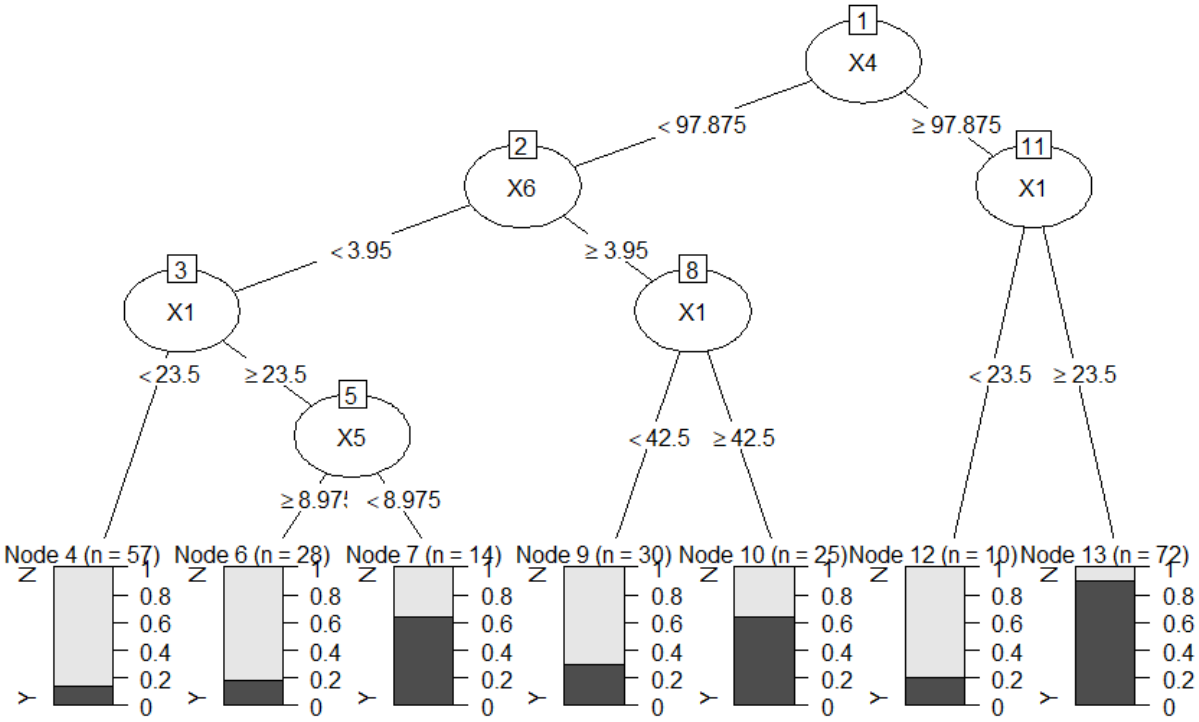
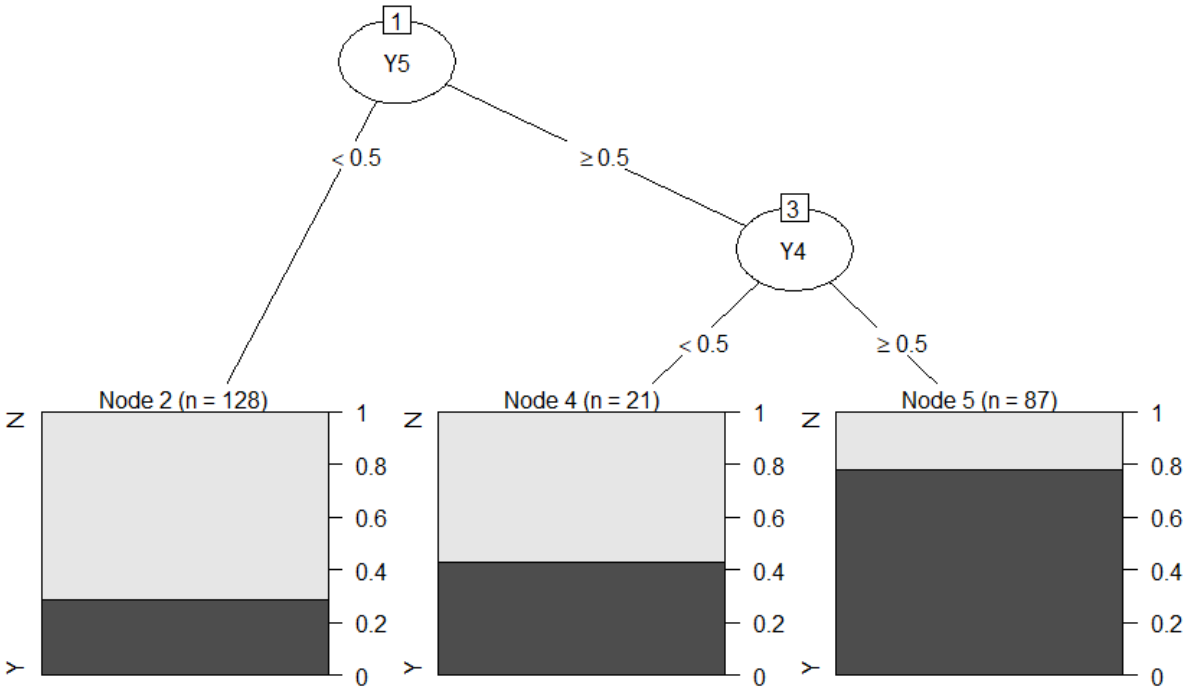
Project Report for CA 1

By Arambakam Mukesh - 19301497



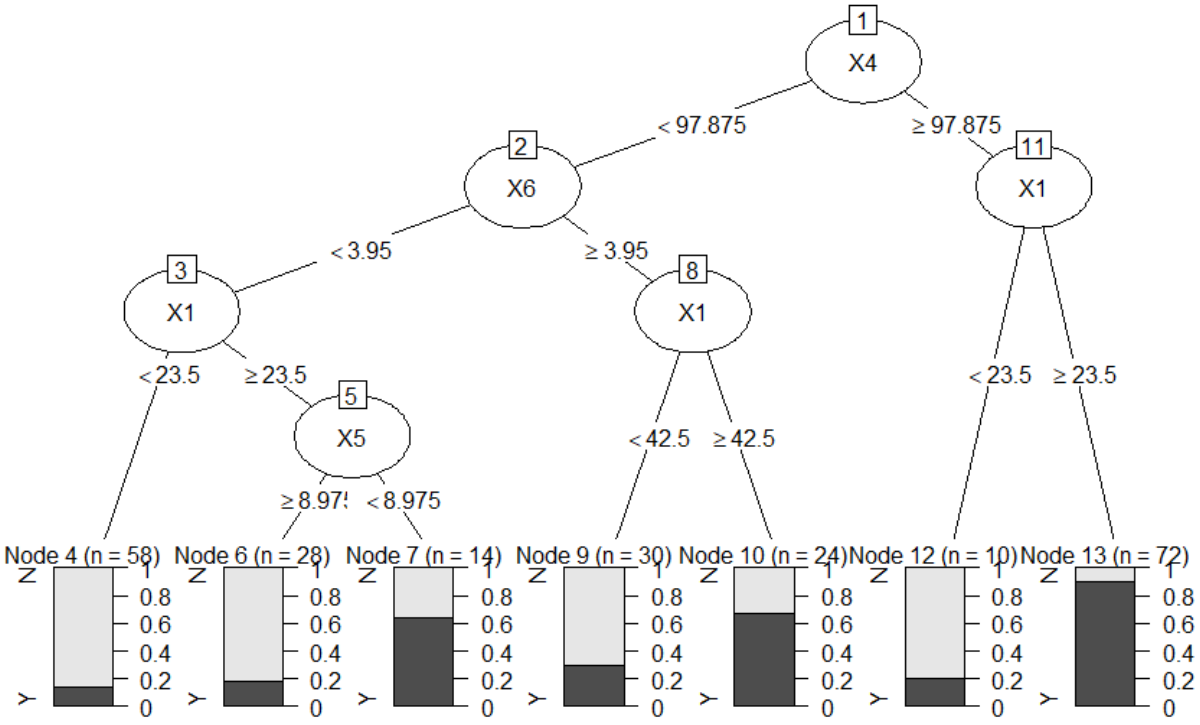
Plot 1 - DT over only X

Plot 1 represents the Decision Tree over the entire data set but with the Predictors though X1-X7. This DT predicts with an accuracy of 80% (0.8).



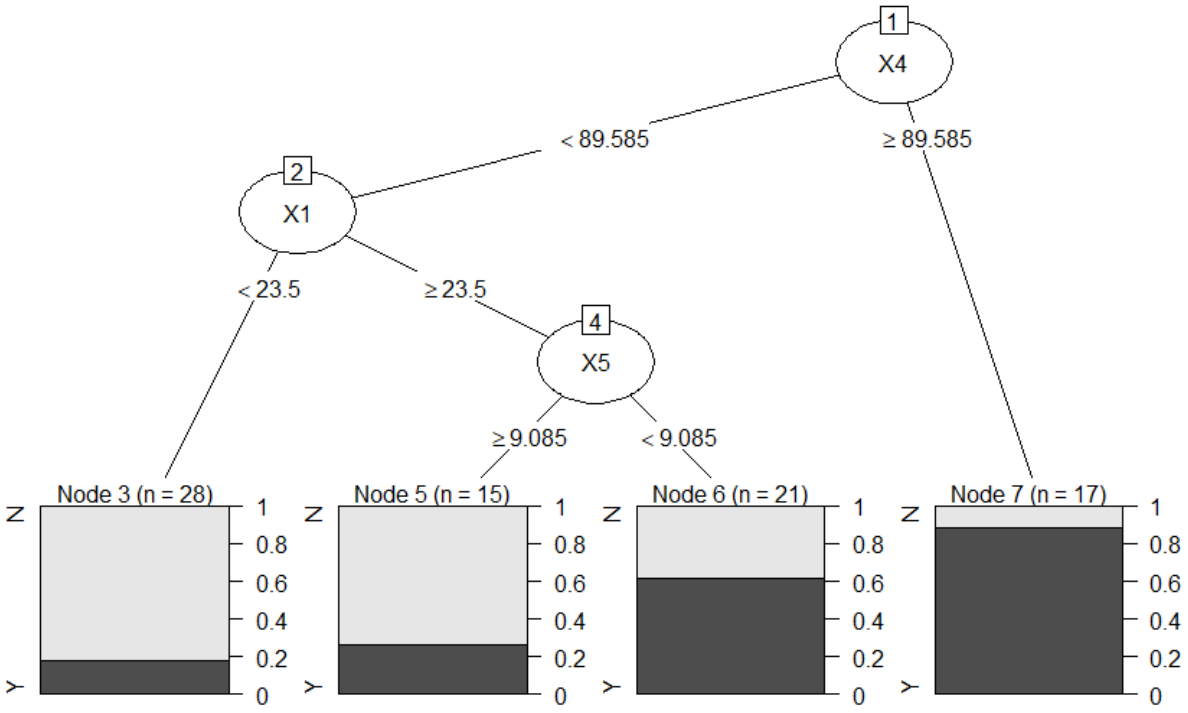
Plot 2 - DT over only Y

Plot 2 represents the Decision Tree over the entire data set but with the Predictors though Y1-Y7. This DT predicts with an accuracy of 80% (0.8).



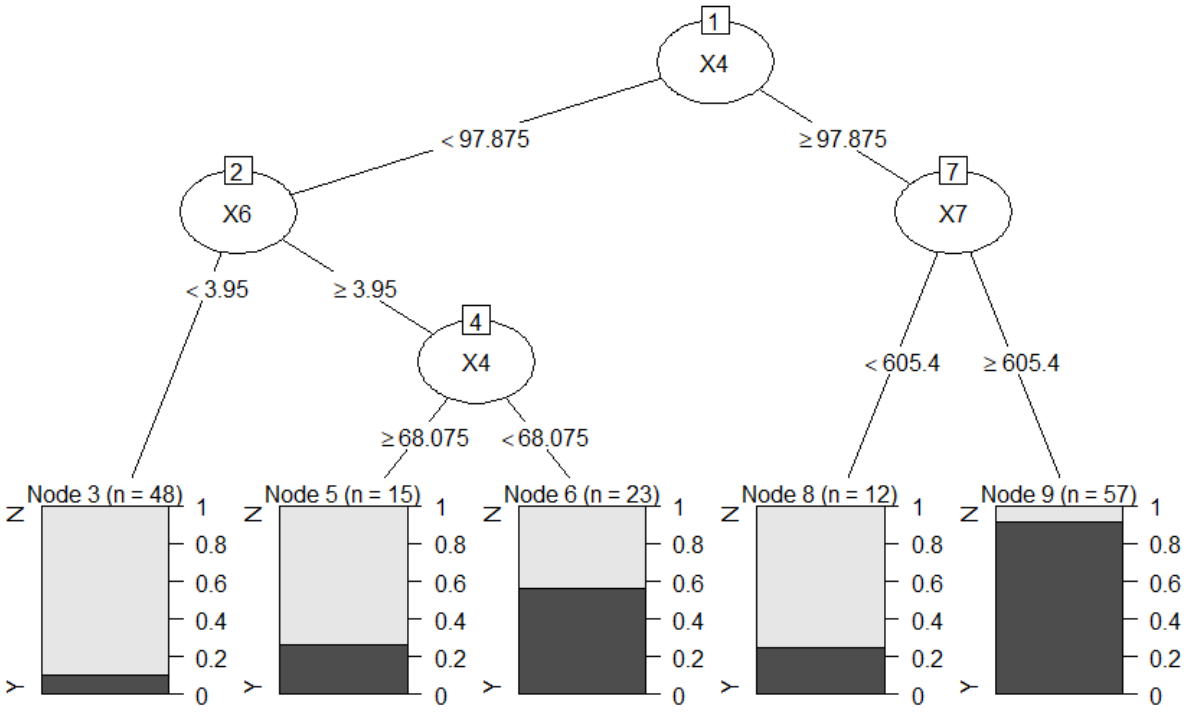
Plot 3 - DT over X and Y

Plot 3 represents the Decision Tree over the entire data set but with the Predictors though X1-X7 and Y1-Y7. This DT predicts with an accuracy of 80% (0.8).



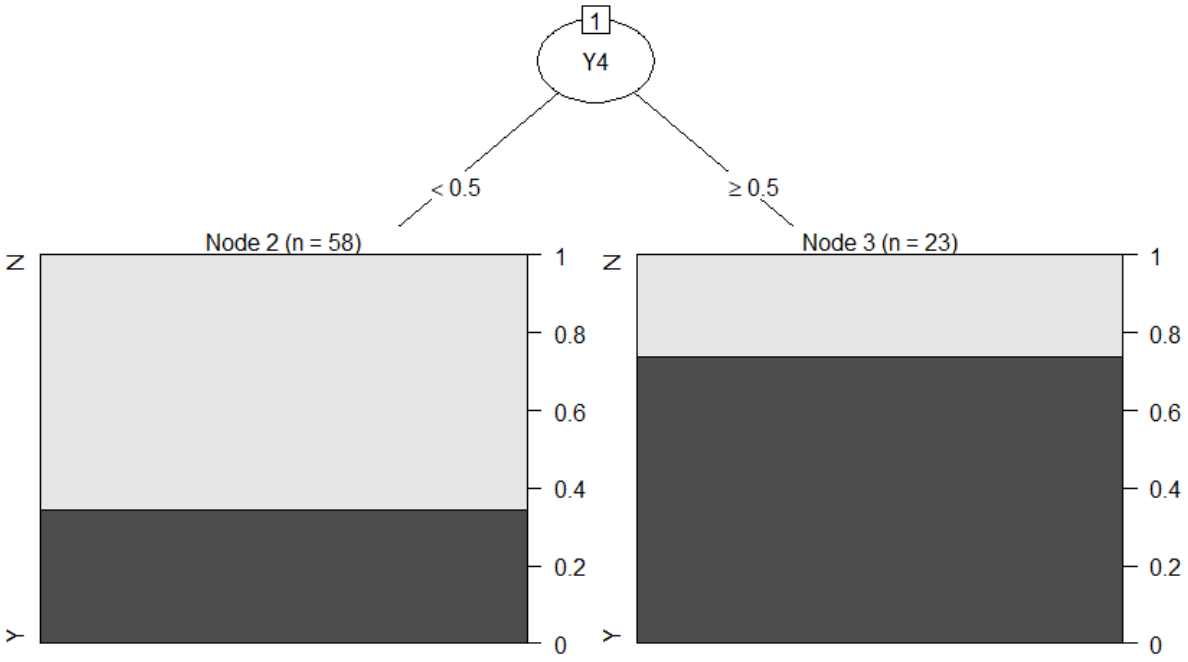
Plot 4 - DT over X with Group 0

Plot 4 represents the Decision Tree over Group 0 set but with the Predictors though X1-X7. This DT predicts with an accuracy of 77% (0.77).



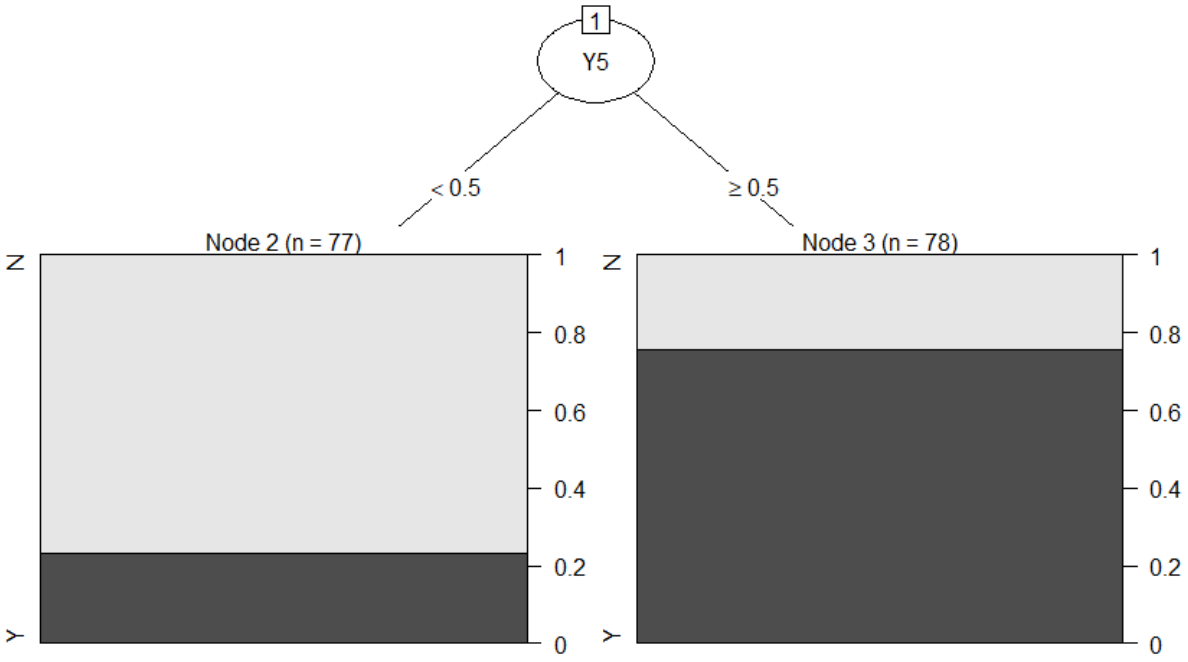
Plot 5 - DT over X with Group 1

Plot 5 represents the Decision Tree over Group 1 set but with the Predictors though X1-X7. This DT predicts with an accuracy of 78% (0.78).



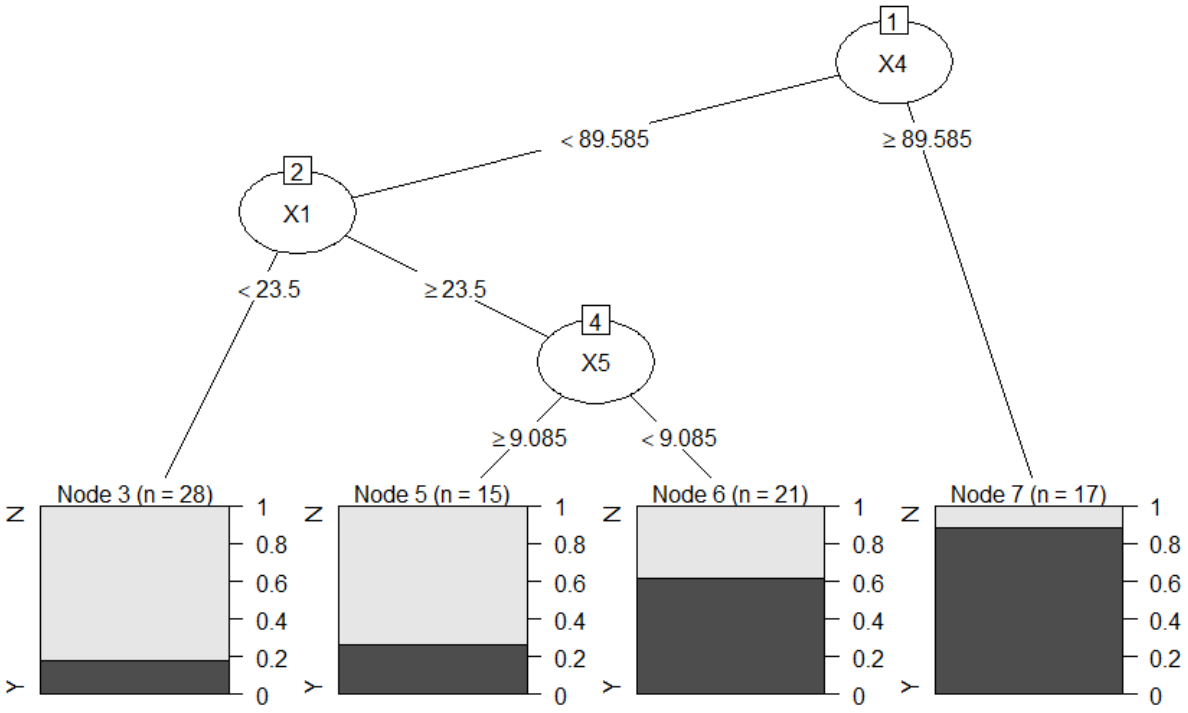
Plot 6 - DT over Y with Group 0

Plot 6 represents the Decision Tree over Group 0 set but with the Predictors though Y1-Y7. This DT predicts with an accuracy of 72% (0.72).



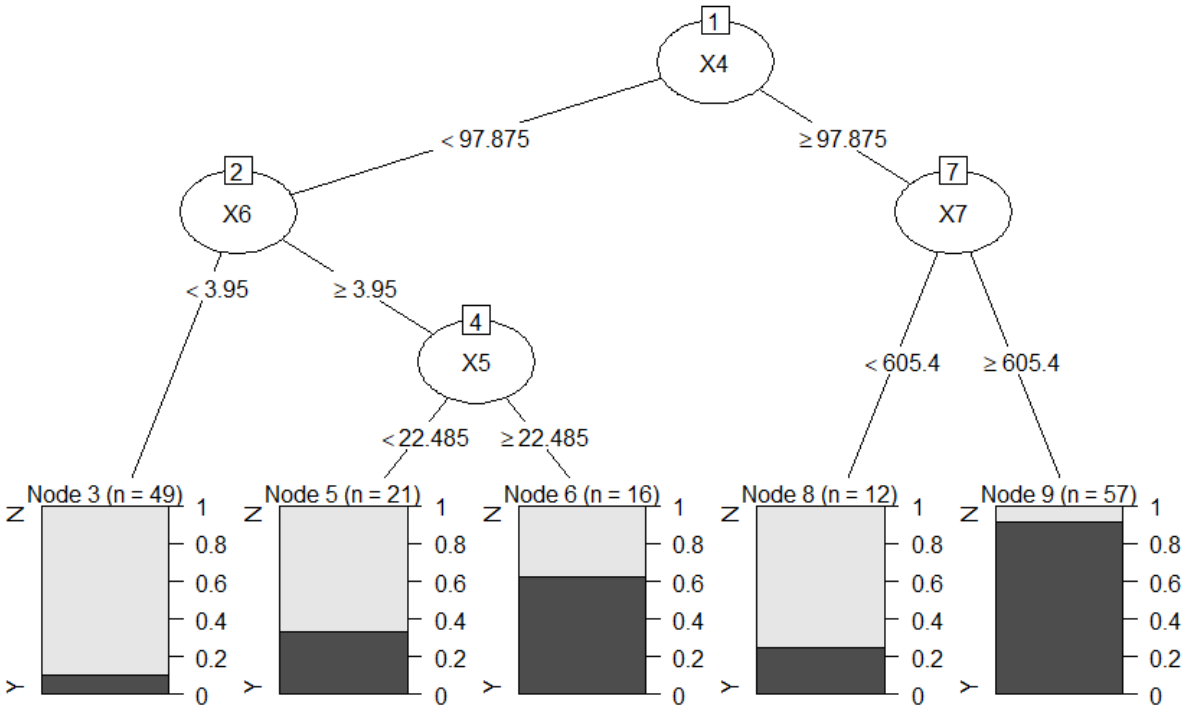
Plot 7 - DT over Y with Group 1

Plot 7 represents the Decision Tree over Group 1 set but with the Predictors though Y1-Y7. This DT predicts with an accuracy of 75% (0.75).



Plot 8 - DT over X and Y with Group 0

Plot 8 represents the Decision Tree over Group 0 set but with the Predictors though X1-X7 and Y1-Y7. This DT predicts with an accuracy of 77% (0.77).



Plot 9 - DT over X and Y with Group 1

Plot 9 represents the Decision Tree over Group 1 set but with the Predictors though X1-X7 and Y1-Y7. This DT predicts with an accuracy of 80% (0.8).

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 80%** - see **Plot 9** for the DT. 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 (0.5032258 0.4967742)
   2) X4< 97.875 86 22 N (0.7441860 0.2558140)
     4) X6< 3.95 49  5 N (0.8979592 0.1020408) *
     5) X6>=3.95 37 17 N (0.5405405 0.4594595)
      10) X5< 22.485 21  7 N (0.6666667 0.3333333) *
      11) X5>=22.485 16  6 Y (0.3750000 0.6250000) *
   3) X4>=97.875 69 14 Y (0.2028986 0.7971014)
     6) X7< 605.4 12  3 N (0.7500000 0.2500000) *
     7) X7>=605.4 57  5 Y (0.0877193 0.9122807) *
```

Though the DT's in Plot 1 and Plot 3 also have an accuracy of 80% - Plot 9 is better because it give a consistent accuracy of 80% when tested with different `rpart` configurations like minsplit, minbucket and maxdepth, more over it splits less frequently.

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

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