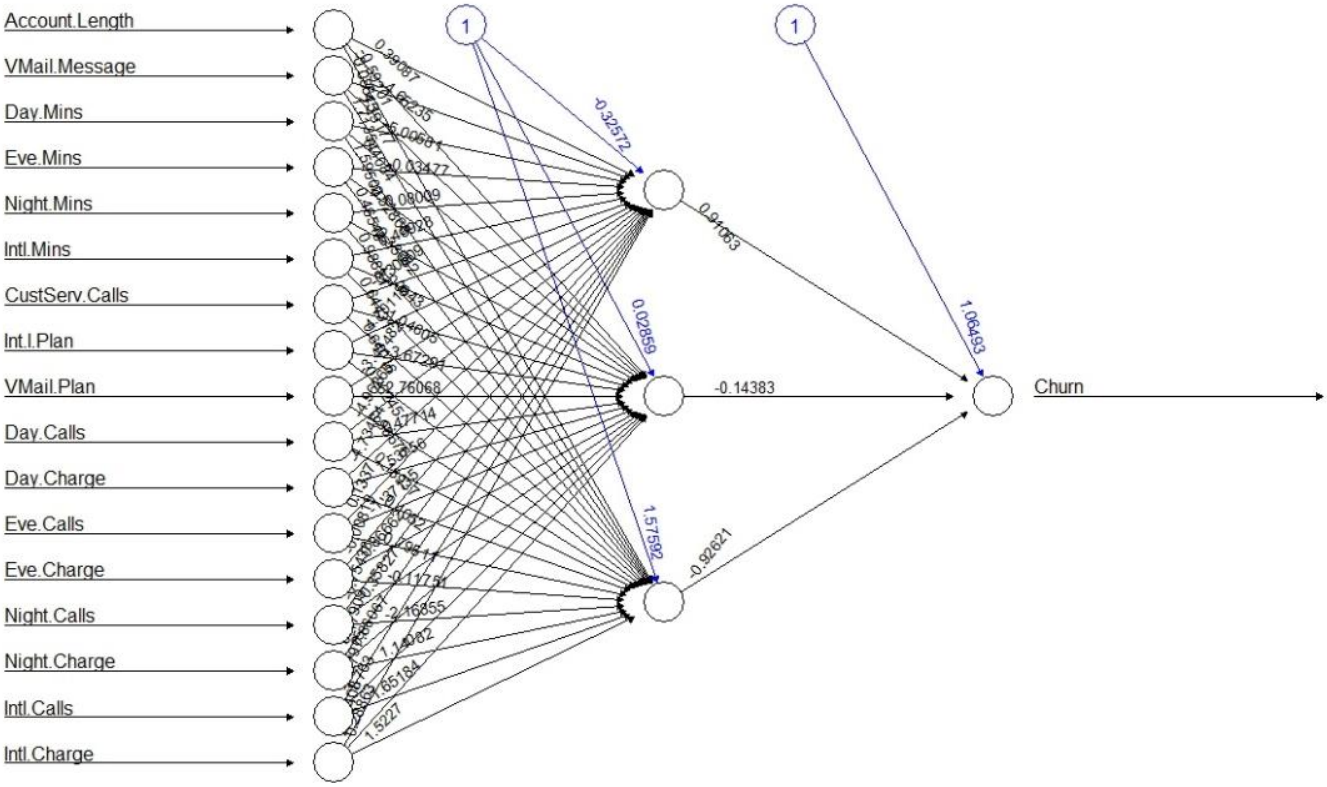
Churn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VMail.Plan
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1.06493
Churn

STARTING THE SERVER

For integrating R with Tableau, Package used is

- Rserve