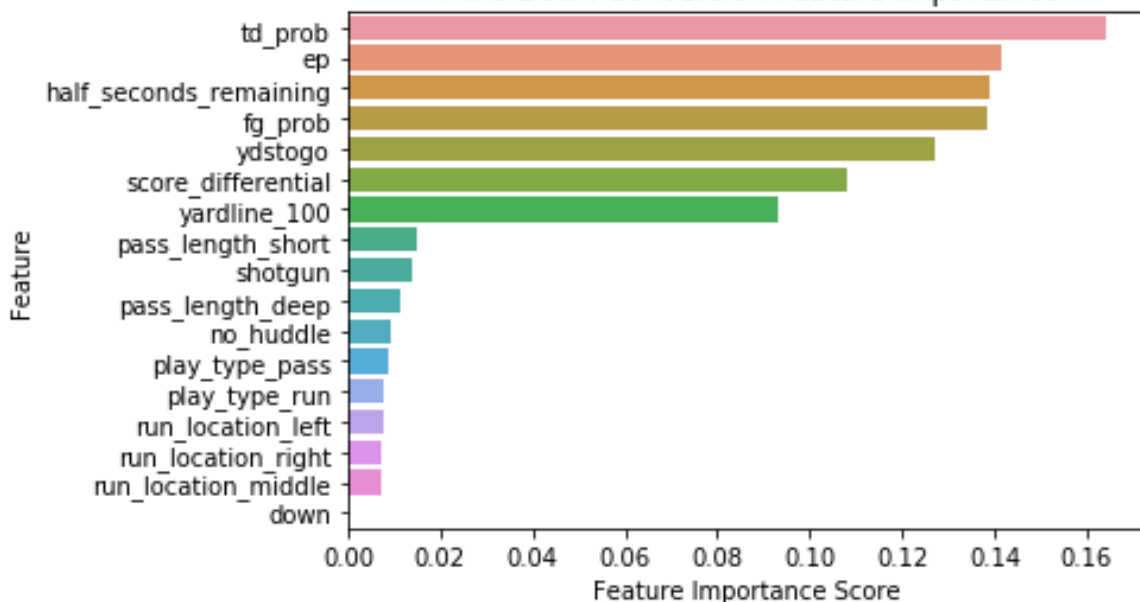


3rd Down Conversion Random Forest Model (n=19704)

Third Down Conversion Feature Importance



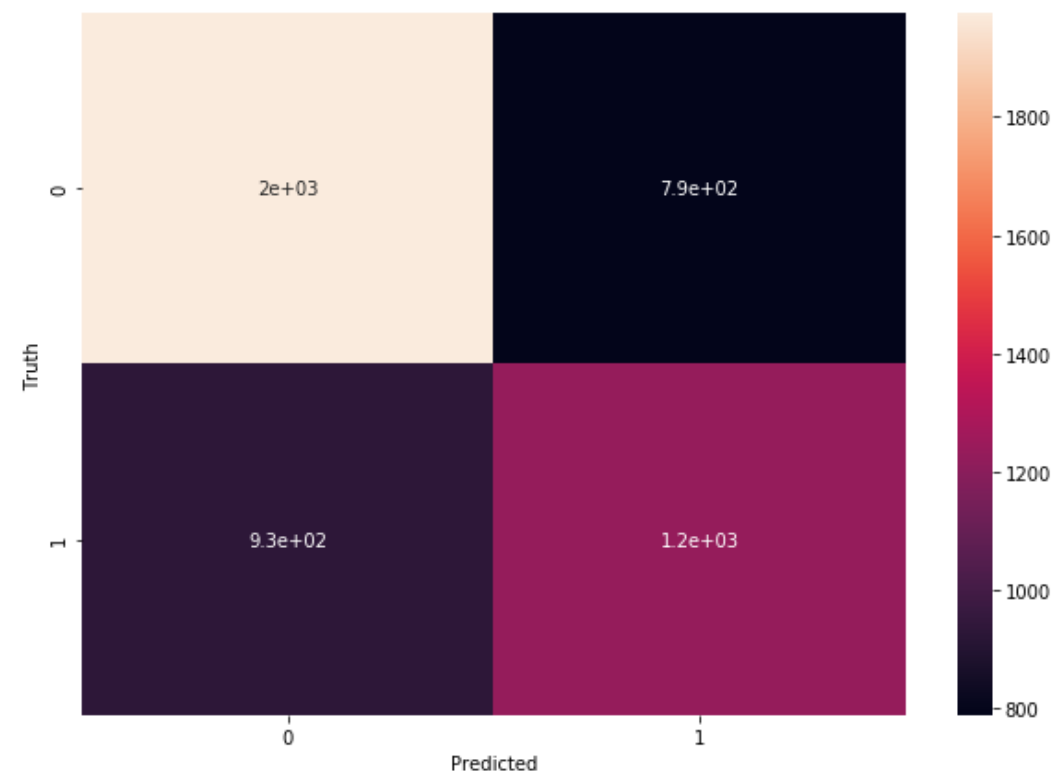
td_prob	0.164064
ep	0.141578
half_seconds_remaining	0.138833
fg_prob	0.138533
ydstogo	0.127071
score_differential	0.107931
yardline_100	0.093181
pass_length_short	0.014770
shotgun	0.014157
pass_length_deep	0.011359
no_huddle	0.009486
play_type_pass	0.008891
play_type_run	0.007926
run_location_left	0.007526
run_location_right	0.007461
run_location_middle	0.007232

Confusion Matrix:

```
[[1975  789]
 [ 931 1231]]
```

Classification Report

	precision	recall	f1-score	support
0.0	0.68	0.71	0.70	2764
1.0	0.61	0.57	0.59	2162
micro avg	0.65	0.65	0.65	4926
macro avg	0.64	0.64	0.64	4926
weighted avg	0.65	0.65	0.65	4926



3rd Down Run/Pass Random Forest Confusion Matrix (pass=0, run=1)

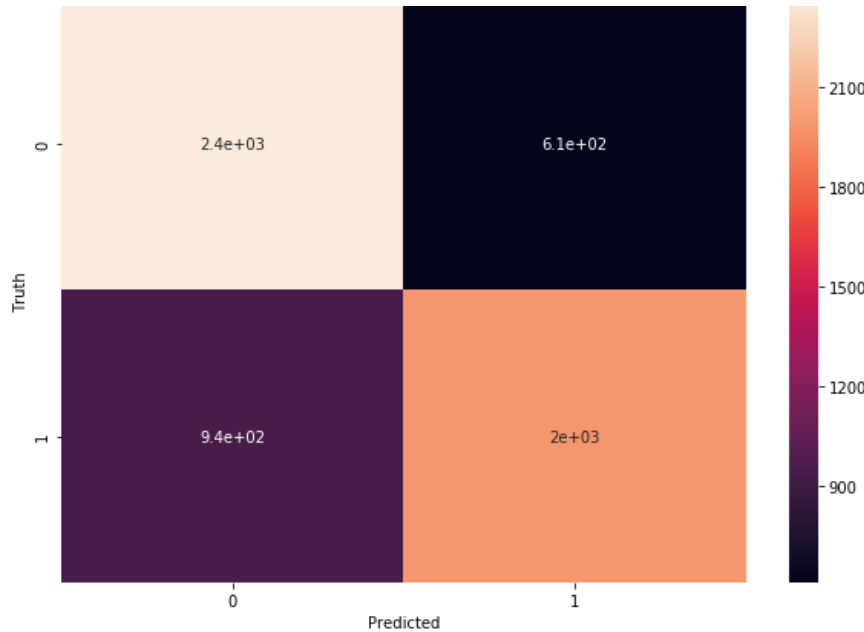
3rd Down Run/Pass No YTG Constraints

Confusion Matrix:

```
[[2366 609]
 [ 943 1994]]
```

Classification Report

	precision	recall	f1-score	support
0	0.72	0.80	0.75	2975
1	0.77	0.68	0.72	2937
micro avg	0.74	0.74	0.74	5912
macro avg	0.74	0.74	0.74	5912
weighted avg	0.74	0.74	0.74	5912



n = 19704

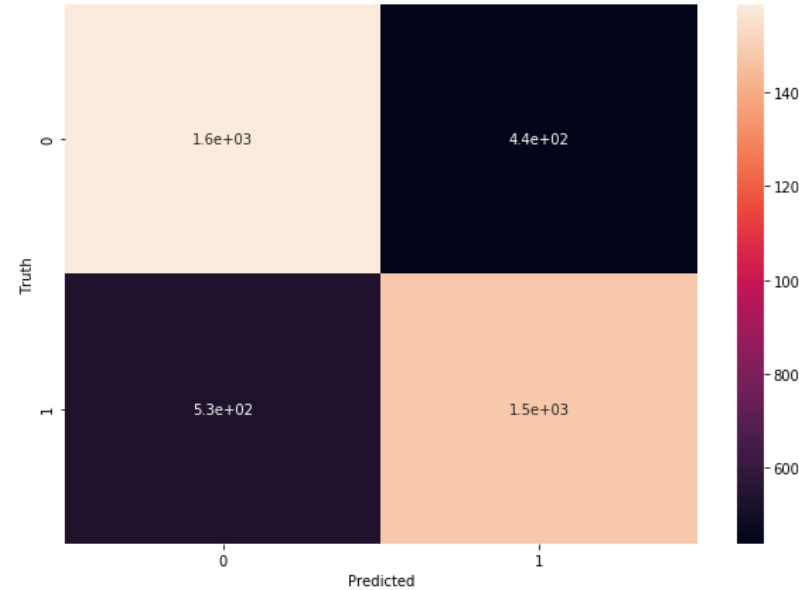
3rd Down Run/Pass <=5 YTG

Confusion Matrix:

```
[[1587 438]
 [ 528 1482]]
```

Classification Report

	precision	recall	f1-score	support
0	0.75	0.78	0.77	2025
1	0.77	0.74	0.75	2010
micro avg	0.76	0.76	0.76	4035
macro avg	0.76	0.76	0.76	4035
weighted avg	0.76	0.76	0.76	4035



n = 13450

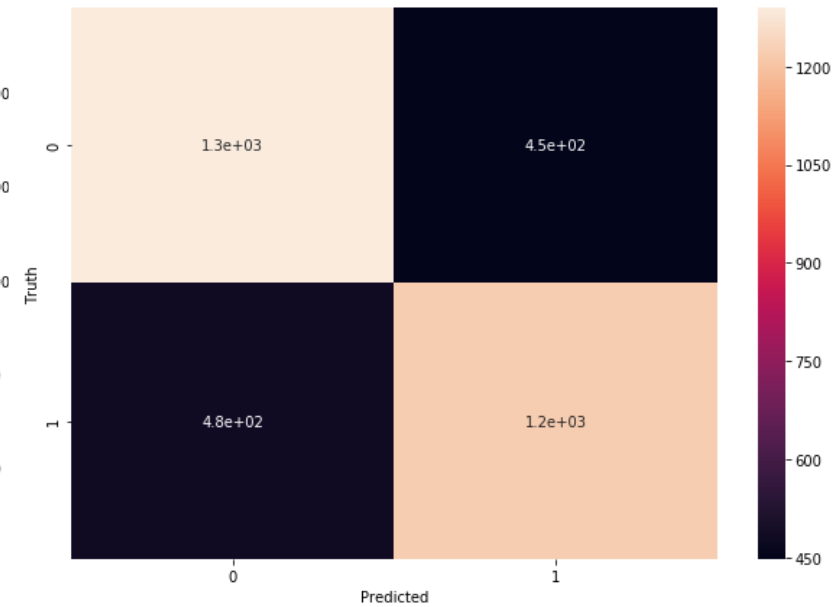
3rd Down Run/Pass <=3 YTG

Confusion Matrix:

```
[[1289 449]
 [ 482 1223]]
```

Classification Report

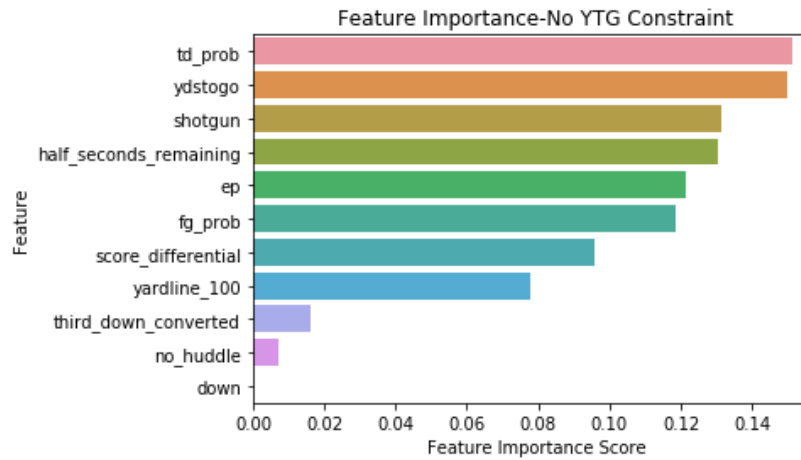
	precision	recall	f1-score	support
0	0.73	0.74	0.73	1738
1	0.73	0.72	0.72	1705
micro avg	0.73	0.73	0.73	3443
macro avg	0.73	0.73	0.73	3443
weighted avg	0.73	0.73	0.73	3443



n = 11474

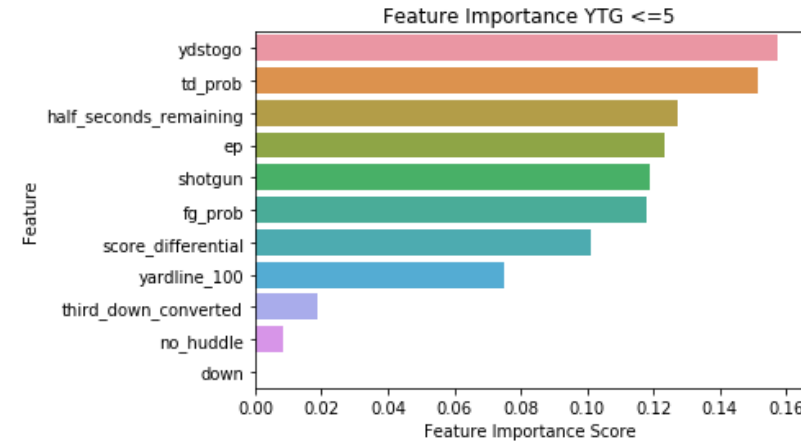
3rd Down Run/Pass Random Forest Feature Weights

- 3rd Down Run/Pass No YTG Constraints →



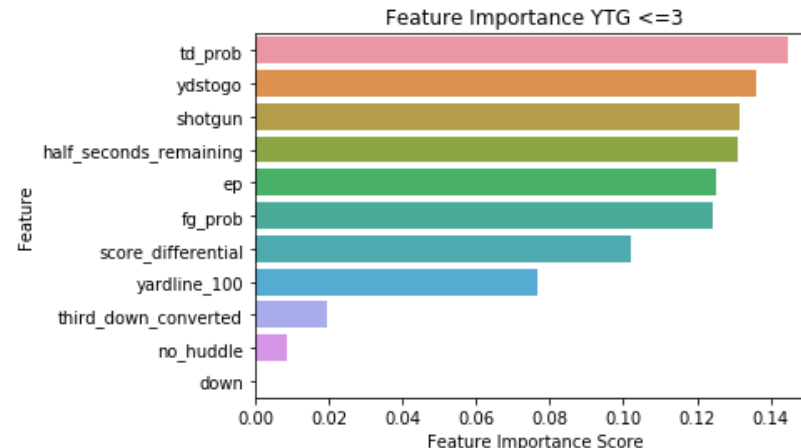
td_prob	0.151187
ydstogo	0.150054
shotgun	0.131456
half_seconds_remaining	0.130214
ep	0.121393
fg_prob	0.118666
score_differential	0.095755
yardline_100	0.077794
third_down_converted	0.016157
no_huddle	0.007325
down	0.000000

- 3rd Down Run/Pass <=5 YTG →



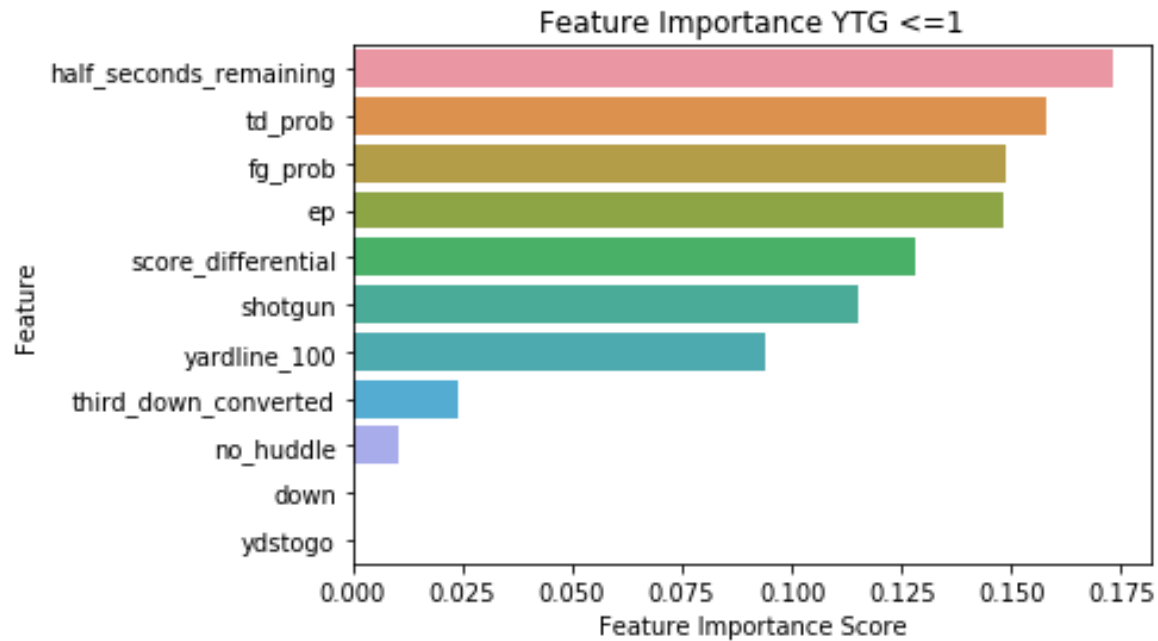
ydstogo	0.157328
td_prob	0.151454
half_seconds_remaining	0.127126
ep	0.123274
shotgun	0.118940
fg_prob	0.117862
score_differential	0.101254
yardline_100	0.075264
third_down_converted	0.018965
no_huddle	0.008533
down	0.000000

- 3rd Down Run/Pass <=3 YTG →



td_prob	0.144581
ydstogo	0.135938
shotgun	0.131683
half_seconds_remaining	0.131126
ep	0.125291
fg_prob	0.124062
score_differential	0.102210
yardline_100	0.076779
third_down_converted	0.019657
no_huddle	0.008673
down	0.000000

3rd Down Run/Pass <=1 Yards to go (n=2946)



half_seconds_remaining	0.173103
td_prob	0.157783
fg_prob	0.148966
ep	0.148276
score_differential	0.128361
shotgun	0.115273
yardline_100	0.093874
third_down_converted	0.023969
no_huddle	0.010394

Confusion Matrix:

```
[[260 178]
 [150 296]]
```

Classification Report

	precision	recall	f1-score	support
0	0.63	0.59	0.61	438
1	0.62	0.66	0.64	446
micro avg	0.63	0.63	0.63	884
macro avg	0.63	0.63	0.63	884
weighted avg	0.63	0.63	0.63	884

