NCAA QUARTERBACK ANALYSIS
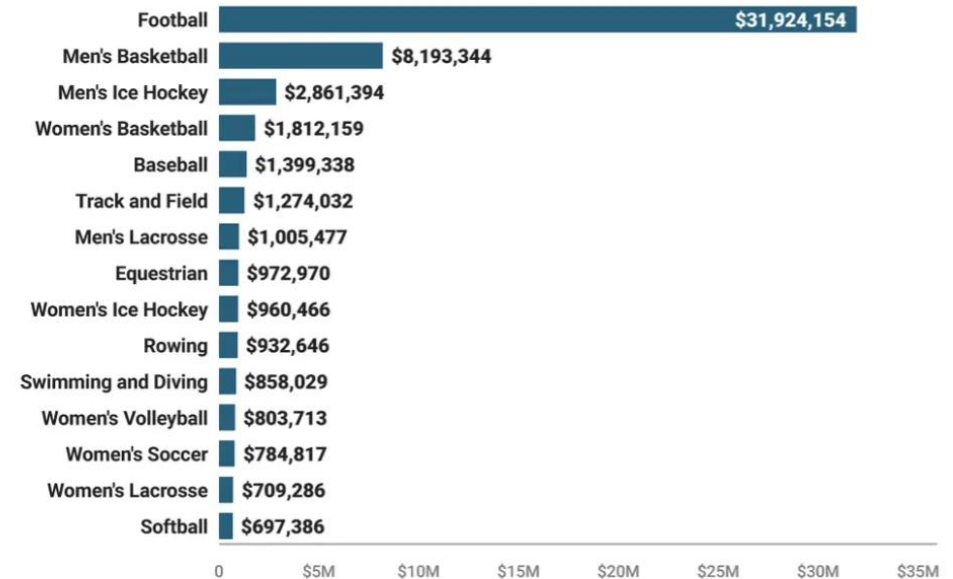
Blake Tolman

blaketolman@outlook.com

BACKGROUND

- College football is the staple of many schools, while also being on of the main sources of revenue for the school

- Colleges have been seen to make up to 70% of their profits through football programs

- Top ranked schools will make around 31$ million a year in revenue

  - The revenue from football equal to the next subsequent 35 sports combined

- The more successful a football program performs the more money they can make, and one of the most influential players is the quarterback.

NCAA AVERAGE REVENUE BY SPORT

Sport	Revenue
Football	$31,924,154
Men's Basketball	$8,193,344
Men's Ice Hockey	$2,861,394
Women's Basketball	$1,812,159
Baseball	$1,399,338
Track and Field	$1,274,032
Men's Lacrosse	$1,005,477
Equestrian	$972,970
Women's Ice Hockey	$960,466
Rowing	$932,646
Swimming and Diving	$858,029
Women's Volleyball	$803,713
Women's Soccer	$784,817
Women's Lacrosse	$709,286
Softball	$697,386

SOURCE: Department of Education based on average revenue from 127 FBS schools

BUSINESS INSIDER

DATA

- The data used was gathered from four different ESPN sources
  1. College Football Total Quarterback Rating(QBR) – (2004-2019) Season Leaders
     - Rates the quarterback on playmaking skill and gives an overall score 0-100
  2. College Football Power Index (2005-2019)
     - Ranks and rates teams offensive defensive and special teams' efficiency
  3. College Football Player Passing Stats (2004-2019)
     - An overview of top performing players and their seasons passing stats
  4. College Football Player Rushing Stats (2004-2019)
     - An overview of top performing players and their seasons passing stats

MODELING

To analyze a quarterback's skill 9 different regression models were analyzed to find what factors influence their score

By finding the best prediction, a school/player can see the most important areas to improve. Ideally increasing the team's skill level and subsequently increase sport revenue

A multivariate regression model had the best fit model with the lowest error and was later test for feature importance's

	Model	R-sq	RMSE	MAE
0	Linear Regression	0.938907	4.26609	3.25493
0	Decision Tree	0.792624	7.85983	5.93007
0	Random Forest	0.900877	5.43402	4.25432
0	Grid Search-(RF)	0.902107	5.40021	4.19218
0	NN-normalized	0.936273	4.3311	3.45474
0	NN-he	0.921332	4.80472	3.86296
0	NN-Lecun	0.92403	4.72163	3.73818
0	NN-RMSprop	0.92765	4.60776	3.73684
0	NN-Adam	0.920315	4.8357	3.79579

QUARTERBACK AGE

- Top conferences : ACC, SEC, BIG10, PAC12

- Bottom conferences : Sun-belt, Independent, C-USA, American

- Bottom tier conference benefit much more from starting an older quarterback then Top conferences

- In bottom conferences the difference between an 18yr old and a 24yr old is a QBR difference of 30 while Top conferences on differ by 15
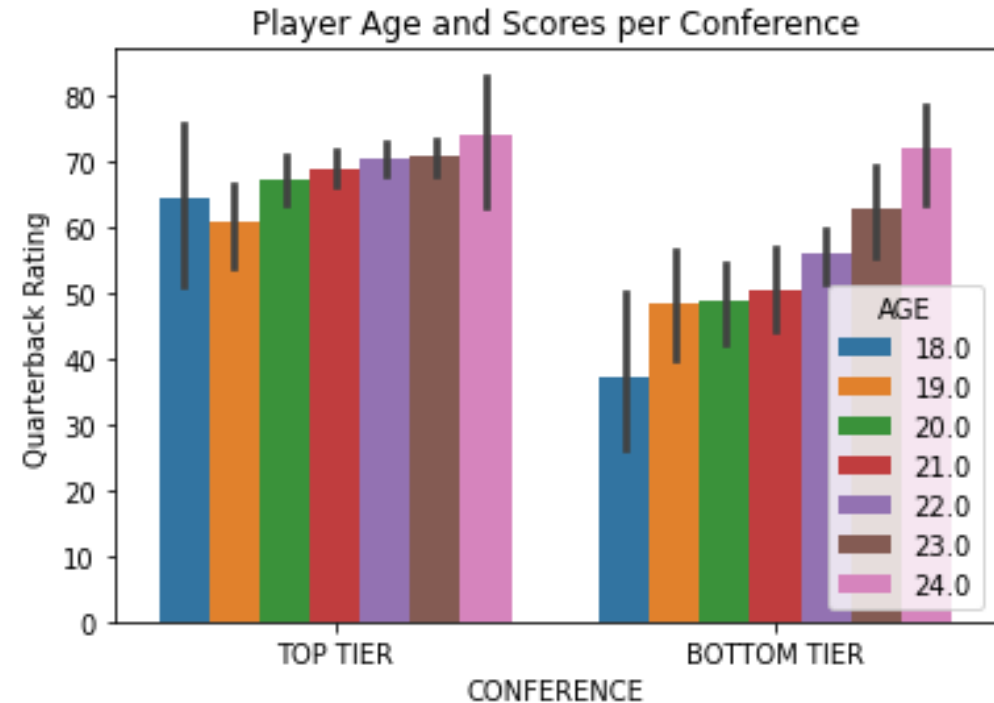
QUARTERBACKS RUSHING AVERAGE

Dual threat quarterbacks are players who have strong skills in both passing and rushing plays

As a quarterback increases their rushing average, the higher their rating increases with less fluctuations

This trend is seen across both high ranking and low-ranking schools

With subsequent analysis, dual-threat players are those with rushing averages over 4 yards

This trend is seen across both high ranking and low-ranking schools
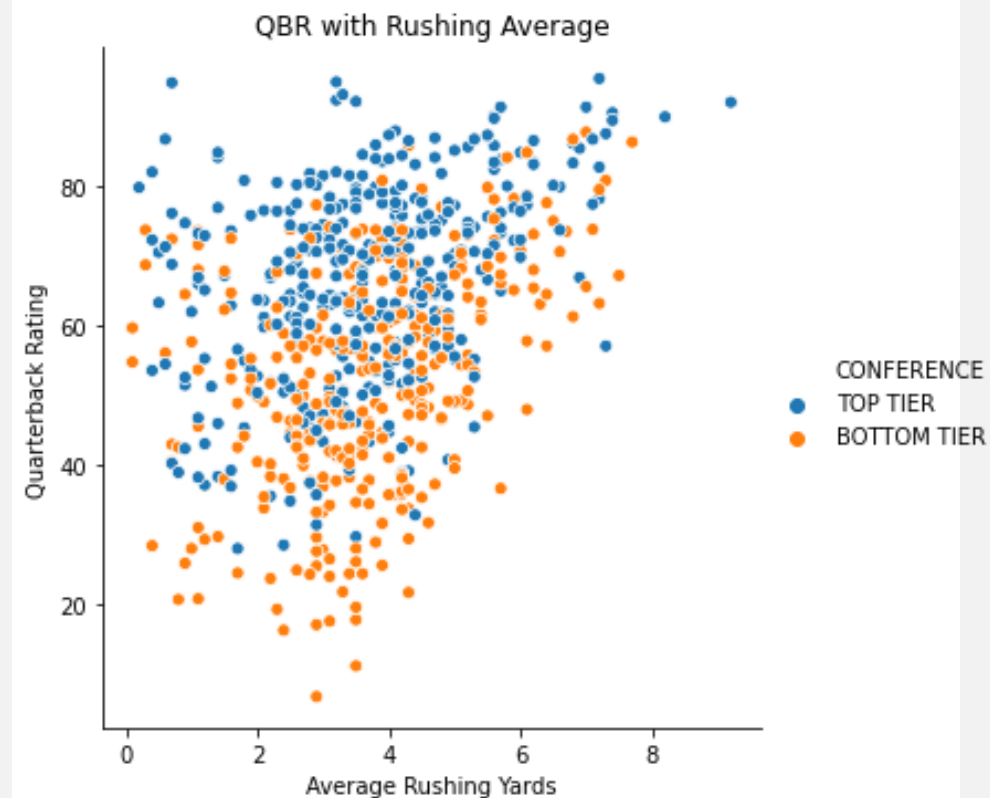
TEAMS INFLUENCE

- The offensive rating is heavily correlated with the quarterback's performance as expected.

- In terms of the defense there is a loosely positive correlation with how the defense plays and the quarterback

- With decreasingly small change in the play style of quarterbacks and their offensive rating, dual-threat quarterbacks more notably outrank standards ones with weaker defenses

- This could suggest the added playstyle of rushing gives the player more adaptivity to change

QBR and Offensive Rating

QBR and Defensive Rating
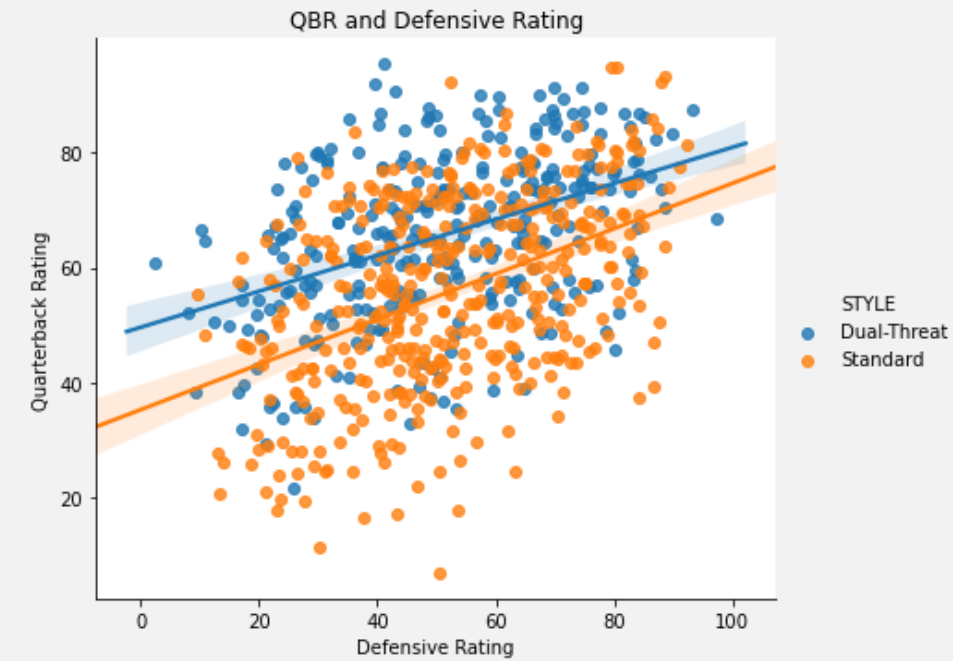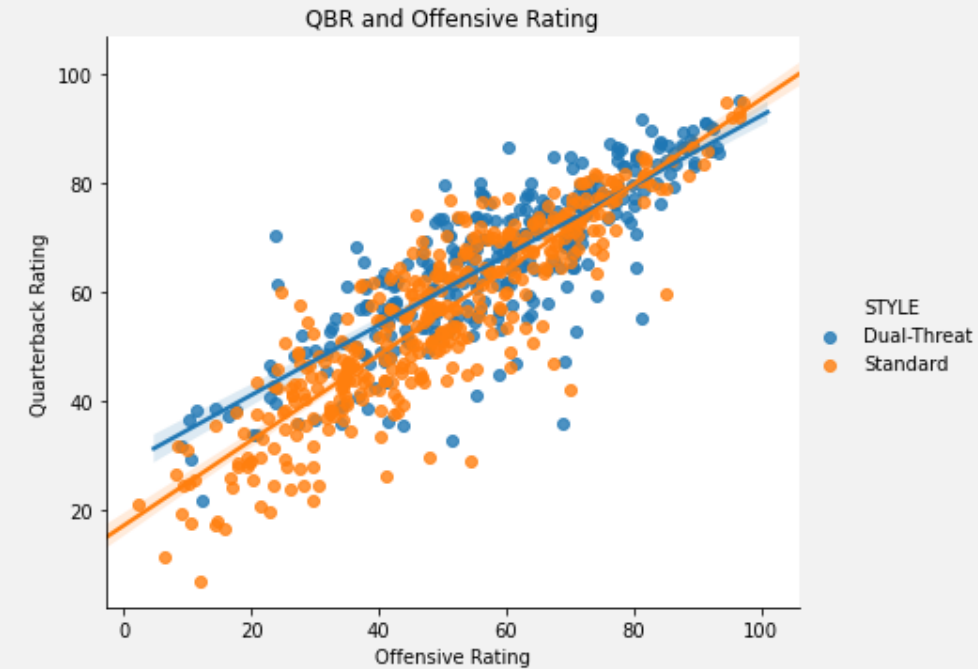
PLAYSTYLE

- At younger ages dual-threat players drastically outperform standard ones

- Its not until around 22 we see that the difference between playstyles is less significant

- Even at older ages dual-threat quarterbacks still typically outperform their counterparts

- Passing plays are riskier than rushing ones, so a quarterback whose main feature is passing is more prone to error
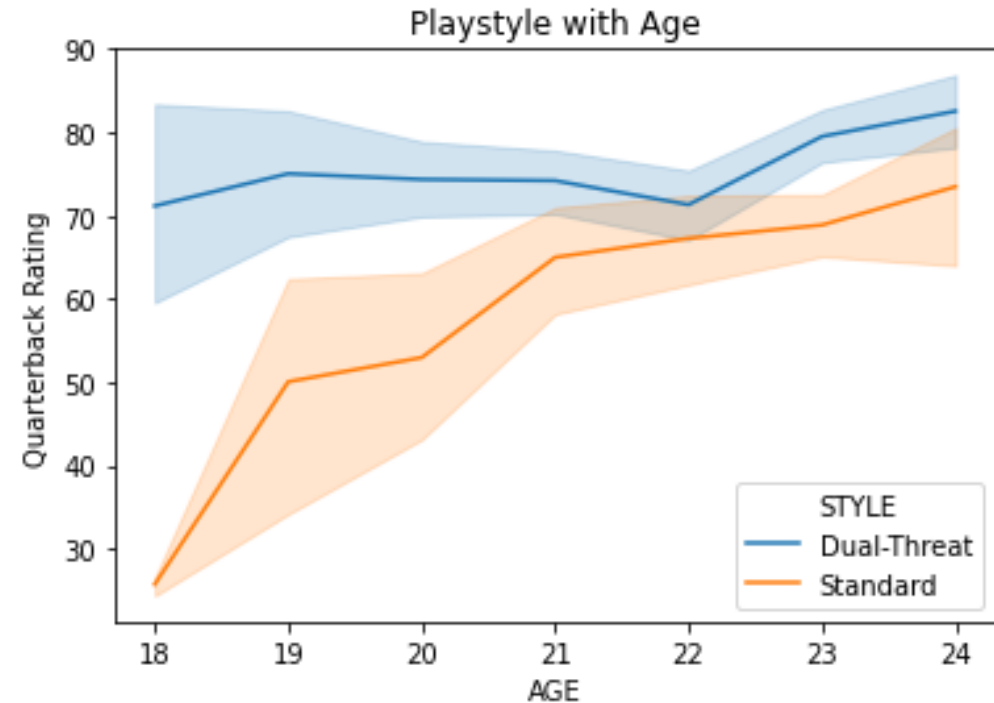
RECOMMENDATIONS

- Recruit older athletes and or redshirt incoming players for a year

- Work on developing more playstyles for quarterbacks to increase their adaptability

- Teams with weaker defenses should focus on a quarterbacks rushing plays

FUTURE WORK

- Look at the rating on athletes before they are recruited to get estimate for how they change

- Gather a complete list of heights and weights of players

- Analyze the ratings of other players on the team

Offensive Leaders

PASSING			YDS
1		Joe Burrow LSU	5,671
2		Anthony Gordon WSU	5,579
3		Cole McDonald HAW	4,135
4		Brady White MEM	4,014
5		Brock Purdy ISU	3,982

THANK YOU