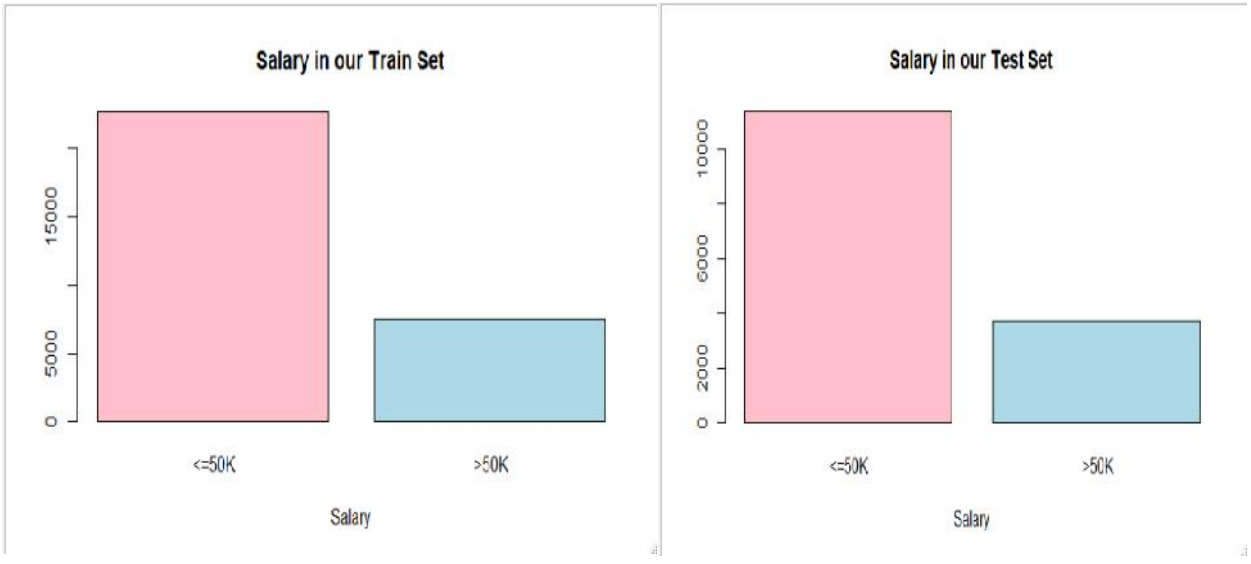
Naïve Bayes

Classification Model For Salary Train and Test Dataset

Structure of data

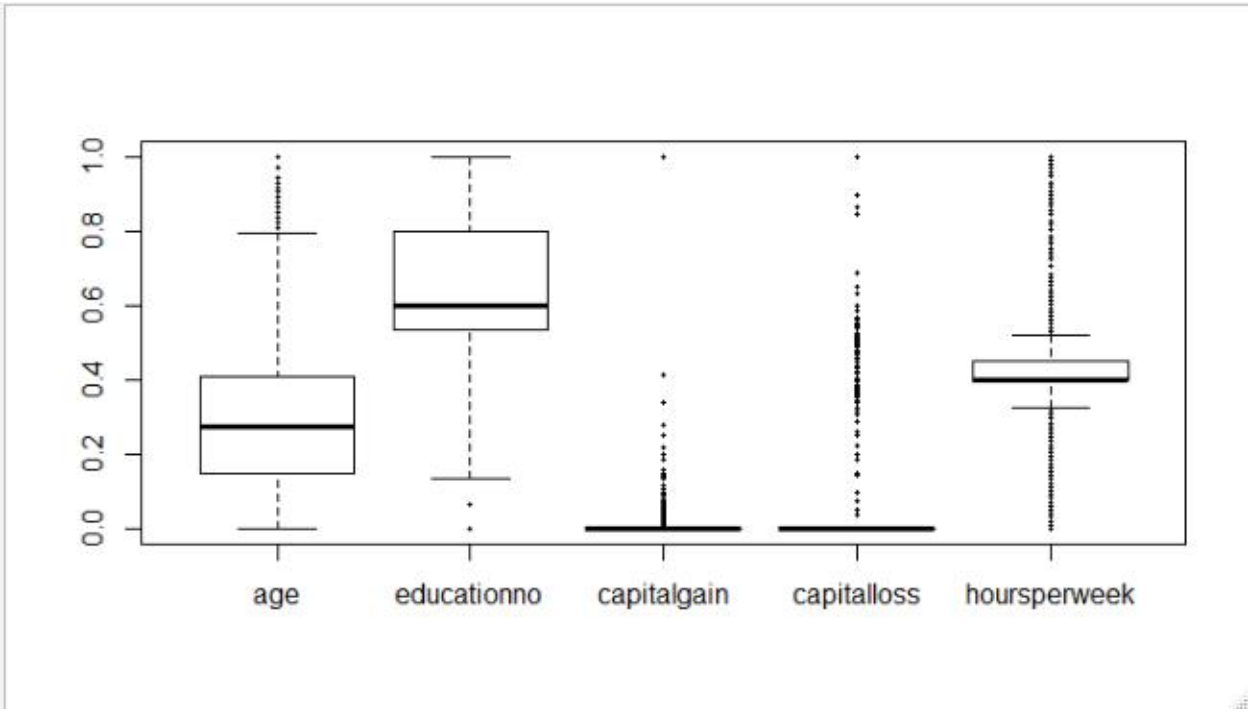
```
data.frame':   30161 obs. of  14 variables:
 $ age          : int  39 50 38 53 28 37 49 52 31 42 ...
 $ workclass    : Factor w/ 7 levels " Federal-gov",..: 6 5 3 3 3 3 3 5 3 3 .
..
 $ education    : Factor w/ 16 levels " 10th"," 11th",..: 10 10 12 2 10 13 7
12 13 10 ...
 $ educationno  : int  13 13 9 7 13 14 5 9 14 13 ...
 $ maritalstatus: Factor w/ 7 levels " Divorced"," Married-AF-spouse",..: 5 3
1 3 3 3 4 3 5 3 ...
 $ occupation   : Factor w/ 14 levels " Adm-clerical",..: 1 4 6 6 10 4 8 4 10
4 ...
 $ relationship : Factor w/ 6 levels " Husband"," Not-in-family",..: 2 1 2 1
6 6 2 1 2 1 ...
 $ race         : Factor w/ 5 levels " Amer-Indian-Eskimo",..: 5 5 5 3 3 5 3
5 5 5 ...
 $ sex          : Factor w/ 2 levels " Female"," Male": 2 2 2 2 1 1 1 2 1 2 .
..
 $ capitalgain  : int  2174 0 0 0 0 0 0 0 14084 5178 ...
 $ capitalloss  : int  0 0 0 0 0 0 0 0 0 0 ...
 $ hoursperweek : int  40 13 40 40 40 40 16 45 50 40 ...
 $ native       : Factor w/ 40 levels " Cambodia"," Canada",..: 38 38 38 38 5
38 22 38 38 38 ...
 $ Salary       : Factor w/ 2 levels " <=50K"," >50K": 1 1 1 1 1 1 1 2 2 2 ..
```

From the above structure it is seen that, data contains 9 factor and 5 numeric variables, so we have to create dummy variable to normalize the data.



From the above boxplot, data is imbalanced.

Boxplot of Numerical Variables In Test Dataset After Normalization



From the above boxplot, lots of outlier are in the data but we are not going to remove them as we may lose a lot of information.

So we will create model with normalized dummy data.

Model without Laplace smoothing ➔

```
summary(model_1)
          Length Class  Mode
apriori      2   table  numeric
tables     102   -none- list
levels       2   -none- character
isnumeric  102   -none- logical
call         3   -none- call
```

Accuracy ➔ 0.7837317

Confusion Matrix

```
         Predicted
Actual     <=50K  >50K
   <=50K   10753   607
   >50K     2650  1050
```

Model with Laplace smoothing ➔

```
summary(model_2)
          Length Class  Mode
apriori      2   table  numeric
tables     102   -none- list
levels       2   -none- character
isnumeric  102   -none- logical
call         4   -none- call
```

Accuracy ➔ 0.7837317

Confusion Matrix

```
Predicted
Actual    <=50K  >50K
   <=50K  10753   607
   >50K    2650  1050
```

Model without laplace and with laplace smoothing giving same results.