



Neural Network report

The data consists of 5 columns:

- variance of Wavelet Transformed image (continuous)
- skewness of Wavelet Transformed image (continuous)
- curtosis of Wavelet Transformed image (continuous)
- entropy of image (continuous)
- class (integer)

Get the Data

```
# load data
df <- read.csv("bank_note_data.csv")
head(df)
str(df)
```

EDA

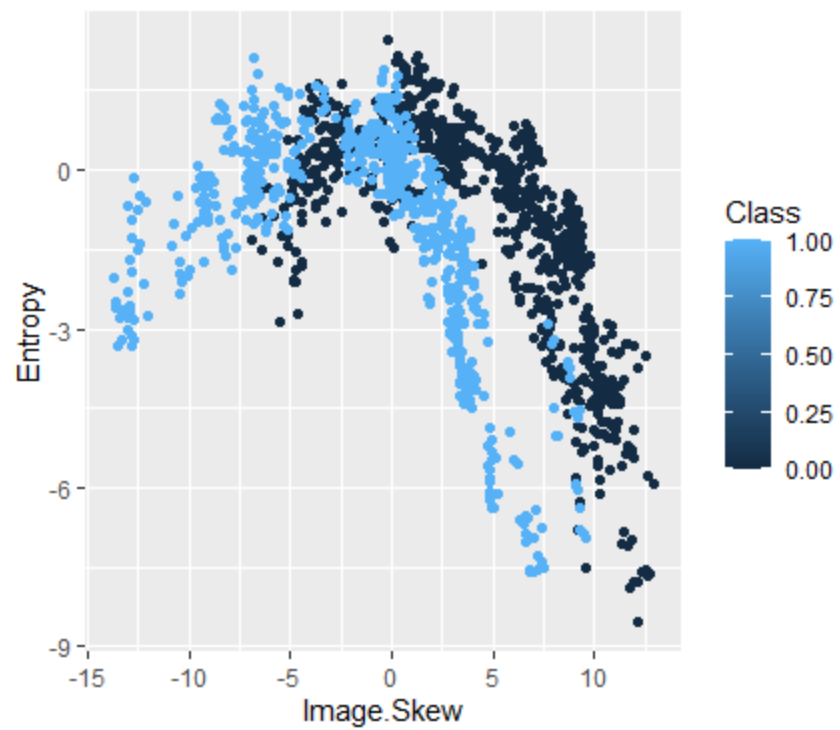
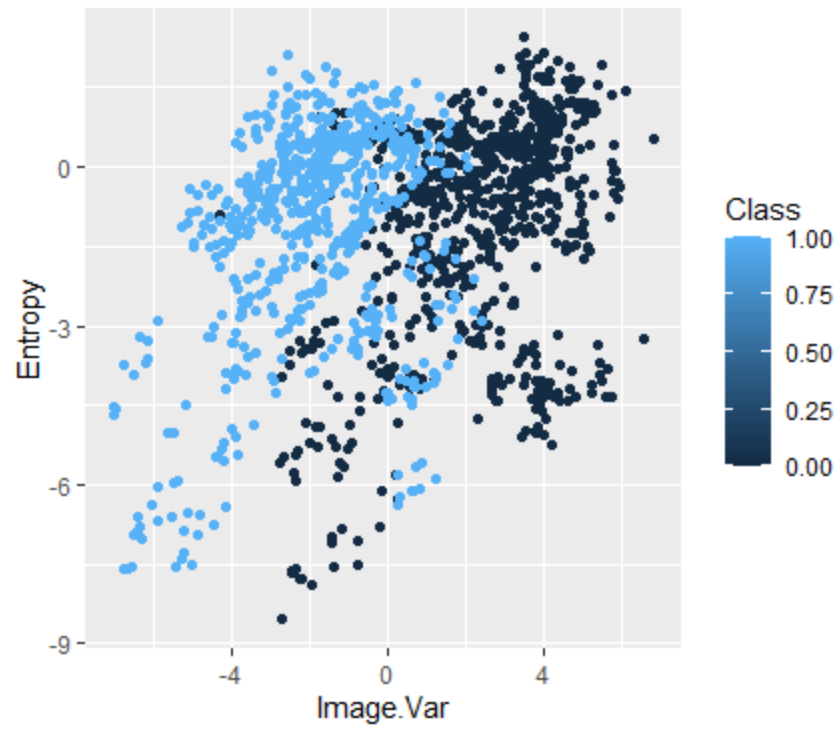
```
library(ggplot2)

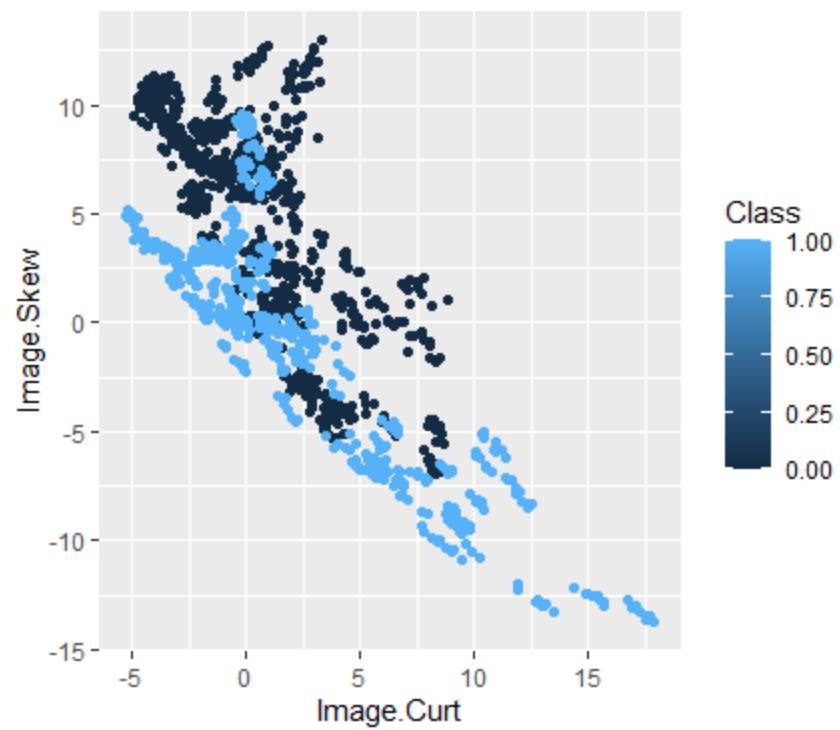
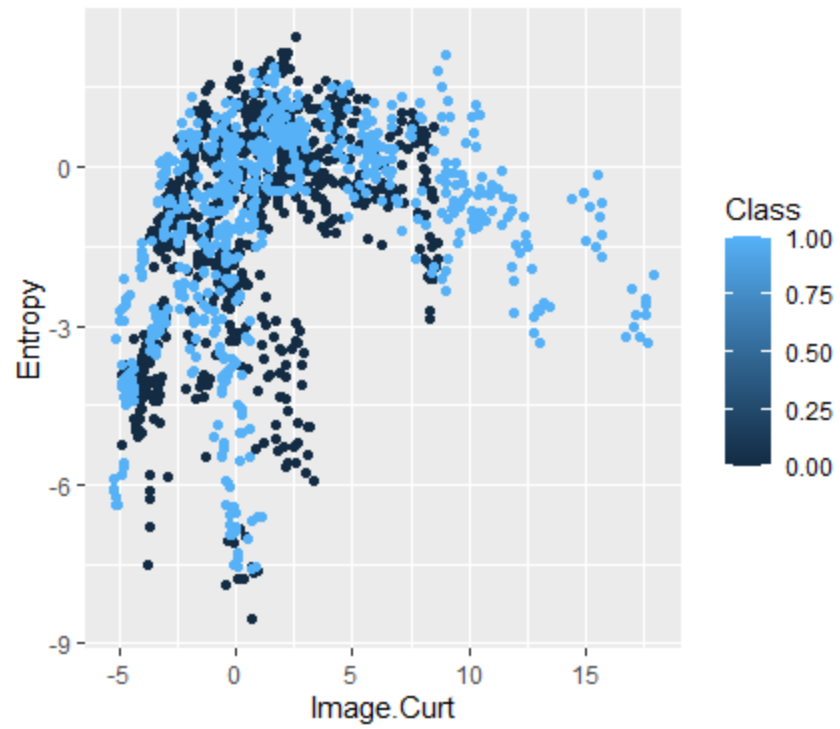
# EDA
ggplot(df, aes(x=Image.Var, y=Entropy, color = Class)) + geom_point()

ggplot(df, aes(x=Image.Skew, y=Entropy, color = Class)) + geom_point()

ggplot(df, aes(x=Image.Curt, y=Entropy, color = Class)) + geom_point()

ggplot(df, aes(x=Image.Curt, y=Image.Skew, color = Class)) + geom_point()
```





Neural Net model

- ตรวจสอบโครงสร้างของ train data เนื่องจาก Class ยังคงเป็นประเภทข้อมูล int จะไม่แปลงเป็น factor เนื่องจากโครงข่ายประสาทเทียมต้องการข้อมูลที่เป็นตัวเลขทั้งหมด

```
library(caTools)
library(neuralnet)

# Train Test Split
set.seed(24)
split = sample.split(df$Class, SplitRatio = 0.70)
train = subset(df, split == TRUE)
test = subset(df, split == FALSE)
str(train)

# Building the Neural Net
nn <- neuralnet(Class~., data=train, hidden=10, linear.output=FALSE)

# Predictions
p <- predict(nn, test[, -5])
head(p)

# set p as 0,1
p <- round(p,0)
# p <- as.numeric(round(p,0))

# confusion matrix
table(test$Class,p)
```

Comparing Models

→ **Let's check our results against a randomForest model**

- convert Class column of the data as a factor

```
library(randomForest)

# randomForest
# convert Class column to factor
df$Class <- factor(df$Class)
str(df)

# Train Test Split
set.seed(24)
split.rf = sample.split(df$Class, SplitRatio = 0.70)
train.rf = subset(df, split.rf == TRUE)
test.rf = subset(df, split.rf == FALSE)
str(train.rf)

# Built randomForest model
```

```
rf <- randomForest(Class ~ ., data= train.rf)

# predict
prf <- predict(rf,test.rf)

# confusion matrix
table(test.rf$Class,prf)

# prf
#      0   1
# 0 227   2
# 1   2 181
```
