Stay Alert!
The Ford Challenge

—2011 kaggle competition

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EXST 7152 Midterm Project
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Agenda

Background

Data Desciption

Data Preprocessing

Evaluation

Models

Results

Summary

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https://images.google.com/

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30 independent variables
604329 observations

- ✓**Physiological (8)** **P1, P2, ……, P8**
- ✓**Environmental (11)** **E1, E2, ……, E11**
- ✓**Vehicular (11)** **V1, V2, ……, V11**

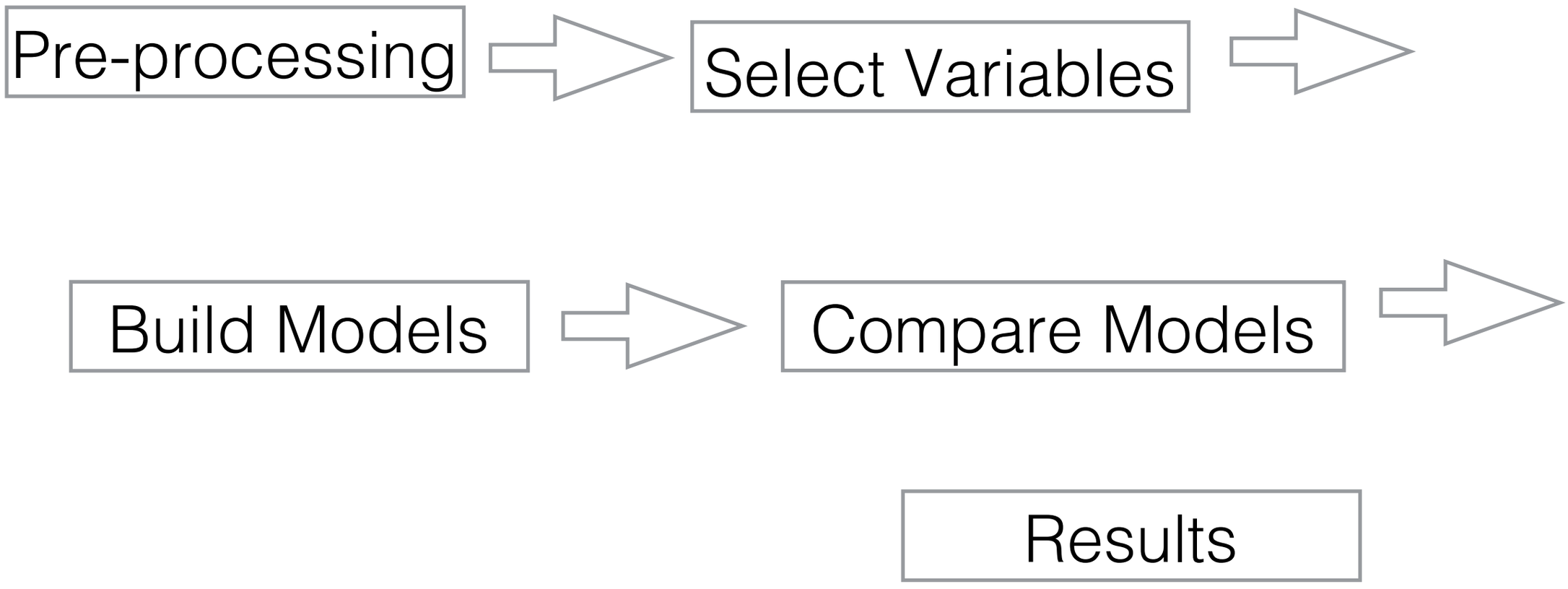
Goal:

Predict response variable “IsAlert”

- IsAlert = 1 if the driver is alert
- IsAlert = 0 if the driver is not alert

https://www.kaggle.com/c/stayalert/data.

Workflow


Pre-processing
Select Variables
Build Models
Compare Models
Results

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Types of bad data:

1. missing values: NA, Unknow, NULL
2. Typos: 0 (numeric), negative values, possibility>1

Methods:

Data Deletion: easy to implement and fast

Data Imputation: complicated but more accurate

Here, **<0.1%** missing values, use data deletion

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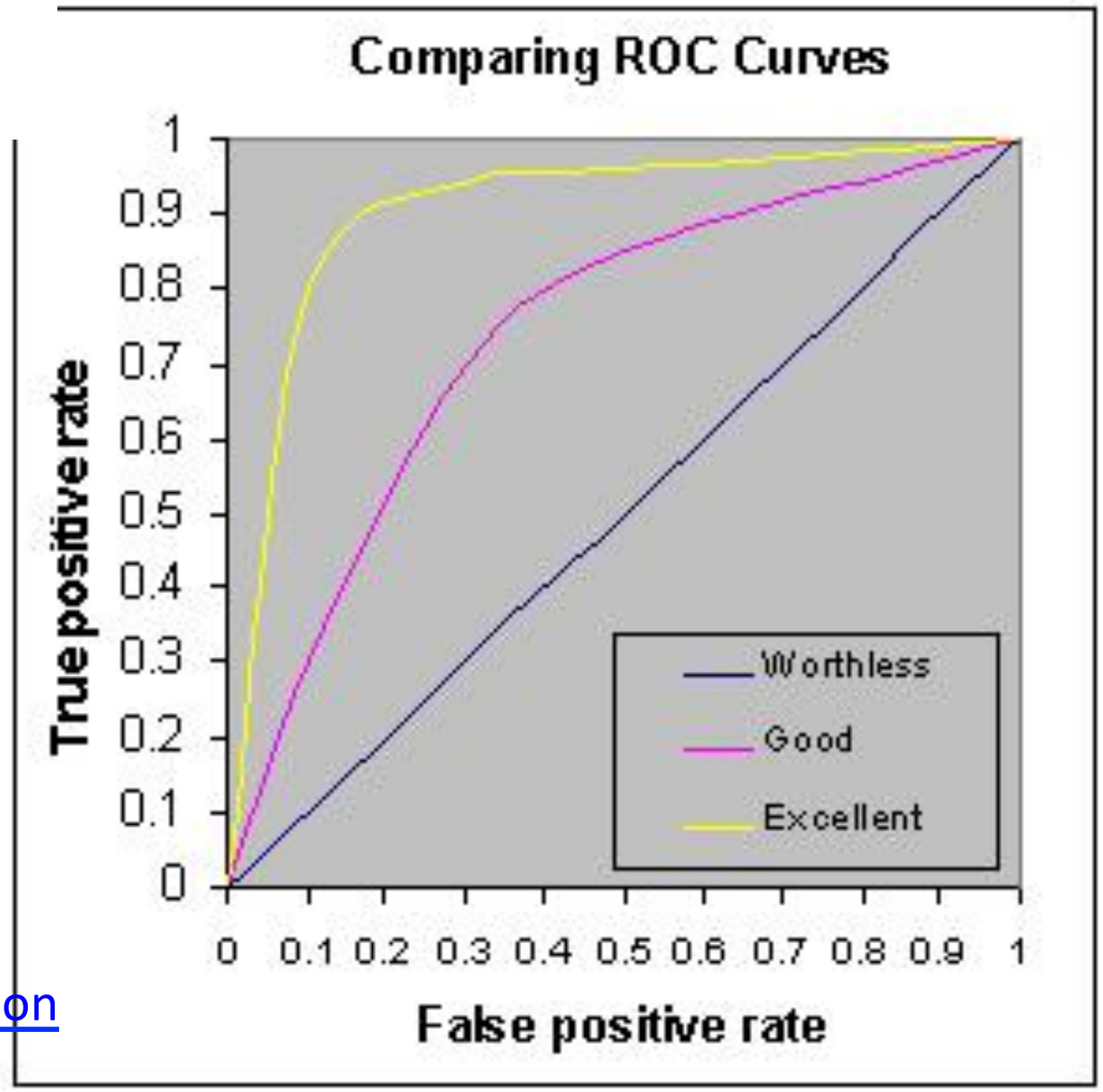
	p' (Predicted)	n' (Predicted)
P (Actual)	True Positive	False Negative
n (Actual)	False Positive	True Negative

AUC Score

ROC Curve



https://www.kaggle.com/c/stayalert/details/Evaluation

http://gim.unmc.edu/dxtests/roc3.htm

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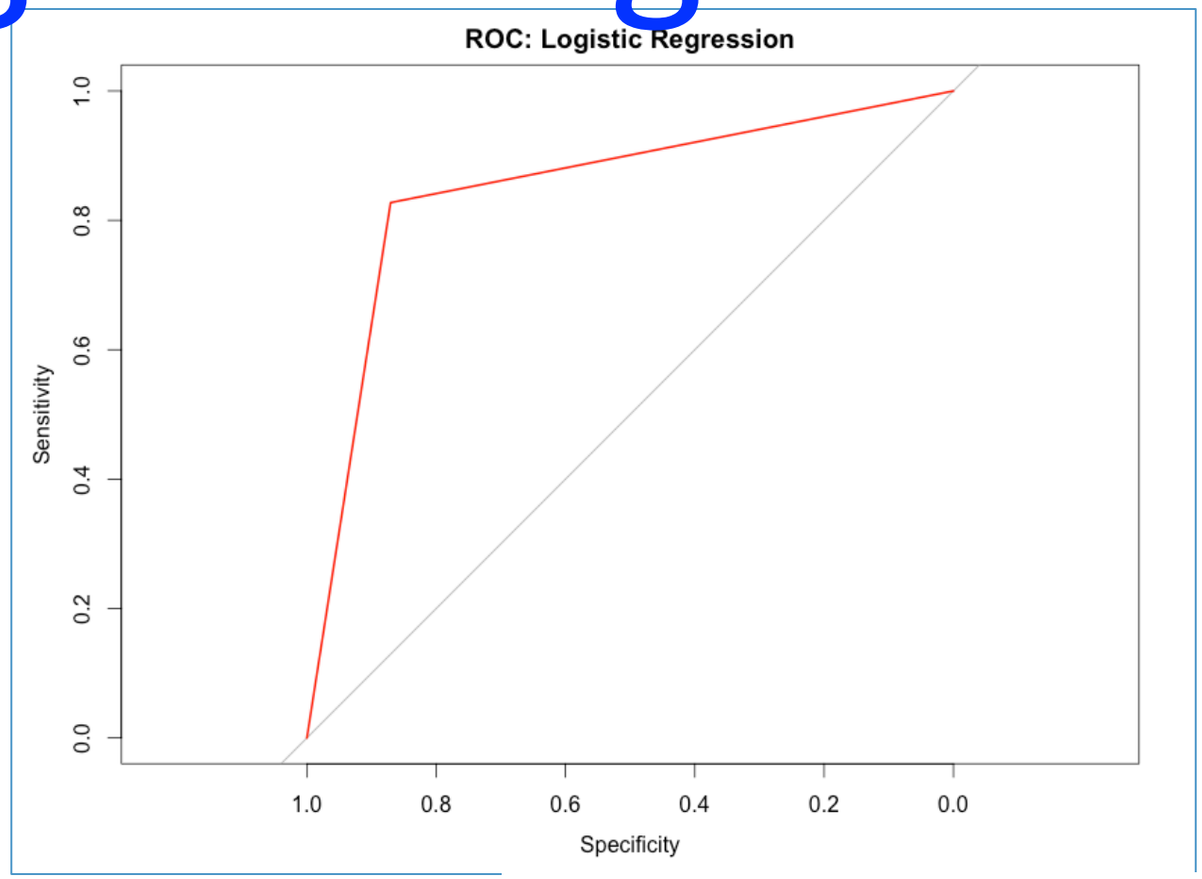
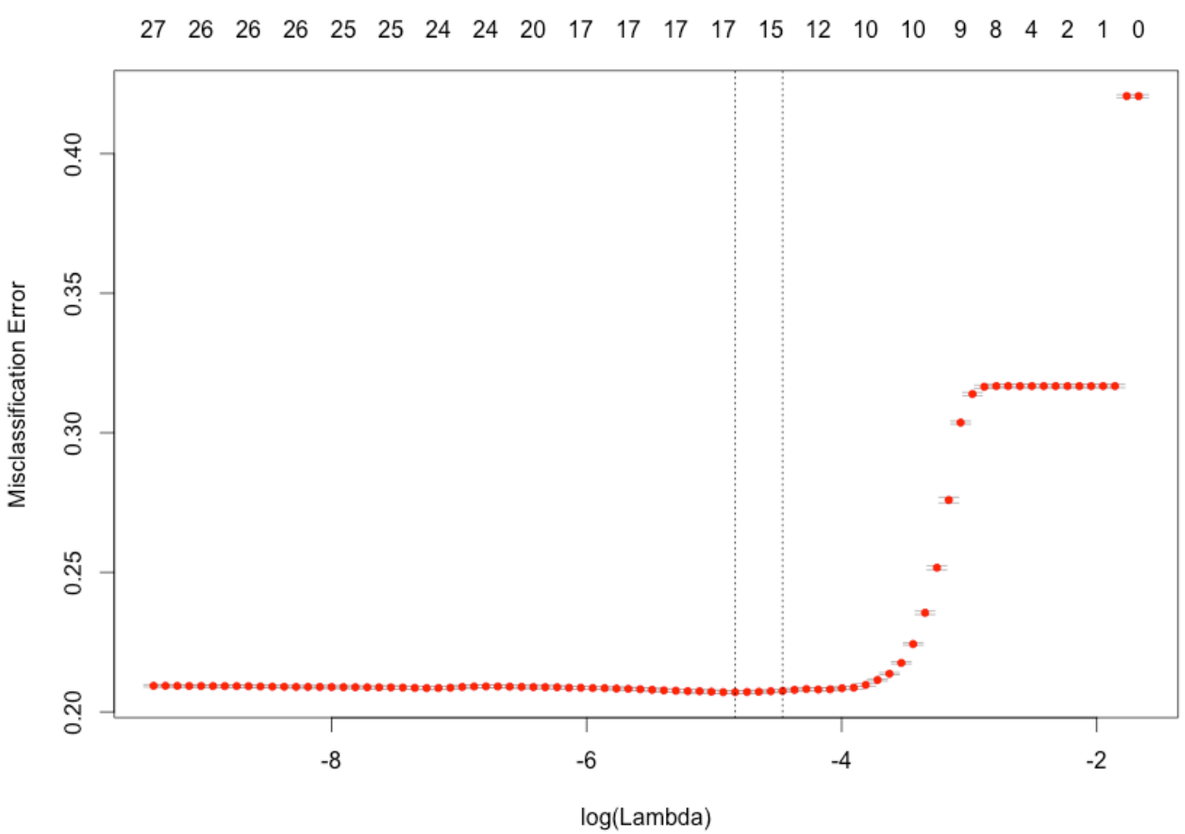
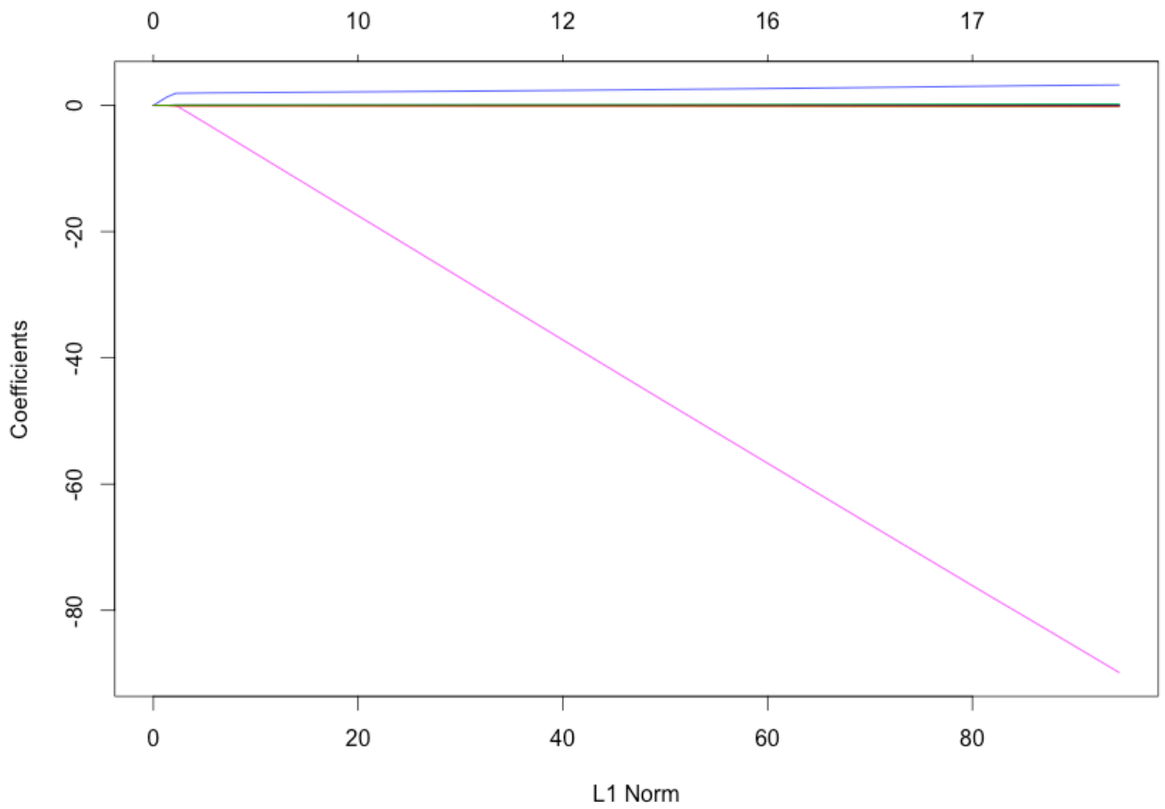
Logistic Regression

Library(glmnet)

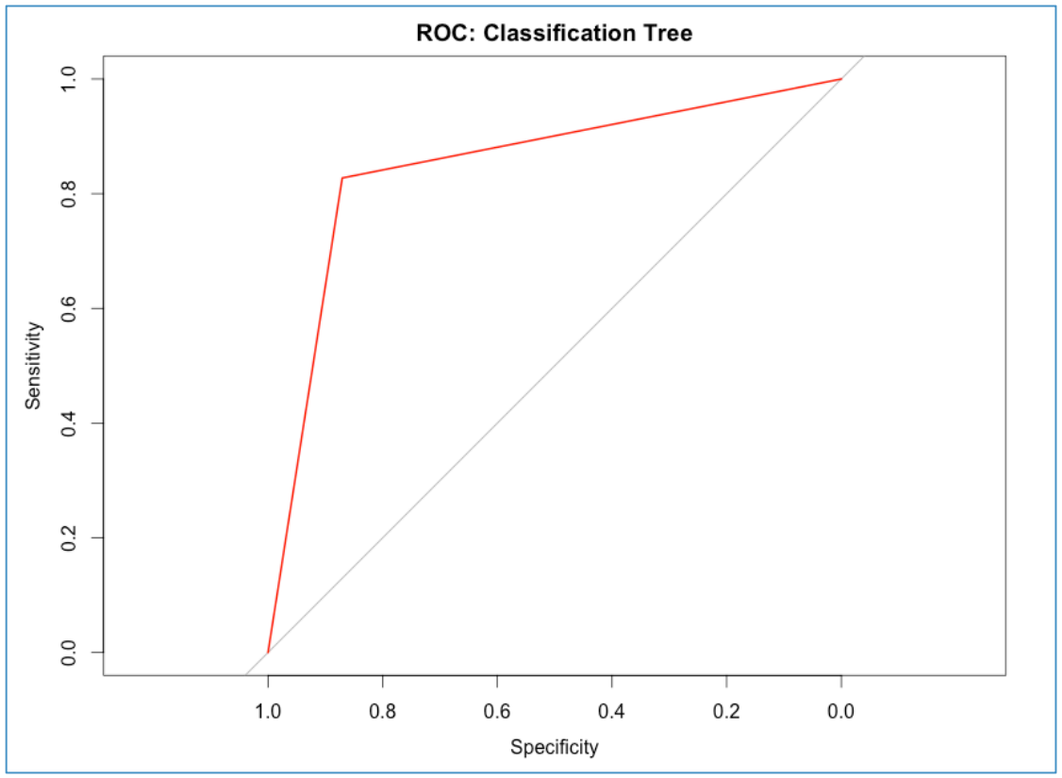


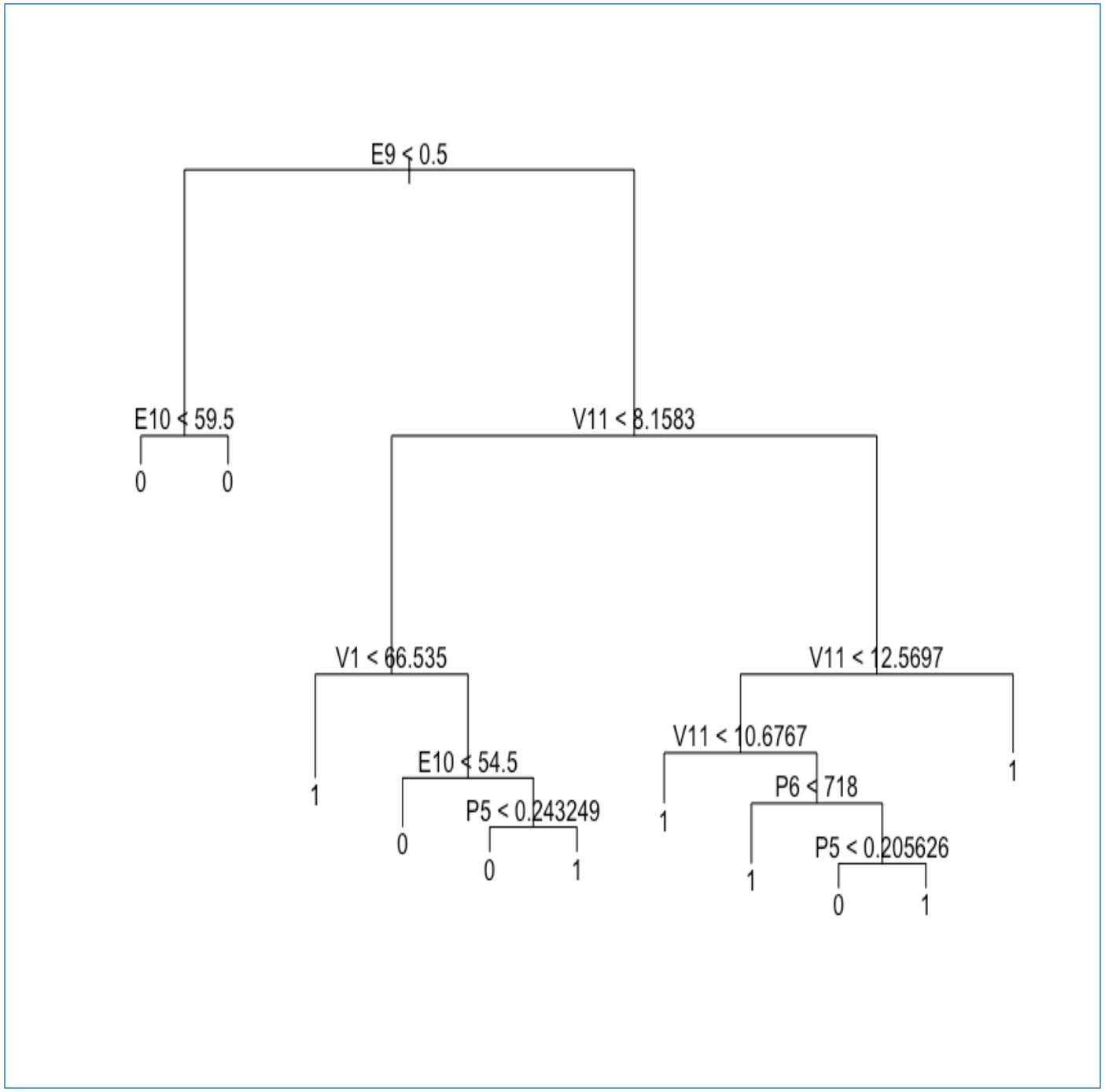




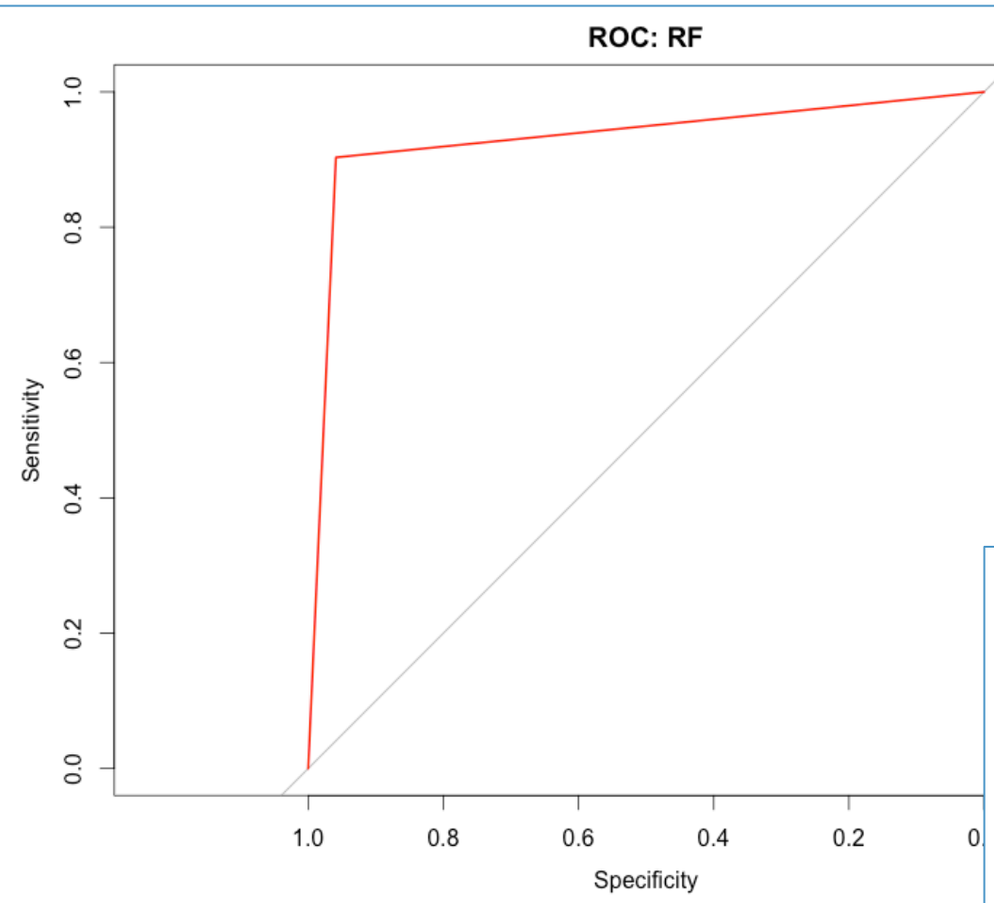
Classification Tree

Library(tree)



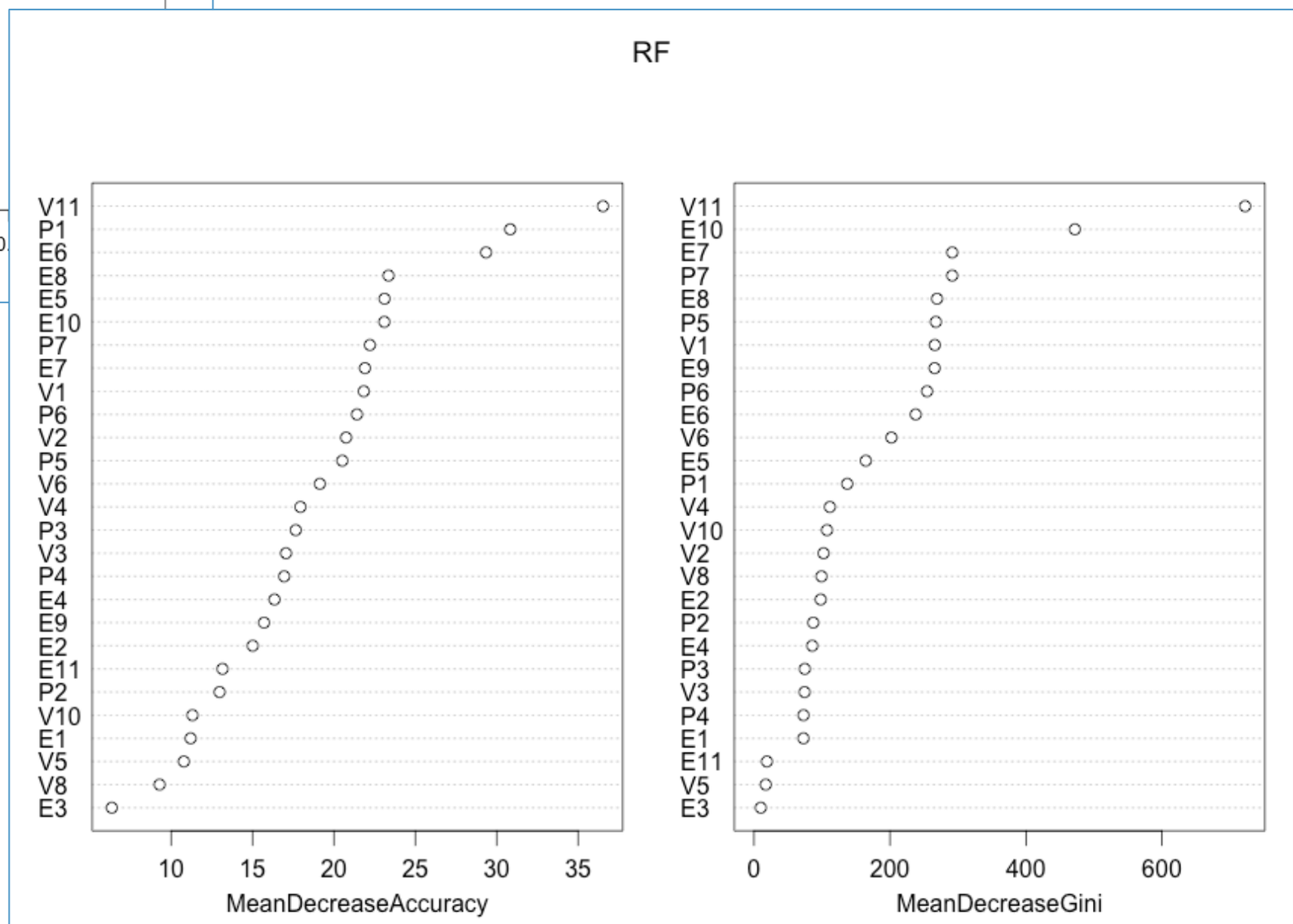


Random Forest



Library(randomForest)

RF <- randomForest
(training[,-c(1,9,27,29)],
factor(trainig$IsAlert),
sampsize=10000,
do.trace=TRUE,
importance=TRUE,
ntree=**100**,
forest=TRUE)



Other models

- ✓Naïve Bayes
- ✓SVM
- ✓GLM
- ✓Neural Network (NN)
- ✓CART – regression tree

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Method	AUC Score	Variables Selected	Computation Time (s)
Logistic	0.78	23 vars	10.722
Random Forest	0.93	V11 E10 E7	393.314
Decistion Tree	0.83	V11 E10 P5 P6 V1	10.722
Naive Bayes	0.76	–	–
NN(two layer)	0.77	–	–
SVM	0.73	–	–

Reference: “First place in the ’Stay Alert!’ competiion”, inference, March 2011.

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- ✓Random Forest works good
- ✓Only V11, E10, etc. variables are important
- ✓R is slow for large data computation

--- Python, Perl, R on HPC?

Thanks ☺