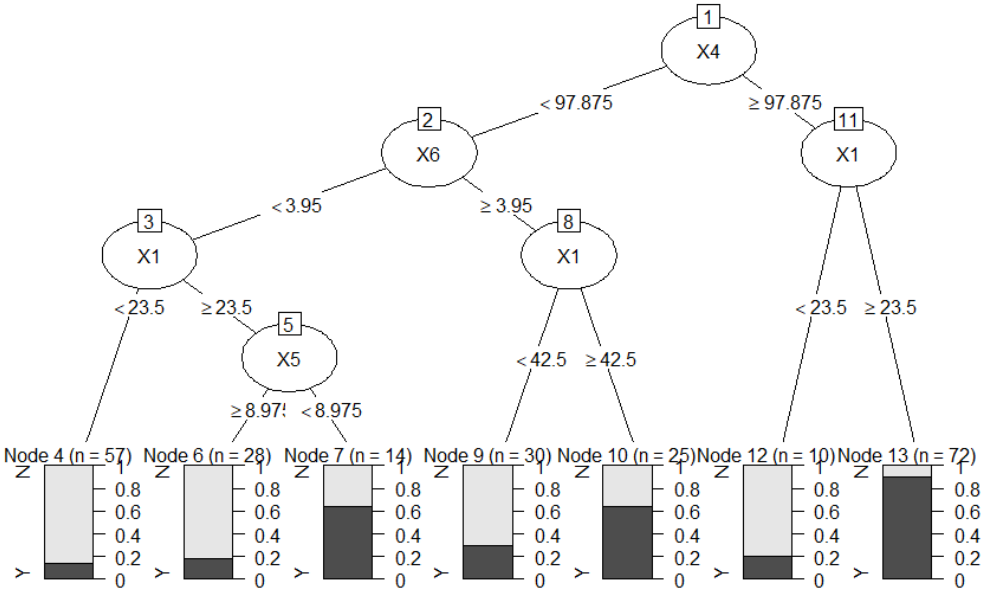
Project Report for CA 2

By Arambakam Mukesh – 19301497

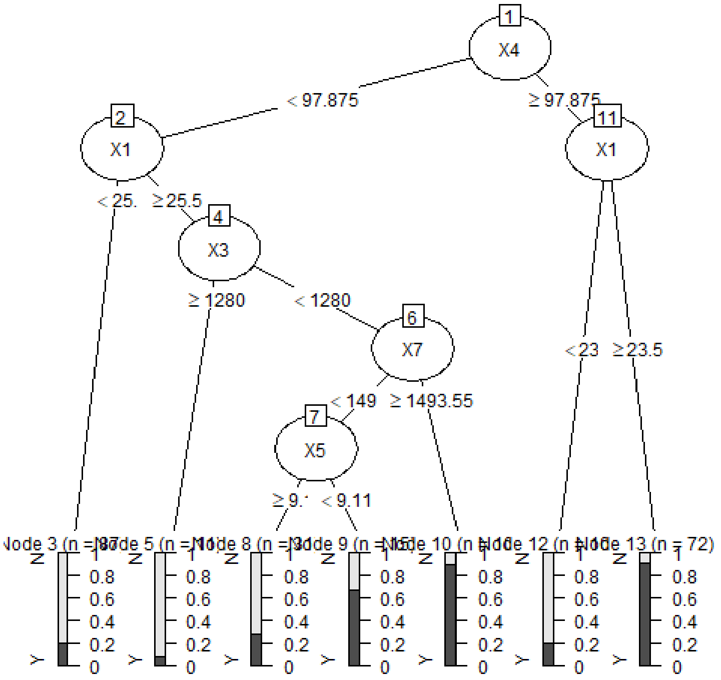
The code for this can be found on my GitHub, please find the link to the repo below.

https://github.com/mukeshmk/r-project

Plot A

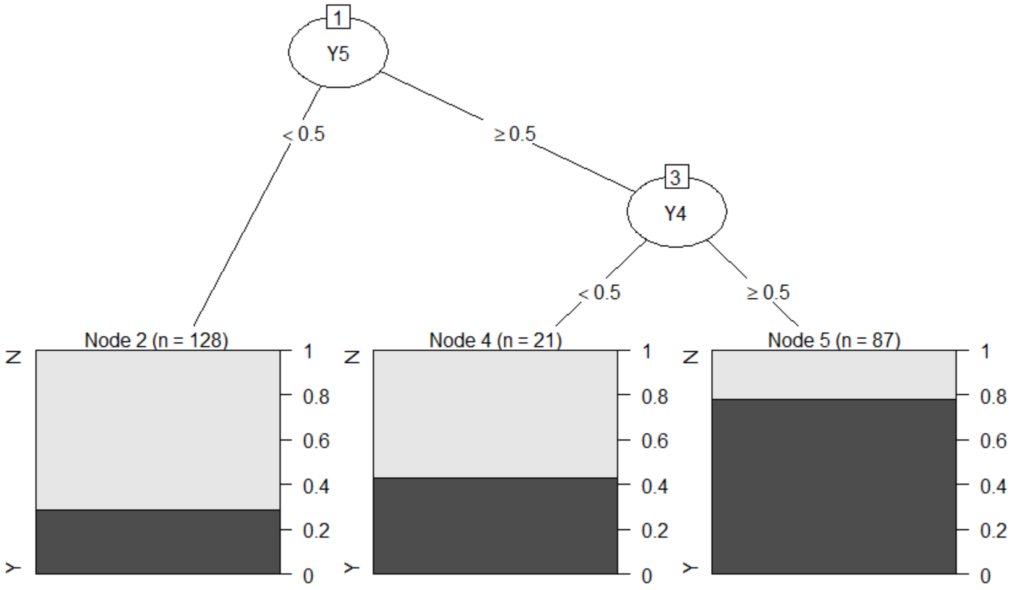


Plot B

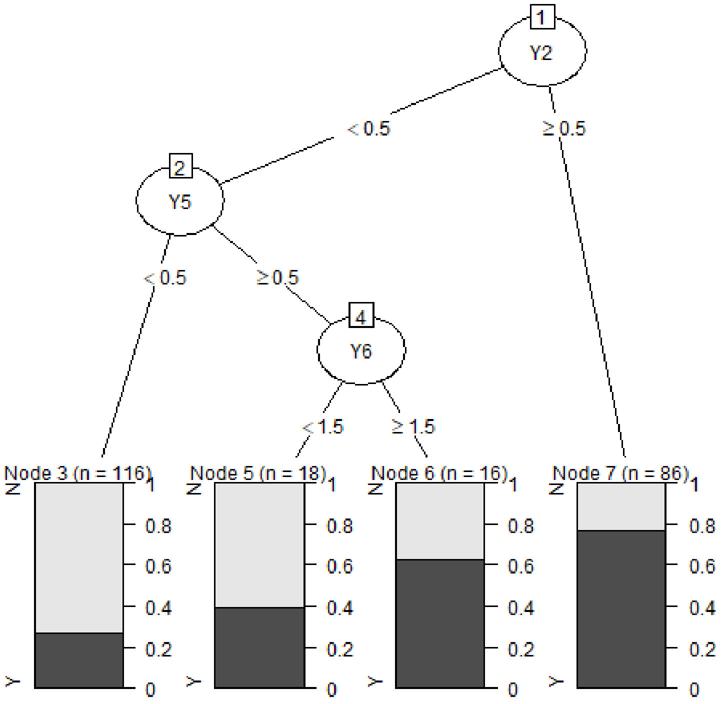


The above plots represent the Decision Tree over the entire data set but with the Predictors though X1-X7 before (Plot A) and after (Plot B) imputation respectively. The DT in Plot A predicts with an accuracy of 80% (0.8) and the DT in Plot B predicts with an accuracy of 82% (0.82).

Plot A

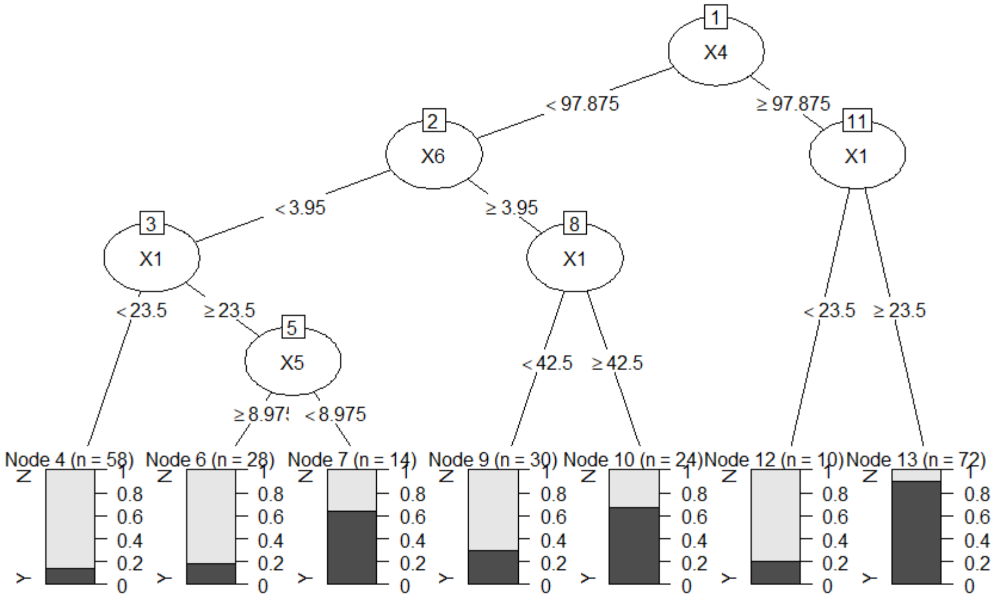


Plot B

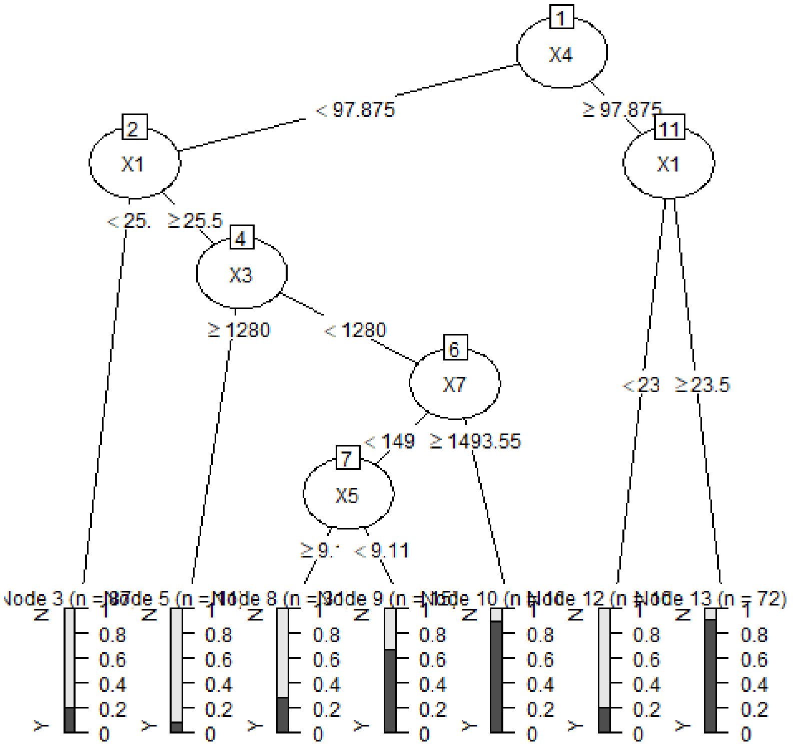


The above plots represent the Decision Tree over the entire data set but with the Predictors though Y1-Y7 before (Plot A) and after (Plot B) imputation respectively. The DT in Plot A predicts with an accuracy of 80% (0.8) and the DT in Plot B predicts with an accuracy of 75% (0.75).

Plot A

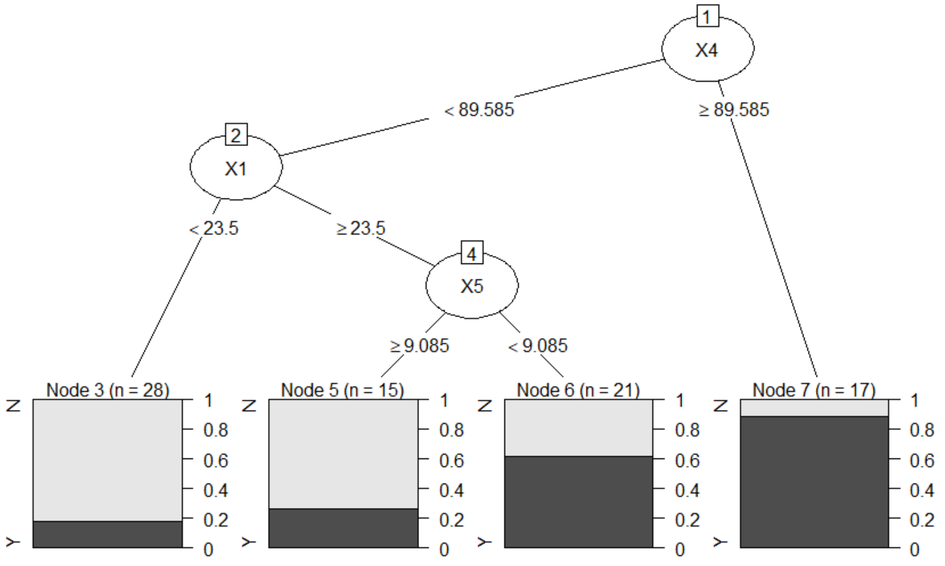


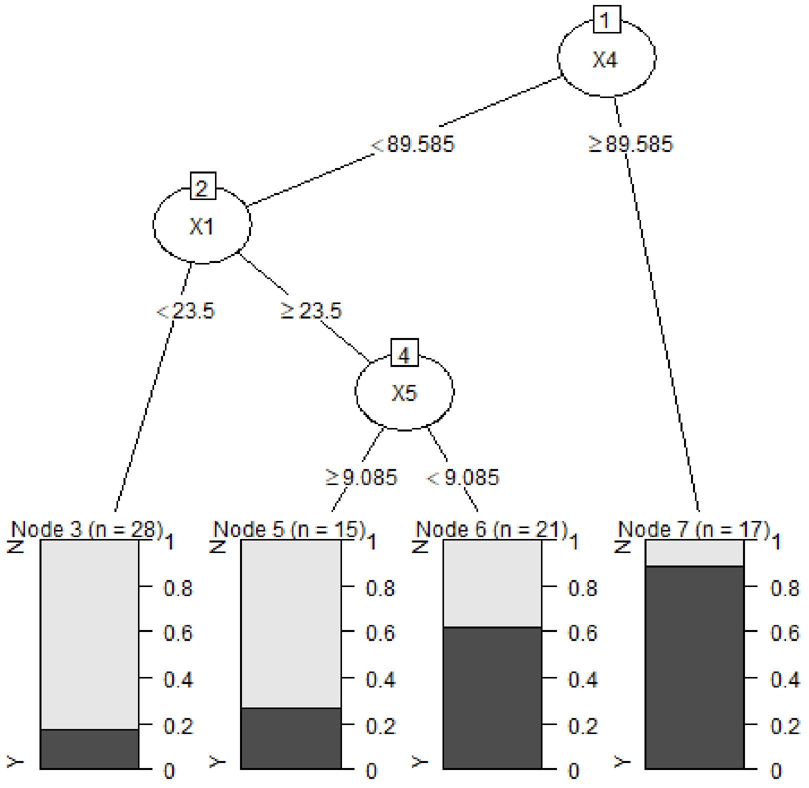
Plot B



The above plots represent the Decision Tree over the entire data set but with the Predictors though X1-X7 and Y1-Y7 before (Plot A) and after (Plot B) imputation respectively. The DT in Plot A predicts with an accuracy of 80% (0.8) and the DT in Plot B predicts with an accuracy of 82% (0.82).

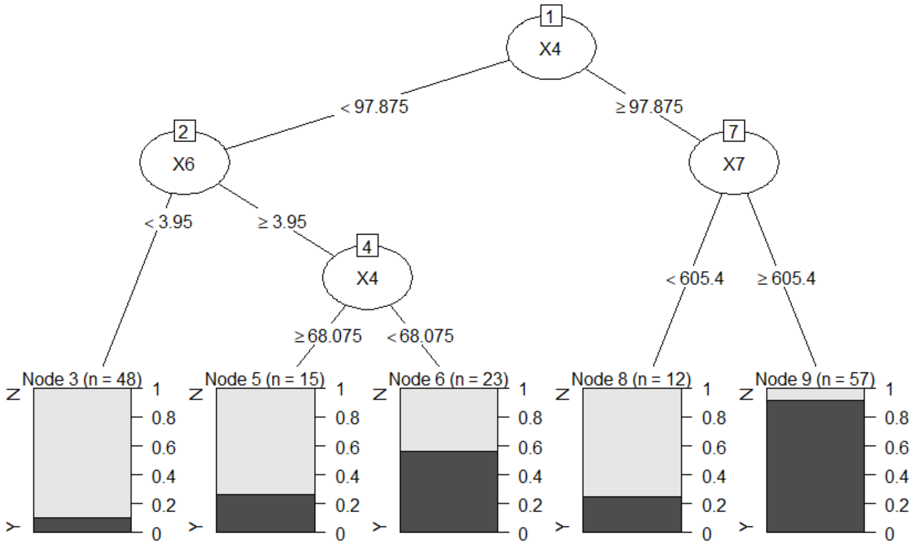
Plot A



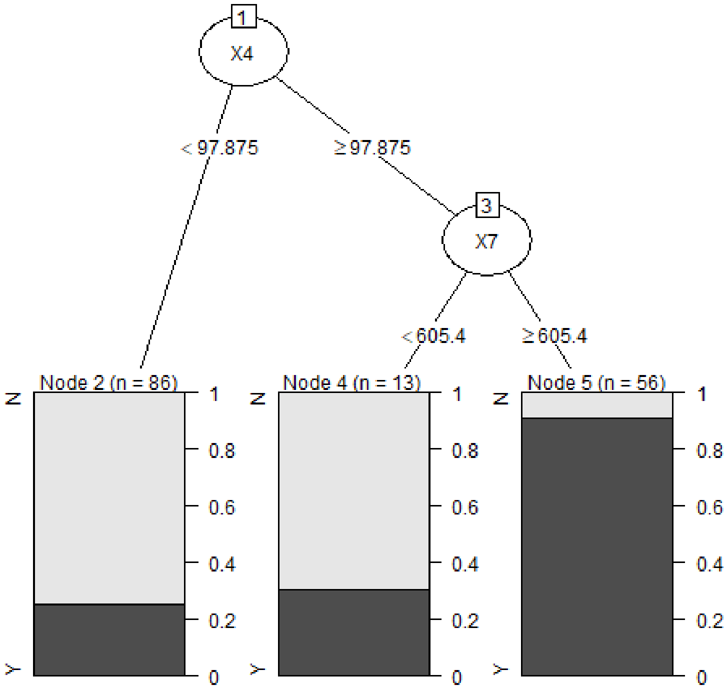


The above plots represent the Decision Tree over Group 0 set but with the Predictors though X1-X7 before (Plot A) and after (Plot B) imputation respectively. The DT in Plot A predicts with an accuracy of 77% (0.77) and the DT in Plot B predicts with an accuracy of 77% (0.77).

Plot A

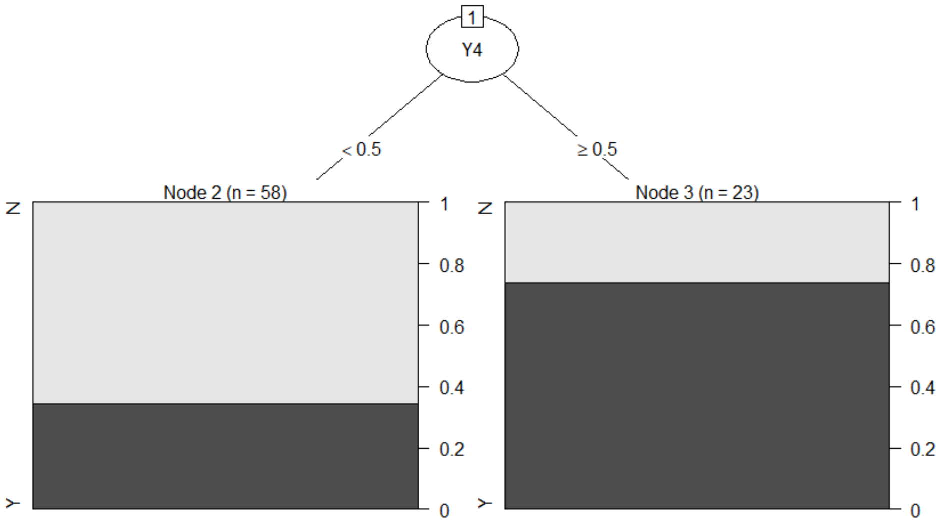


Plot B

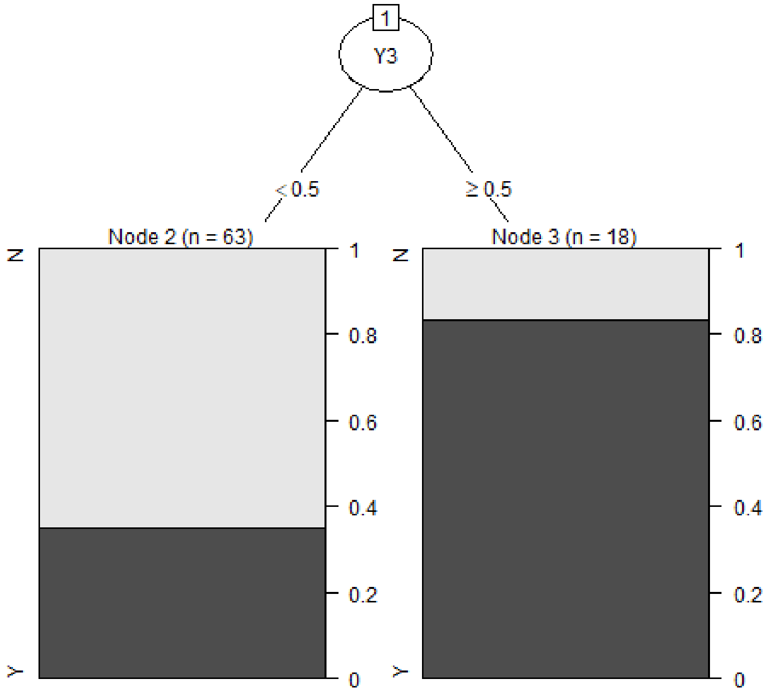


The above plots represent the Decision Tree over Group 1 set but with the Predictors though X1-X7 before (Plot A) and after (Plot B) imputation respectively. The DT in Plot A predicts with an accuracy of 78% (0.78) and the DT in Plot B predicts with an accuracy of 82% (0.82).

Plot A

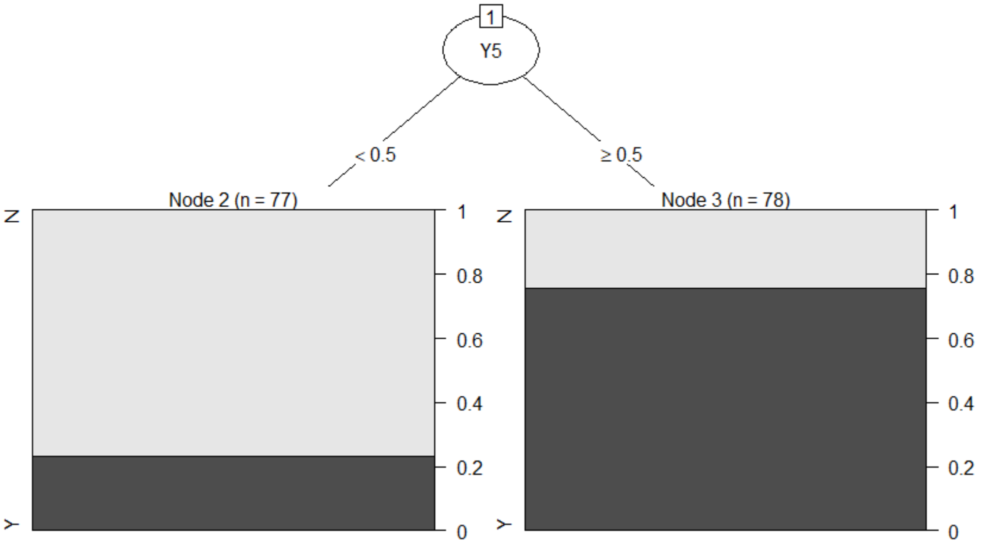


Plot B

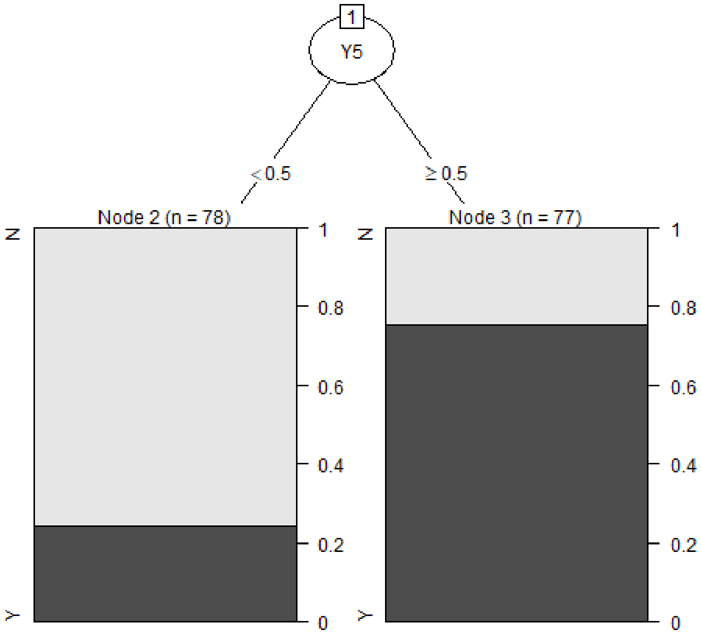


The above plots represent the Decision Tree over Group 0 set but with the Predictors though Y1-Y7 before (Plot A) and after (Plot B) imputation respectively. The DT in Plot A predicts with an accuracy of 72% (0.72) and the DT in Plot B predicts with an accuracy of 65% (0.65).

Plot A

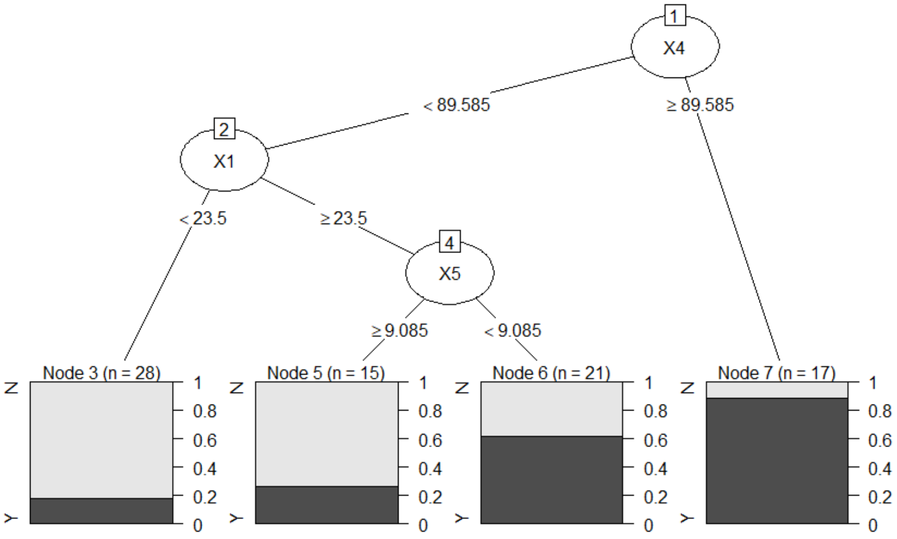


Plot B

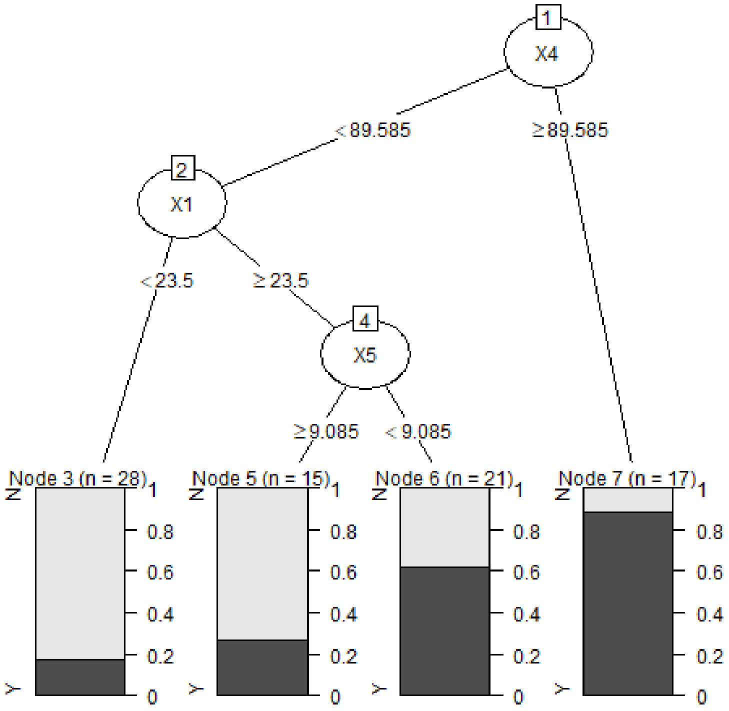


The above plots represent the Decision Tree over Group 1 set but with the Predictors though Y1-Y7 before (Plot A) and after (Plot B) imputation respectively. The DT in Plot A predicts with an accuracy of 75% (0.75) and the DT in Plot B predicts with an accuracy of 75% (0.75).

Plot A

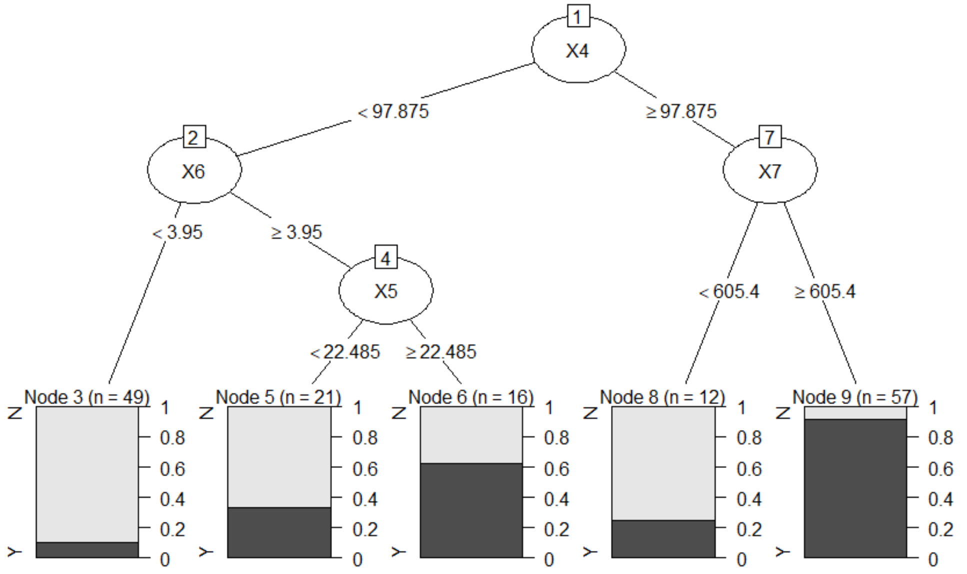


Plot B

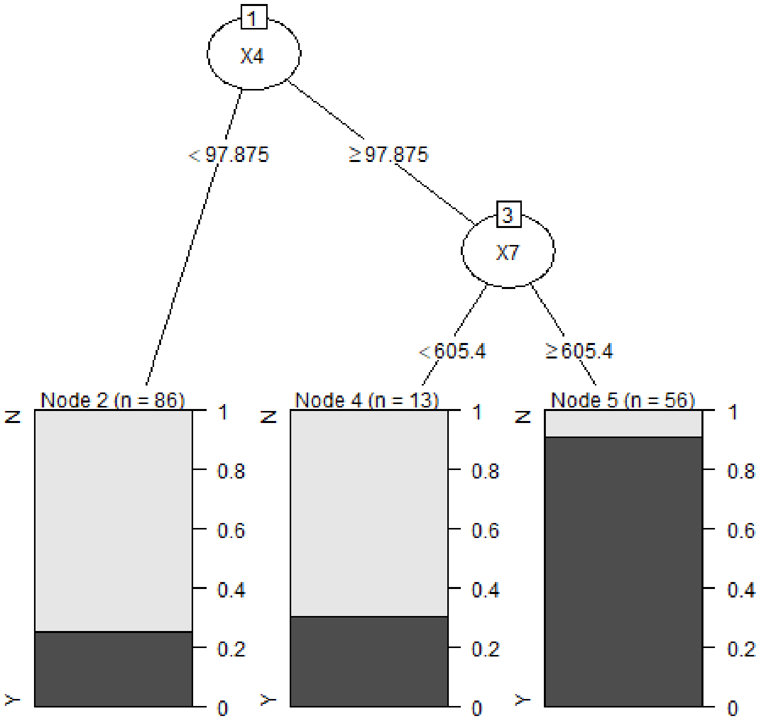


The above plots represent the Decision Tree over Group 0 set but with the Predictors though X1-X7 and Y1-Y7 before (Plot A) and after (Plot B) imputation respectively. The DT in Plot A predicts with an accuracy of 77% (0.77) and the DT in Plot B predicts with an accuracy of 77% (0.77).

Plot A



Plot B



The above plots represent the Decision Tree over Group 1 set but with the Predictors though X1-X7 and Y1-Y7 before (Plot A) and after (Plot B) imputation respectively. The DT in Plot A predicts with an accuracy of 80% (0.8) and the DT in Plot B predicts with an accuracy of 82% (0.82).

Conclusion:

The best Decision Tree generated is the DT generated over **Group 1 with the Predictors X1-X7 and Y1-Y7** as it has the highest **accuracy of 82%**. The below is the Decision Tree's summary, indicating the splits:

```
n= 155

node), split, n, loss, yval, (yprob)
      * denotes terminal node

1) root 155 77 N (0.50322581 0.49677419)  
  2) X4< 97.875 86 22 N (0.74418605 0.25581395) *
  3) X4>=97.875 69 14 Y (0.20289855 0.79710145)  
    6) X7< 605.4 13  4 N (0.69230769 0.30769231) *
    7) X7>=605.4 56  5 Y (0.08928571 0.91071429) *
```

Though the DT's in Plot 1 and Plot 3 also have an accuracy of 82% - Plot 9 is better because it gives a consistent accuracy of 82% when tested with different `rpart` configurations like minsplit, minbucket and maxdepth, more over it has a **Low Variance** between different decision tree when run with different seed values for the data and different rpart configuration.

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