Staples PE

Decision Tree Model

## Call:  
## rpart(formula = Decision\_Criterion ~ Conversion + Price\_Comp +   
## OA\_Bounce\_rate + OA\_Cart\_Views + OA\_Visit\_Freq, data = Staples\_Aggr\_Monthly\_Dec\_Train)  
## n= 839   
##   
## CP nsplit rel error xerror xstd  
## 1 0.27923628 0 1.0000000 1.0883055 0.03443395  
## 2 0.08114558 1 0.7207637 0.7279236 0.03325260  
## 3 0.03579952 2 0.6396181 0.6754177 0.03268403  
## 4 0.03102625 4 0.5680191 0.6682578 0.03259792  
## 5 0.01431981 5 0.5369928 0.5847255 0.03143267  
## 6 0.01193317 6 0.5226730 0.5799523 0.03135677  
## 7 0.01000000 7 0.5107399 0.5823389 0.03139485  
##   
## Variable importance  
## Conversion OA\_Cart\_Views Price\_Comp OA\_Visit\_Freq OA\_Bounce\_rate   
## 32 29 26 7 6   
##   
## Node number 1: 839 observations, complexity param=0.2792363  
## predicted class=1 expected loss=0.4994041 P(node) =1  
## class counts: 420 419  
## probabilities: 0.501 0.499   
## left son=2 (392 obs) right son=3 (447 obs)  
## Primary splits:  
## Price\_Comp < 1.255 to the right, improve=33.071690, (0 missing)  
## Conversion < 0.105 to the left, improve=15.906430, (0 missing)  
## OA\_Visit\_Freq < 41.045 to the left, improve= 9.623099, (0 missing)  
## OA\_Cart\_Views < 634 to the left, improve= 9.560619, (0 missing)  
## OA\_Bounce\_rate < 31.71 to the left, improve= 5.072384, (0 missing)  
## Surrogate splits:  
## OA\_Cart\_Views < 654 to the left, agree=0.633, adj=0.214, (0 split)  
## OA\_Visit\_Freq < 44.485 to the left, agree=0.578, adj=0.097, (0 split)  
## OA\_Bounce\_rate < 8.93 to the left, agree=0.571, adj=0.082, (0 split)  
## Conversion < 0.245 to the left, agree=0.559, adj=0.056, (0 split)  
##   
## Node number 2: 392 observations, complexity param=0.03579952  
## predicted class=1 expected loss=0.3494898 P(node) =0.4672229  
## class counts: 255 137  
## probabilities: 0.651 0.349   
## left son=4 (66 obs) right son=5 (326 obs)  
## Primary splits:  
## Conversion < 0.495 to the right, improve=13.246120, (0 missing)  
## OA\_Cart\_Views < 448.5 to the right, improve= 9.523887, (0 missing)  
## OA\_Bounce\_rate < 21.775 to the right, improve= 7.127056, (0 missing)  
## OA\_Visit\_Freq < 48.8 to the right, improve= 3.884111, (0 missing)  
## Price\_Comp < 2.04 to the right, improve= 3.780656, (0 missing)  
##   
## Node number 3: 447 observations, complexity param=0.08114558  
## predicted class=2 expected loss=0.3691275 P(node) =0.5327771  
## class counts: 165 282  
## probabilities: 0.369 0.631   
## left son=6 (112 obs) right son=7 (335 obs)  
## Primary splits:  
## OA\_Cart\_Views < 484.5 to the left, improve=23.879980, (0 missing)  
## Conversion < 0.195 to the left, improve=21.550910, (0 missing)  
## Price\_Comp < 1.235 to the left, improve= 6.181561, (0 missing)  
## OA\_Visit\_Freq < 38.835 to the left, improve= 5.716487, (0 missing)  
## OA\_Bounce\_rate < 25.885 to the left, improve= 5.178898, (0 missing)  
## Surrogate splits:  
## OA\_Visit\_Freq < 22.495 to the left, agree=0.781, adj=0.125, (0 split)  
## Conversion < 0.055 to the left, agree=0.770, adj=0.080, (0 split)  
## OA\_Bounce\_rate < 4.015 to the left, agree=0.767, adj=0.071, (0 split)  
##   
## Node number 4: 66 observations  
## predicted class=1 expected loss=0.06060606 P(node) =0.07866508  
## class counts: 62 4  
## probabilities: 0.939 0.061   
##   
## Node number 5: 326 observations, complexity param=0.03579952  
## predicted class=1 expected loss=0.4079755 P(node) =0.3885578  
## class counts: 193 133  
## probabilities: 0.592 0.408   
## left son=10 (232 obs) right son=11 (94 obs)  
## Primary splits:  
## Conversion < 0.405 to the left, improve=16.722660, (0 missing)  
## OA\_Bounce\_rate < 21.775 to the right, improve= 7.736022, (0 missing)  
## OA\_Visit\_Freq < 29.245 to the left, improve= 5.475470, (0 missing)  
## Price\_Comp < 2.04 to the right, improve= 5.460881, (0 missing)  
## OA\_Cart\_Views < 448.5 to the right, improve= 5.321901, (0 missing)  
## Surrogate splits:  
## OA\_Cart\_Views < 2567 to the left, agree=0.73, adj=0.064, (0 split)  
##   
## Node number 6: 112 observations  
## predicted class=1 expected loss=0.3482143 P(node) =0.1334923  
## class counts: 73 39  
## probabilities: 0.652 0.348   
##   
## Node number 7: 335 observations, complexity param=0.03102625  
## predicted class=2 expected loss=0.2746269 P(node) =0.3992849  
## class counts: 92 243  
## probabilities: 0.275 0.725   
## left son=14 (17 obs) right son=15 (318 obs)  
## Primary splits:  
## Conversion < 0.125 to the left, improve=13.228550, (0 missing)  
## Price\_Comp < 1.235 to the left, improve= 3.315458, (0 missing)  
## OA\_Visit\_Freq < 41.605 to the left, improve= 2.958386, (0 missing)  
## OA\_Bounce\_rate < 30.235 to the left, improve= 2.203859, (0 missing)  
## OA\_Cart\_Views < 1026.5 to the right, improve= 1.119665, (0 missing)  
##   
## Node number 10: 232 observations  
## predicted class=1 expected loss=0.3060345 P(node) =0.2765197  
## class counts: 161 71  
## probabilities: 0.694 0.306   
##   
## Node number 11: 94 observations, complexity param=0.01431981  
## predicted class=2 expected loss=0.3404255 P(node) =0.1120381  
## class counts: 32 62  
## probabilities: 0.340 0.660   
## left son=22 (50 obs) right son=23 (44 obs)  
## Primary splits:  
## OA\_Cart\_Views < 753.5 to the right, improve=10.300040, (0 missing)  
## OA\_Visit\_Freq < 48.87 to the right, improve= 4.598480, (0 missing)  
## Price\_Comp < 1.63 to the left, improve= 3.496717, (0 missing)  
## OA\_Bounce\_rate < 18.175 to the right, improve= 3.423577, (0 missing)  
## Conversion < 0.455 to the right, improve= 2.026942, (0 missing)  
## Surrogate splits:  
## OA\_Bounce\_rate < 6.915 to the right, agree=0.734, adj=0.432, (0 split)  
## OA\_Visit\_Freq < 45.66 to the right, agree=0.691, adj=0.341, (0 split)  
## Price\_Comp < 1.475 to the left, agree=0.649, adj=0.250, (0 split)  
## Conversion < 0.455 to the right, agree=0.574, adj=0.091, (0 split)  
##   
## Node number 14: 17 observations  
## predicted class=1 expected loss=0.1176471 P(node) =0.02026222  
## class counts: 15 2  
## probabilities: 0.882 0.118   
##   
## Node number 15: 318 observations  
## predicted class=2 expected loss=0.2421384 P(node) =0.3790226  
## class counts: 77 241  
## probabilities: 0.242 0.758   
##   
## Node number 22: 50 observations, complexity param=0.01193317  
## predicted class=1 expected loss=0.44 P(node) =0.05959476  
## class counts: 28 22  
## probabilities: 0.560 0.440   
## left son=44 (27 obs) right son=45 (23 obs)  
## Primary splits:  
## Price\_Comp < 1.335 to the right, improve=2.4242190, (0 missing)  
## OA\_Cart\_Views < 1022.5 to the left, improve=1.6988240, (0 missing)  
## OA\_Visit\_Freq < 46.695 to the right, improve=1.5675360, (0 missing)  
## OA\_Bounce\_rate < 7.1 to the left, improve=0.7891841, (0 missing)  
## Conversion < 0.415 to the right, improve=0.2811960, (0 missing)  
## Surrogate splits:  
## OA\_Cart\_Views < 1211.5 to the left, agree=0.66, adj=0.261, (0 split)  
## OA\_Bounce\_rate < 26.395 to the left, agree=0.62, adj=0.174, (0 split)  
## OA\_Visit\_Freq < 50.485 to the left, agree=0.62, adj=0.174, (0 split)  
## Conversion < 0.415 to the right, agree=0.56, adj=0.043, (0 split)  
##   
## Node number 23: 44 observations  
## predicted class=2 expected loss=0.09090909 P(node) =0.05244338  
## class counts: 4 40  
## probabilities: 0.091 0.909   
##   
## Node number 44: 27 observations  
## predicted class=1 expected loss=0.2962963 P(node) =0.03218117  
## class counts: 19 8  
## probabilities: 0.704 0.296   
##   
## Node number 45: 23 observations  
## predicted class=2 expected loss=0.3913043 P(node) =0.02741359  
## class counts: 9 14  
## probabilities: 0.391 0.609

Decision Tree

## 

Model Validation

## Predict  
## Actual 1 2  
## 1 138 50  
## 2 56 114

## Actual Predict value Decision  
## 1: 2 2 114 True Positive  
## 2: 2 1 56 True Negative  
## 3: 1 2 50 False Positive  
## 4: 1 1 138 False Negative

## 1 2 Per\_Correct  
## 1 138 50 38.54749  
## 2 56 114 31.84358

## [1] 70.39106

Classification Accuracy

