Course3 - Task2

Question1

For each method, did you experiment with adjusting the input values until you did not see an improvement in the error metrics?

DECISION TREE MODEL

Tune Length:

Tune length =15 has the best accuracy of 91% for the cp value 0.0015020027. As you can see even though cp value increase the accuracy doesn't improve.

```
> dTreeTuneLengthModel
CART

7919 samples
   6 predictor
   2 classes: '0', '1'

Pre-processing: centered (6), scaled (6)
Resampling: Cross-Validated (10 fold, repeated 3 times)
Summary of sample sizes: 7128, 7128, 7126, 7127, 7128, 7126, ...
Resampling results across tuning parameters:

  cp            Accuracy   Kappa
  0.0006675567  0.9117328  0.8125211
  0.0007788162  0.9132486  0.8159582
  0.0008344459  0.9132908  0.8160364
  0.0010013351  0.9146374  0.8192057
  0.0011682243  0.9148059  0.8194728
  0.0012238540  0.9148059  0.8194728
  0.0015020027  0.9156902  0.8213445
  0.0050066756  0.9118593  0.8147250
  0.0080106809  0.9090386  0.8094315
  0.0126835781  0.9008734  0.7932340
  0.0133511348  0.9006208  0.7926356
  0.0503337784  0.8808849  0.7536127
  0.0627503338  0.7724877  0.5376569
  0.0857810414  0.7423041  0.4661881
  0.1011348465  0.6574430  0.1510971

Accuracy was used to select the optimal model using the largest value.
The final value used for the model was cp = 0.001502003.
```

Tune Grid:

Tune Grid has the best accuracy of 90 % for the cp value 0.01. As you can see even though cp value increase the accuracy doesn't improve.

```
> dTreeTuneGridModel
CART

7919 samples
   6 predictor
   2 classes: '0', '1'

Pre-processing: centered (6), scaled (6)
Resampling: Cross-Validated (10 fold, repeated 3 times)
Summary of sample sizes: 7127, 7126, 7128, 7126, 7128, 7126, ...
Resampling results across tuning parameters:

  cp    Accuracy   Kappa
  0.00  0.9070194  0.8024513
  0.01  0.9082389  0.8081655
  0.02  0.9009563  0.7937074
  0.03  0.9009563  0.7937074
  0.04  0.9009563  0.7937074
  0.05  0.8796634  0.7511356
  0.06  0.7779149  0.5477896
  0.07  0.7647030  0.5238701
  0.08  0.7639033  0.5216815
  0.09  0.7324165  0.4409831
  0.10  0.6919702  0.2868719

Accuracy was used to select the optimal model using the largest value.
The final value used for the model was cp = 0.01.
```

C5.0 MODEL

Tune Length

Tune length has the best accuracy of 91 % for the Trials-30 ,winnow= true & model= tree. As you can see the accuracy doesn't improve even though the values are changing.

```
> c50TuneLengthModel
C5.0

7919 samples
   6 predictor
   2 classes: '0', '1'

No pre-processing
Resampling: Cross-Validated (10 fold, repeated 10 times)
Summary of sample sizes: 7127, 7128, 7127, 7128, 7126, 7127, ...
Resampling results across tuning parameters:

  model  winnow  trials  Accuracy   Kappa
  rules  FALSE     1     0.9004959  0.7924936
  rules  FALSE    10     0.9169969  0.8229608
  rules  FALSE    20     0.9181961  0.8260610
  rules  FALSE    30     0.9180195  0.8258764
  rules  FALSE    40     0.9180069  0.8258658
  rules  FALSE    50     0.9181205  0.8261182
  rules  FALSE    60     0.9181079  0.8260977
  rules  FALSE    70     0.9181079  0.8260977
  rules  FALSE    80     0.9181079  0.8260977
  rules  FALSE    90     0.9181079  0.8260977
  rules  FALSE   100     0.9181079  0.8260977
  rules   TRUE     1     0.9014181  0.7945835
  rules   TRUE    10     0.9175152  0.8237146
  rules   TRUE    20     0.9183986  0.8262369
  rules   TRUE    30     0.9181333  0.8258508
  rules   TRUE    40     0.9182848  0.8261955
  rules   TRUE    50     0.9182848  0.8261955
  rules   TRUE    60     0.9182848  0.8261955
  rules   TRUE    70     0.9182848  0.8261955
  rules   TRUE    80     0.9182848  0.8261955
  rules   TRUE    90     0.9182848  0.8261955
  rules   TRUE   100     0.9182848  0.8261955
  tree   FALSE     1     0.8996880  0.7907210
  tree   FALSE    10     0.9177041  0.8252353
  tree   FALSE    20     0.9176538  0.8253323
  tree   FALSE    30     0.9173380  0.8247781
  tree   FALSE    40     0.9169843  0.8241164
  tree   FALSE    50     0.9169590  0.8240537
  tree   FALSE    60     0.9169338  0.8239954
  tree   FALSE    70     0.9169338  0.8239954
  tree   FALSE    80     0.9169338  0.8239954
  tree   FALSE    90     0.9169338  0.8239954
  tree   FALSE   100     0.9169338  0.8239954
  tree    TRUE     1     0.9010391  0.7937669
  tree    TRUE    10     0.9191314  0.8282457
  tree    TRUE    20     0.9189162  0.8281150
  tree    TRUE    30     0.9193202  0.8290543
  tree    TRUE    40     0.9191056  0.8286550
  tree    TRUE    50     0.9191687  0.8287896
  tree    TRUE    60     0.9191687  0.8287896
  tree    TRUE    70     0.9191687  0.8287896
  tree    TRUE    80     0.9191687  0.8287896
  tree    TRUE    90     0.9191687  0.8287896
  tree    TRUE   100     0.9191687  0.8287896

Accuracy was used to select the optimal model using the largest value.
The final values used for the model were trials = 30, model = tree and winnow = TRUE.
```

Tune Grid:

Tune Grid has the best accuracy of 91 % for the Trials-30 & winnow= false. As you can see, the accuracy doesn't improve even though the values are changing.

```
> c50TuneGridModel
C5.0

7919 samples
   6 predictor
   2 classes: '0', '1'

No pre-processing
Resampling: Cross-Validated (10 fold, repeated 10 times)
Summary of sample sizes: 7127, 7127, 7127, 7128, 7127, 7126, ...
Resampling results across tuning parameters:

  winnow  trials  Accuracy   Kappa
  FALSE    1      0.8941012  0.7795201
  FALSE    5      0.9151155  0.8199188
  FALSE   10      0.9173135  0.8244648
  FALSE   15      0.9177682  0.8256858
  FALSE   20      0.9177558  0.8257522
  FALSE   25      0.9177429  0.8257937
  FALSE   30      0.9183367  0.8270989
   TRUE    1      0.8963242  0.7842569
   TRUE    5      0.9176413  0.8253970
   TRUE   10      0.9195487  0.8292036
   TRUE   15      0.9194602  0.8292733
   TRUE   20      0.9199527  0.8303323
   TRUE   25      0.9196625  0.8299161
   TRUE   30      0.9203822  0.8314175

Tuning parameter 'model' was held constant at a value of tree
Accuracy was used to select the optimal model using the largest value.
The final values used for the model were trials = 30, model = tree and winnow = TRUE.
```

GBM MODEL

Default

No tune parameters for the model. The best accuracy is 92% for interaction depth=30 & ntree=150.

```
> gbmDefaultModel
Stochastic Gradient Boosting

7919 samples
   6 predictor
   2 classes: '0', '1'

No pre-processing
Resampling: Cross-Validated (10 fold, repeated 10 times)
Summary of sample sizes: 7127, 7127, 7127, 7127, 7128, 7128, ...
Resampling results across tuning parameters:

  interaction.depth  n.trees  Accuracy   Kappa
  1                   50      0.7348797  0.4396138
  1                  100      0.7351829  0.4384784
  1                  150      0.7351069  0.4374349
  2                   50      0.8238299  0.6322036
  2                  100      0.8814625  0.7524828
  2                  150      0.9100383  0.8104705
  3                   50      0.8781924  0.7479431
  3                  100      0.9113645  0.8140227
  3                  150      0.9205834  0.8324992

Tuning parameter 'shrinkage' was held constant at a value of 0.1
Tuning parameter 'n.minobsinnode' was held constant at a value of 10
Accuracy was used to select the optimal model using the largest value.
The final values used for the model were n.trees = 150, interaction.depth = 3, shrinkage = 0.1 and n.minobsinnode = 10.
```

Tune Length

Tune length has the best accuracy of 92 % for the Interaction depth=3, ntrees= 250. As you can see, the accuracy doesn't improve even though the values are changing.

```
> gbmTuneLengthModel
Stochastic Gradient Boosting

7919 samples
   6 predictor
   2 classes: '0', '1'

No pre-processing
Resampling: Cross-Validated (10 fold, repeated 10 times)
Summary of sample sizes: 7128, 7128, 7127, 7128, 7127, 7126, ...
Resampling results across tuning parameters:

  interaction.depth  n.trees  Accuracy   Kappa
  1                   50      0.7343876  0.4381999
  1                  100      0.7346398  0.4373185
  1                  150      0.7347919  0.4370508
  1                  200      0.7350321  0.4369819
  1                  250      0.7353351  0.4371450
  1                  300      0.7360800  0.4384135
  1                  350      0.7359415  0.4378553
  1                  400      0.7360930  0.4379804
  2                   50      0.8214439  0.6275996
  2                  100      0.8811125  0.7518863
  2                  150      0.9096756  0.8097383
  2                  200      0.9162537  0.8231259
  2                  250      0.9199160  0.8306103
  2                  300      0.9221132  0.8351200
  2                  350      0.9230604  0.8371010
  2                  400      0.9232497  0.8374883
  3                   50      0.8758079  0.7431400
  3                  100      0.9104060  0.8120554
  3                  150      0.9208752  0.8329938
  3                  200      0.9237669  0.8388047
  3                  250      0.9240700  0.8393476
  3                  300      0.9232872  0.8375852
  3                  350      0.9226683  0.8362582
  3                  400      0.9221379  0.8350847
  4                   50      0.8944218  0.7809527
  4                  100      0.9201297  0.8317627
  4                  150      0.9230088  0.8373289
  4                  200      0.9233502  0.8378869
  4                  250      0.9226811  0.8363654
  4                  300      0.9218731  0.8345580
  4                  350      0.9215955  0.8339495
  4                  400      0.9210393  0.8326984
  5                   50      0.9216842  0.8348186
  5                  100      0.9237548  0.8387572
  5                  150      0.9238176  0.8387263
  5                  200      0.9232243  0.8373422
  5                  250      0.9221760  0.8350854
  5                  300      0.9211028  0.8327796
  5                  350      0.9204836  0.8314026
  5                  400      0.9201555  0.8306194
  6                   50      0.9239562  0.8392375
  6                  100      0.9240189  0.8391189
  6                  150      0.9230848  0.8370204
  6                  200      0.9215949  0.8337591
  6                  250      0.9209760  0.8324267
  6                  300      0.9203318  0.8310321
  6                  350      0.9190943  0.8283509
  6                  400      0.9186402  0.8273628
  7                   50      0.9240071  0.8392303
  7                  100      0.9238172  0.8386177
  7                  150      0.9220876  0.8348415
  7                  200      0.9210776  0.8326276
  7                  250      0.9197011  0.8296486
  7                  300      0.9191582  0.8285121
  7                  350      0.9181227  0.8262837
  7                  400      0.9180850  0.8261872
  8                   50      0.9236282  0.8383080
  8                  100      0.9229968  0.8367754
  8                  150      0.9215446  0.8336302
  8                  200      0.9202946  0.8309288
  8                  250      0.9192468  0.8287121
  8                  300      0.9185903  0.8272843
  8                  350      0.9177186  0.8254032
  8                  400      0.9176173  0.8251804

Tuning parameter 'shrinkage' was held constant at a value of 0.1
Tuning parameter 'n.minobsinnode' was held constant at a value of 10
Accuracy was used to select the optimal model using the largest value.
The final values used for the model were n.trees = 250, interaction.depth = 3, shrinkage = 0.1 and n.minobsinnode = 10.
```

Tune Grid

Tune Grid has the best accuracy of 92 % for the interaction depth=5 & ntrees=100. As you can see, the accuracy doesn't improve even though the values are changing.

```
> gbmTuneGridModel
Stochastic Gradient Boosting

7919 samples
   6 predictor
   2 classes: '0', '1'

No pre-processing
Resampling: Cross-Validated (10 fold, repeated 10 times)
Summary of sample sizes: 7128, 7128, 7128, 7127, 7127, 7126, ...
Resampling results across tuning parameters:

  interaction.depth  n.trees  Accuracy   Kappa
  1                    50     0.7349906  0.4391465
  1                   100     0.7351291  0.4384359
  1                   150     0.7353568  0.4382218
  1                   200     0.7359251  0.4388694
  1                   250     0.7363672  0.4393277
  1                   300     0.7364429  0.4391969
  1                   350     0.7364809  0.4389498
  1                   400     0.7365693  0.4389693
  1                   450     0.7367838  0.4392691
  1                   500     0.7366954  0.4390924
  1                   550     0.7366321  0.4387952
  1                   600     0.7366073  0.4387340
  1                   650     0.7369102  0.4392120
  1                   700     0.7368723  0.4391341
  1                   750     0.7368343  0.4389537
  1                   800     0.7369732  0.4392171
  1                   850     0.7367583  0.4388156
  1                   900     0.7370867  0.4393731
  1                   950     0.7370617  0.4392942
  1                  1000     0.7367458  0.4386274
  1                  1050     0.7365816  0.4382031
  1                  1100     0.7363416  0.4377749
  1                  1150     0.7366447  0.4382282
  1                  1200     0.7366825  0.4382581
  1                  1250     0.7367075  0.4382016
  1                  1300     0.7367457  0.4383285
  1                  1350     0.7362152  0.4371457
  1                  1400     0.7364046  0.4376219
  1                  1450     0.7364680  0.4377194
  1                  1500     0.7365437  0.4378349
  5                    50     0.9216183  0.8347295
  5                   100     0.9250287  0.8414182
  5                   150     0.9238035  0.8387062
  5                   200     0.9232476  0.8374077
  5                   250     0.9218837  0.8344906
  5                   300     0.9209621  0.8324817
  5                   350     0.9203184  0.8310919
  5                   400     0.9189037  0.8280620
  5                   450     0.9184492  0.8270044
  5                   500     0.9180450  0.8261647
  5                   550     0.9175149  0.8250145
```

```
  5                   600     0.9173258  0.8245908
  5                   650     0.9166434  0.8231667
  5                   700     0.9164286  0.8226884
  5                   750     0.9161887  0.8221772
  5                   800     0.9157973  0.8213274
  5                   850     0.9154944  0.8206888
  5                   900     0.9152039  0.8200834
  5                   950     0.9151536  0.8199337
  5                  1000     0.9152038  0.8200526
  5                  1050     0.9145222  0.8186218
  5                  1100     0.9139285  0.8173603
  5                  1150     0.9137517  0.8169223
  5                  1200     0.9136252  0.8166711
  5                  1250     0.9135241  0.8164907
  5                  1300     0.9133220  0.8160407
  5                  1350     0.9131071  0.8156019
  5                  1400     0.9128295  0.8150024
  5                  1450     0.9125014  0.8143163
  5                  1500     0.9125772  0.8144631
  9                    50     0.9239302  0.8388501
  9                   100     0.9225412  0.8357801
  9                   150     0.9212276  0.8328888
  9                   200     0.9201664  0.8305771
  9                   250     0.9186768  0.8273922
  9                   300     0.9181966  0.8263291
  9                   350     0.9171993  0.8242203
  9                   400     0.9168207  0.8234038
  9                   450     0.9160122  0.8216588
  9                   500     0.9162520  0.8221754
  9                   550     0.9150391  0.8195964
  9                   600     0.9148371  0.8191962
  9                   650     0.9144078  0.8182506
  9                   700     0.9141934  0.8178197
  9                   750     0.9138020  0.8169671
  9                   800     0.9134609  0.8162571
  9                   850     0.9132713  0.8158535
  9                   900     0.9129937  0.8152973
  9                   950     0.9126780  0.8146211
  9                  1000     0.9124254  0.8141229
  9                  1050     0.9125894  0.8144685
  9                  1100     0.9121474  0.8134994
  9                  1150     0.9121474  0.8135248
  9                  1200     0.9120338  0.8132701
  9                  1250     0.9118823  0.8129406
  9                  1300     0.9119709  0.8130774
  9                  1350     0.9116676  0.8124728
  9                  1400     0.9115667  0.8122866
  9                  1450     0.9110618  0.8111903
  9                  1500     0.9111375  0.8113578

Tuning parameter 'shrinkage' was held constant at a value of 0.1
Tuning parameter 'n.minobsinnode' was held constant at a value of 20
Accuracy was used to select the optimal model using the largest value.
The final values used for the model were n.trees = 100, interaction.depth = 5, shrinkage = 0.1 and n.minobsinnode = 20.
```

ROC

ROChas the best accuracy of 92 % for the interaction depth=9 & ntrees=50. As you can see, the accuracy doesn't improve even though the values are changing.

```
> gbmROCModel
Stochastic Gradient Boosting

7919 samples
   6 predictor
   2 classes: 'X0', 'X1'

No pre-processing
Resampling: Cross-Validated (10 fold, repeated 10 times)
Summary of sample sizes: 7127, 7127, 7126, 7127, 7127, 7128, ...
Resampling results across tuning parameters:

  interaction.depth  n.trees  Accuracy   Kappa
  1                    50     0.7353325  0.4401118
  1                   100     0.7355978  0.4387712
  1                   150     0.7362922  0.4397234
  1                   200     0.7363302  0.4393393
  1                   250     0.7365195  0.4393540
  1                   300     0.7367343  0.4392591
  1                   350     0.7369742  0.4396124
  1                   400     0.7370500  0.4395790
  1                   450     0.7369617  0.4392976
  1                   500     0.7367597  0.4387875
  1                   550     0.7366713  0.4385686
  1                   600     0.7366716  0.4384779
  1                   650     0.7367598  0.4385631
  1                   700     0.7366837  0.4384048
  1                   750     0.7365830  0.4382143
  1                   800     0.7366714  0.4384023
  1                   850     0.7365196  0.4378728
  1                   900     0.7367219  0.4384142
  1                   950     0.7366587  0.4380964
  1                  1000     0.7366965  0.4380412
  1                  1050     0.7364821  0.4376162
  1                  1100     0.7364819  0.4376619
  1                  1150     0.7363557  0.4373537
  1                  1200     0.7366083  0.4378196
  1                  1250     0.7361534  0.4368876
  1                  1300     0.7359388  0.4364184
  1                  1350     0.7359264  0.4362850
  1                  1400     0.7357369  0.4359183
  1                  1450     0.7357621  0.4358912
  1                  1500     0.7362419  0.4369198
  5                    50     0.9217950  0.8350872
  5                   100     0.9243964  0.8401480
  5                   150     0.9239041  0.8389370
  5                   200     0.9232601  0.8374892
  5                   250     0.9220984  0.8349632
  5                   300     0.9205449  0.8316701
  5                   350     0.9201406  0.8307198
  5                   400     0.9198250  0.8300056
  5                   450     0.9192567  0.8287618
  5                   500     0.9184863  0.8270488
  5                   550     0.9178045  0.8256263
```

```
  5                   600     0.9174510  0.8248518
  5                   650     0.9168324  0.8235407
  5                   700     0.9161125  0.8220081
  5                   750     0.9158474  0.8214236
  5                   800     0.9153551  0.8203336
  5                   850     0.9151276  0.8198394
  5                   900     0.9147615  0.8190640
  5                   950     0.9143195  0.8180953
  5                  1000     0.9143196  0.8180965
  5                  1050     0.9144078  0.8182897
  5                  1100     0.9138016  0.8169884
  5                  1150     0.9140796  0.8175793
  5                  1200     0.9139404  0.8173033
  5                  1250     0.9139279  0.8172646
  5                  1300     0.9138900  0.8172100
  5                  1350     0.9138522  0.8171062
  5                  1400     0.9134106  0.8161650
  5                  1450     0.9130187  0.8153408
  5                  1500     0.9128292  0.8149550
  9                    50     0.9245221  0.8400976
  9                   100     0.9230447  0.8368150
  9                   150     0.9213530  0.8331325
  9                   200     0.9198121  0.8297959
  9                   250     0.9190544  0.8282151
  9                   300     0.9186877  0.8273789
  9                   350     0.9177158  0.8253083
  9                   400     0.9171600  0.8241201
  9                   450     0.9165037  0.8226699
  9                   500     0.9164276  0.8225389
  9                   550     0.9156446  0.8208873
  9                   600     0.9151774  0.8198789
  9                   650     0.9149627  0.8193954
  9                   700     0.9146471  0.8187675
  9                   750     0.9145209  0.8184589
  9                   800     0.9140663  0.8175149
  9                   850     0.9138387  0.8170671
  9                   900     0.9131823  0.8156741
  9                   950     0.9131949  0.8157007
  9                  1000     0.9130561  0.8153466
  9                  1050     0.9127277  0.8146900
  9                  1100     0.9126648  0.8145942
  9                  1150     0.9121092  0.8133817
  9                  1200     0.9119451  0.8130575
  9                  1250     0.9120208  0.8132051
  9                  1300     0.9120964  0.8133736
  9                  1350     0.9120207  0.8131983
  9                  1400     0.9120211  0.8132655
  9                  1450     0.9119831  0.8131308
  9                  1500     0.9118186  0.8128115

Tuning parameter 'shrinkage' was held constant at a value of 0.1
Tuning parameter 'n.minobsinnode' was held constant at a value of 20
Accuracy was used to select the optimal model using the largest value.
The final values used for the model were n.trees = 50, interaction.depth = 9, shrinkage = 0.1 and n.minobsinnode = 20.
```

RANDOM FOREST MODEL

Tune Length

Tune length has the best accuracy of 92 % for mtry=2. As you can see, even though mtry value increases, the accuracy doesn't improve .

```
> rfTuneLengthModel
Random Forest

7919 samples
   6 predictor
   2 classes: '0', '1'

No pre-processing
Resampling: Cross-Validated (10 fold, repeated 3 times)
Summary of sample sizes: 7127, 7126, 7127, 7128, 7126, 7128, ...
Resampling results across tuning parameters:

  mtry  Accuracy   Kappa
  2     0.9215836  0.8339370
  3     0.9207412  0.8318668
  4     0.9187636  0.8274740
  5     0.9163634  0.8223327
  6     0.9140485  0.8174408

Accuracy was used to select the optimal model using the largest value.
The final value used for the model was mtry = 2.
```

Tune Grid

Tune Grid has the best accuracy of 92 % for mtry=2. As you can see, even though mtry value increases, the accuracy doesn't improve .

```
> rfTuneGridModel
Random Forest

7919 samples
   6 predictor
   2 classes: '0', '1'

No pre-processing
Resampling: Cross-Validated (10 fold, repeated 3 times)
Summary of sample sizes: 7127, 7127, 7126, 7126, 7127, 7128, ...
Resampling results across tuning parameters:

  mtry  Accuracy   Kappa
  1     0.8685015  0.7120302
  2     0.9220861  0.8350195
  3     0.9211186  0.8326470
  4     0.9200246  0.8302171
  5     0.9179201  0.8256654
  6     0.9153939  0.8201895

Accuracy was used to select the optimal model using the largest value.
The final value used for the model was mtry = 2.
```

Question 2
Did you include a brief explanation of your rationale for selecting the training model you did?

Because it's a classification problem, I chose the below Algorithms to help find the best models.

- Decision Tree Algorithm
- Stochastic Gradient Boosting Algorithm
- C5.0 Algorithm
- Random Forest Algorithm

Question 3
Did you provide a simple chart that displays which brand Blackwell customers prefer?

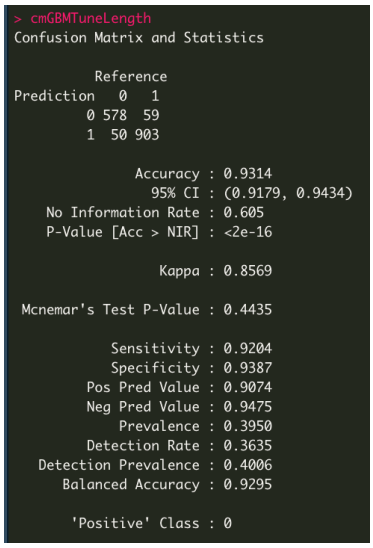
Best Decision Tree Model - Confusion Matrix

```
> cmTreeTuneLength
Confusion Matrix and Statistics

          Reference
Prediction   0   1
         0 568  59
         1  60 903

               Accuracy : 0.9252
                 95% CI : (0.9111, 0.9376)
    No Information Rate : 0.605
    P-Value [Acc > NIR] : <2e-16

                  Kappa : 0.8434

 Mcnemar's Test P-Value : 1

            Sensitivity : 0.9045
            Specificity : 0.9387
         Pos Pred Value : 0.9059
         Neg Pred Value : 0.9377
             Prevalence : 0.3950
         Detection Rate : 0.3572
   Detection Prevalence : 0.3943
      Balanced Accuracy : 0.9216

       'Positive' Class : 0
```

Best C50 Model - Confusion Matrix

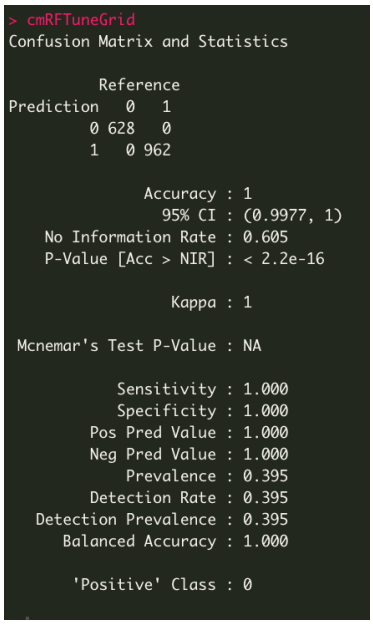
```
> cmC50TuneLength
Confusion Matrix and Statistics

          Reference
Prediction   0   1
         0 572  42
         1  56 920

               Accuracy : 0.9384
                 95% CI : (0.9254, 0.9497)
    No Information Rate : 0.605
    P-Value [Acc > NIR] : <2e-16

                  Kappa : 0.8705

 Mcnemar's Test P-Value : 0.1891

            Sensitivity : 0.9108
            Specificity : 0.9563
         Pos Pred Value : 0.9316
         Neg Pred Value : 0.9426
             Prevalence : 0.3950
         Detection Rate : 0.3597
   Detection Prevalence : 0.3862
      Balanced Accuracy : 0.9336

       'Positive' Class : 0
```

Best GBM Mode - Confusion Matrix



```
> cmGBMTuneLength
Confusion Matrix and Statistics

          Reference
Prediction   0   1
         0 578  59
         1  50 903

               Accuracy : 0.9314
                 95% CI : (0.9179, 0.9434)
    No Information Rate : 0.605
    P-Value [Acc > NIR] : <2e-16

                  Kappa : 0.8569

 Mcnemar's Test P-Value : 0.4435

            Sensitivity : 0.9204
            Specificity : 0.9387
         Pos Pred Value : 0.9074
         Neg Pred Value : 0.9475
             Prevalence : 0.3950
         Detection Rate : 0.3635
   Detection Prevalence : 0.4006
      Balanced Accuracy : 0.9295

       'Positive' Class : 0
```

Best Random Forest Model



```
> cmRFTuneGrid
Confusion Matrix and Statistics

          Reference
Prediction   0   1
         0 628   0
         1   0 962

               Accuracy : 1
                 95% CI : (0.9977, 1)
    No Information Rate : 0.605
    P-Value [Acc > NIR] : < 2.2e-16

                  Kappa : 1

 Mcnemar's Test P-Value : NA

            Sensitivity : 1.000
            Specificity : 1.000
         Pos Pred Value : 1.000
         Neg Pred Value : 1.000
             Prevalence : 0.395
         Detection Rate : 0.395
   Detection Prevalence : 0.395
      Balanced Accuracy : 1.000

       'Positive' Class : 0
```

Conclusion

If you check the above the confusion matrices for all the models, the fraction of Brand-1 (SONY) is more compared to Brand-0 (ACER). Hence we can say that SONY if preferred more compared to ACER. Also the Prediction accuracy on the Incomplete

Survey data points to the same inference where in Sony is preferred compared to ACER.

Did you include the logs of the results of each classifier run? - PFA