



IDIS 3802:

The Rise, Fall and Potential Comeback of an Empire

Database analysis of NFL Data and the
San Francisco 49ers



What Problems we Addressed?

- 1) What NFL statistics matter and how the 49ers rank in them since their last Super Bowl performance?
- 2) How does the 49ers passing game breakdown?
- 3) How does the 49ers running game breakdown?





1) What NFL statistics matter and how the 49ers rank in them in the past five seasons?

- Run regression models to determine which NFL statistics show the best predictive power associated with Wins
- Top two statistical categories:
 - Turnover %: .92 adjusted R2
 - Scoring Drive %: .91 adjusted R2
- 49ers Ranks in Categories:
 - 2012: TO% (13) SC%(7) Record 11-4-1
 - 2018: TO% (32) SC%(25) Record: 4-14
- Recommendation:** Focus on TO% with Team Building



	W	TO%	Sc%		W	TO%	Sc%
Tm				Tm			
Cleveland Browns	3.857143	11.171429	35.885714	New England Patriots	12.285714	13.357143	30.085714
Jacksonville Jaguars	4.571429	10.000000	35.514286	Seattle Seahawks	10.714286	13.900000	29.257143
Tampa Bay Buccaneers	5.428571	12.757143	38.128571	Los Angeles Chargers	10.500000	13.450000	31.100000
Oakland Raiders	5.714286	9.671429	39.728571	Denver Broncos	10.000000	11.900000	30.514286
New York Jets	6.000000	9.428571	34.528571	Pittsburgh Steelers	10.000000	11.314286	33.800000
Tennessee Titans	6.428571	10.285714	36.914286	Kansas City Chiefs	9.571429	12.671429	33.428571
New York Giants	6.714286	12.928571	35.514286	Los Angeles Rams	9.333333	13.433333	33.366667
St. Louis Rams	6.750000	12.700000	31.900000	Carolina Panthers	9.285714	14.285714	33.714286
San Diego Chargers	6.800000	11.460000	36.160000	Dallas Cowboys	9.142857	11.142857	35.685714
San Francisco 49ers	6.857143	10.357143	34.542857	Green Bay Packers	9.142857	12.000000	36.514286
Washington Redskins	6.857143	13.128571	36.757143	Indianapolis Colts	9.000000	11.642857	35.914286
Chicago Bears	7.000000	13.300000	36.100000	New Orleans Saints	9.000000	12.214286	38.828571
Buffalo Bills	7.285714	12.371429	34.200000	Cincinnati Bengals	8.857143	12.442857	33.742857
Miami Dolphins	7.428571	11.000000	35.428571	Minnesota Vikings	8.857143	11.085714	33.657143
Detroit Lions	7.571429	10.685714	34.828571	Baltimore Ravens	8.571429	11.714286	31.985714
Houston Texans	8.000000	11.157143	31.571429	Philadelphia Eagles	8.571429	12.042857	34.057143

```
df_to = df_teamd.corr()
```

```
df_to.loc['TO%'].nlargest(5)
```

```
TO%    1.000000
TO      0.959832
Int     0.842392
FL      0.651481
W       0.554721
Name: TO%, dtype: float64
```

```
df_sc = df_teamo.corr()
```

```
df_sc.loc['Sc%'].nlargest(6)
```

```
Sc%    1.000000
EXP     0.916799
PF      0.886193
Y/P     0.786419
NY/A    0.786102
Yds     0.773771
Name: Sc%, dtype: float64
```

2) How does the 49ers passing game breakdown?

-Importance of passing as a more efficient way to move the ball

-Issue: number of times the 49ers took advantage of their best moving offense

-How the 49ers do with protecting the QB

Recommendation: Pass more up the middle and deeper



	air_yards	yards_after_catch
pass_location		
left	6.163158	6.320312
middle	9.376812	7.111111
right	6.240984	7.576923

	air_yards	yards_after_catch
pass_length		
deep	23.149254	9.322581
short	4.566745	6.680851

```
df_SF['pass_location'].value_counts()
```

```
left    190
right   166
middle  138
Name: pass_location, dtype: int64
```

```
df_SF['pass_length'].value_counts()
```

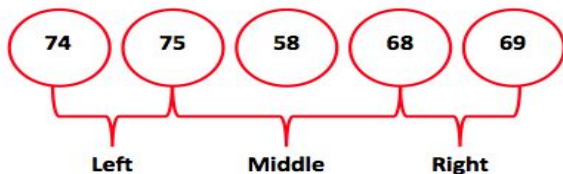
```
short    427
deep     67
Name: pass_length, dtype: int64
```


3) How does the 49ers running game breakdown?

-Splits for running right, left, middle

-Number of plays show the 49ers did not take advantage of efficiency on the outside

Recommendation: Track location efficiency and rely on advantages



```
df_SF.groupby('run_location')['yards_gained'].mean()
```

```
run_location
left      5.333333
middle    3.682692
right     4.620000
Name: yards_gained, dtype: float64
```

```
df_SF['run_location'].value_counts()
```

```
right      150
left       144
middle     104
Name: run_location, dtype: int64
```

```
df_2018.groupby('run_location')['yards_gained'].mean()
```

```
run_location
left      4.875925
middle    4.047632
right     4.894570
Name: yards_gained, dtype: float64
```



So what?

Potential rise of sabermetrics and NFL
Strategy



A BRIEF HISTORY OF SABERMETRICS



Sabermetrics is a science of sport.
It is the empirical analysis of baseball through statistics, used to predict the performance of players, giving teams a winning edge.



Q&A?

**Now onto the
Code!**