Application

Return to the Vehicle data used in the previous lecture. Use the same split as before.

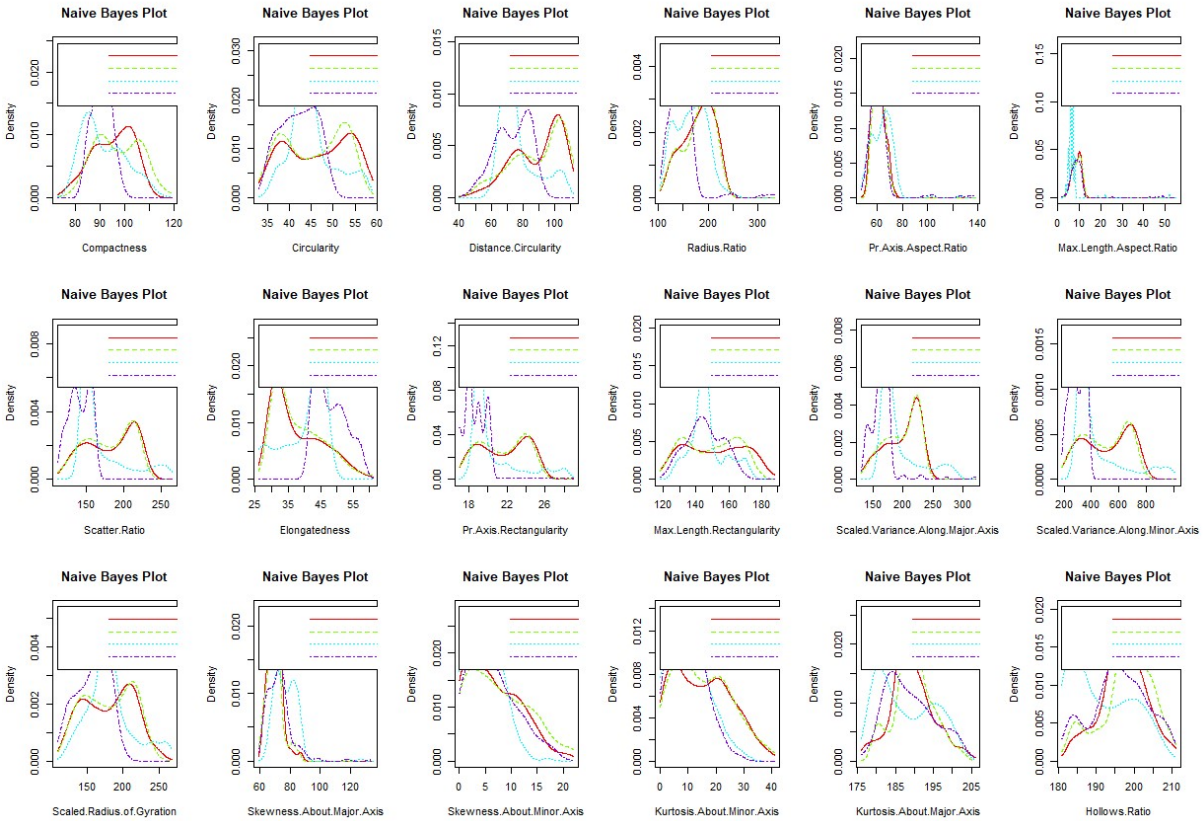
```
set . seed (46685326 , kind =" Mersenne - Twister ")
perm <- sample (x= nrow ( vehdata ))
set1 <- vehdata [ which ( perm <= 3* nrow ( vehdata )/4) , ]
set2 <- vehdata [ which ( perm > 3* nrow ( vehdata )/4) , ]
```

I already know that GAM will not fit these data. It uses enough degrees of freedom that it creates a complete separation, and this ruins the logit model.
Instead, we will focus on Naive Bayes. You will fit the same four models that we used in the example: with/without kernel, and with/without PC preprocessing.

```
# Title: STAT 452 Exercise 19 L17A1
# Author: Injun Son
# Date: November 27, 2020

library(dplyr)
library(MASS)   # For ridge regression
library(glmnet) # For LASSO
library(nnet) # Fits neural net models
library(rgl)
library(FNN)
source("Helper Functions.R")


### Some of our code will be random, so we have to set the seed.
### Use Mersenne-Twister for compatibility.
set.seed(46685326, kind = "Mersenne-Twister")
vehdata = read.csv("vehicle.csv")

####################
### Naive Bayes ###
####################

# 1. Run the version with kernel density estimation on the original variables first
fit.NB.original = NaiveBayes(vehdata[,-19], as.factor(vehdata[,19]), usekernel = T)
par(mfrow = c(3,6)) # Set plotting to 3x6
plot(fit.NB.original)
```

1. Run the version with kernel density estimation on the original variables first

   (a) **Present plots of each variable's density separated by classes.**



(b) Look at the plot:

i. Do many of the variables look like they have very skewed, multimodal, or otherwise non-normal distributions across the classes? If so, **name any that seem pretty non-normal (but no more than three), and mention a word or two about what non-normal feature(s) each one has**.

➔ Yes, the graph with Pr.Axis.Aspect.Ratio and Max.Length.Aspect.Ratio looks very skewed and graph with Pr.Axis.Rectangularity looks multimodal.

ii. Do any of the variables look like they do a very good job of discriminating among classes, particularly by separating their means? If so, **name any that seem to separate the classes well (but no more than your top 3), and mention which class(es) they seem to separate.**

➔ I think all of the graphs looks non-normal

In these questions, I mainly want to make sure you are absorbing the information correctly and understanding what to look for. I do not have a specific three variables that are “right” and consider all the rest “wrong”. Judgment may vary, but the decisions should be made rationally.