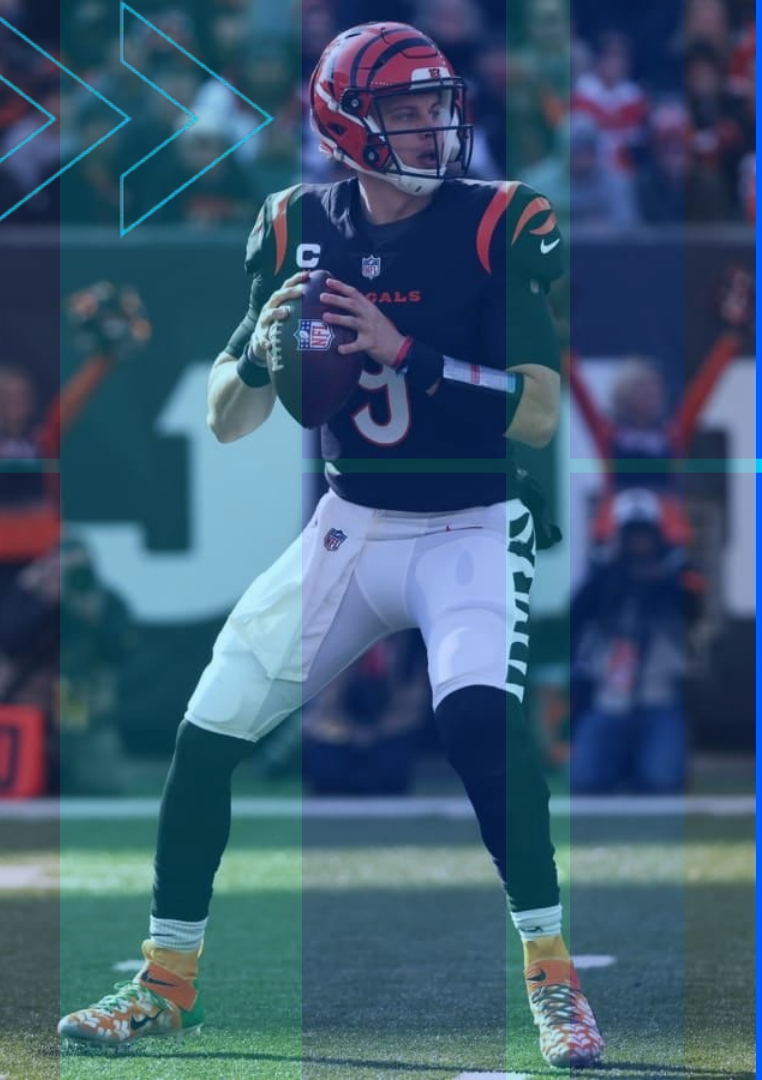
Pass
Forward
Anticipating Quarterback Performance



OBJECTIVE

Use a QB's career data to project future (2023) performance.

Give NFL organizations insight.

Sports betting, Fantasy football.

QB PERFORMANCE

Passing Statistics:

- Yards
- Touchdowns
- Completion %

Common Rating Systems:

- Passer Rating
- ESPN QBR

GRADE

0 - 100

NEGATIVE	OFFENSIVE GRADE	POSITIVE
- Poor throws (independent of outcome) - Turnover in a critical situation	- Passing grade - Rushing grade	- Accurate throws (independent of outcome) - Deep 3rd down conversions - Great pass in a clutch situation

GOAL

Predict **Offensive grade** of NFL QBs in the 2023 season.

CONTENTS

01 DATA

02 ANALYSIS

03 MODELING

04 RESULTS

01
DATA

THE DATASET

288 QBs

From 2006-2023 (18 NFL regular seasons)

1306 Seasons

From backups who only played 1 game to season-long starters who played all games

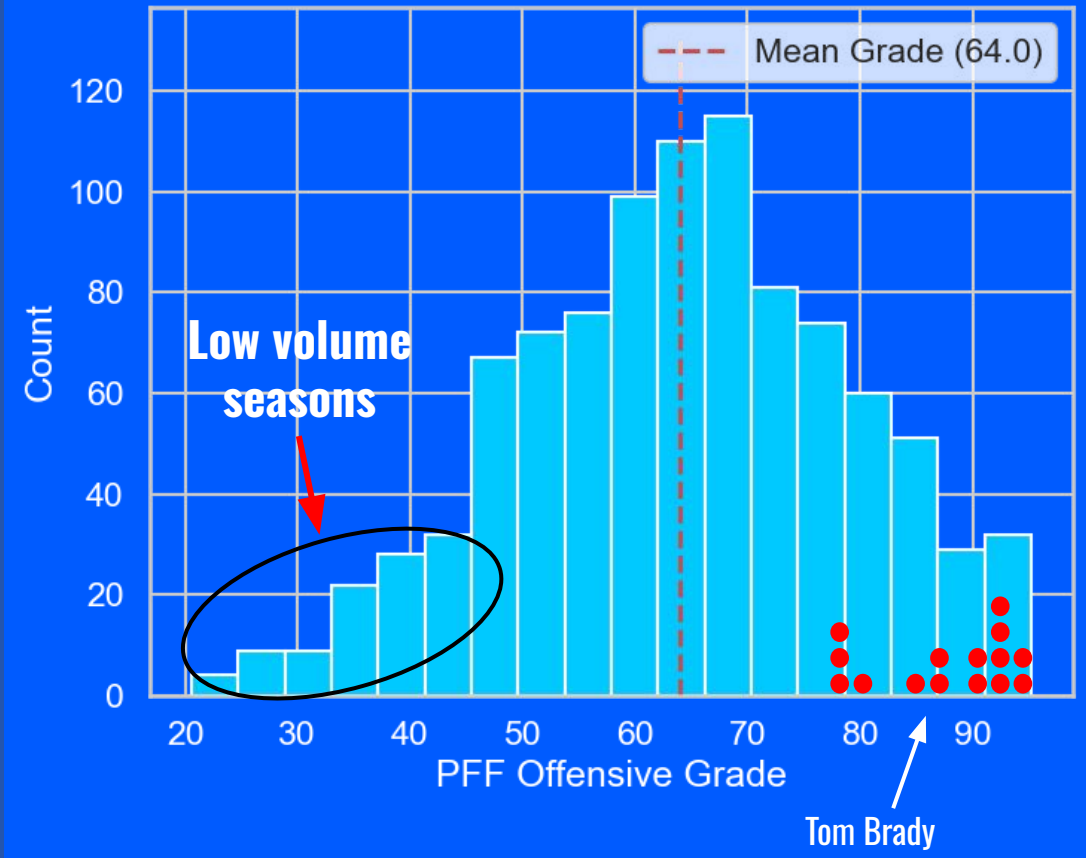
61 Features

Passing & rushing statistics:
Raw numbers, as well as normalized percentages

Target Distribution

Min Grade: 20.6
Geno Smith, 2018

- 3 games
- 4 Passing Attempts



Max Grade: 95.2
Tom Brady, 2016

02 ANALYSIS

CORRELATION

“Rolling Mean”:

- Capture performance in recent seasons
- Average of 3 most recent seasons offensive grade
- Correlation of 0.523

“Rolling Variance”:

- Capture consistency in recent seasons
- Variance in offensive grade of 3 most recent seasons

Pass TDs	Pass Yards	First Downs	Completions	Prev Offense Grade
0.536	0.518	0.517	0.508	0.502

03 MODELING

Algorithms

Previous season → Next season

- Linear Regression
- Decision Tree
- Random Forest
- XGBoost
- KNN

- Dense NN

Sequence of previous seasons → Next season

- RNN
- LSTM
- GRU

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KWIK TRIP
HYUNDAI
22
17
99

04 RESULTS

2023 PREDICTIONS

	2023 Grade	Prediction	Difference
Geno Smith	75.3	74.60	-0.70
Sam Darnold	59.8	58.49	-1.31
Gardner Minshew	56.6	57.99	+1.39
P.J. Walker	30.8	55.95	+25.15
Mitch Trubisky	34.8	62.58	+27.78
Aaron Rodgers	39.4	78.00	+38.60

Injured on 4th play of the season

48 Total QBs:

- RMSE: 12.16
- R^2: 0.40
- 64.6% of preds within 10 pts

2023 PREDICTIONS

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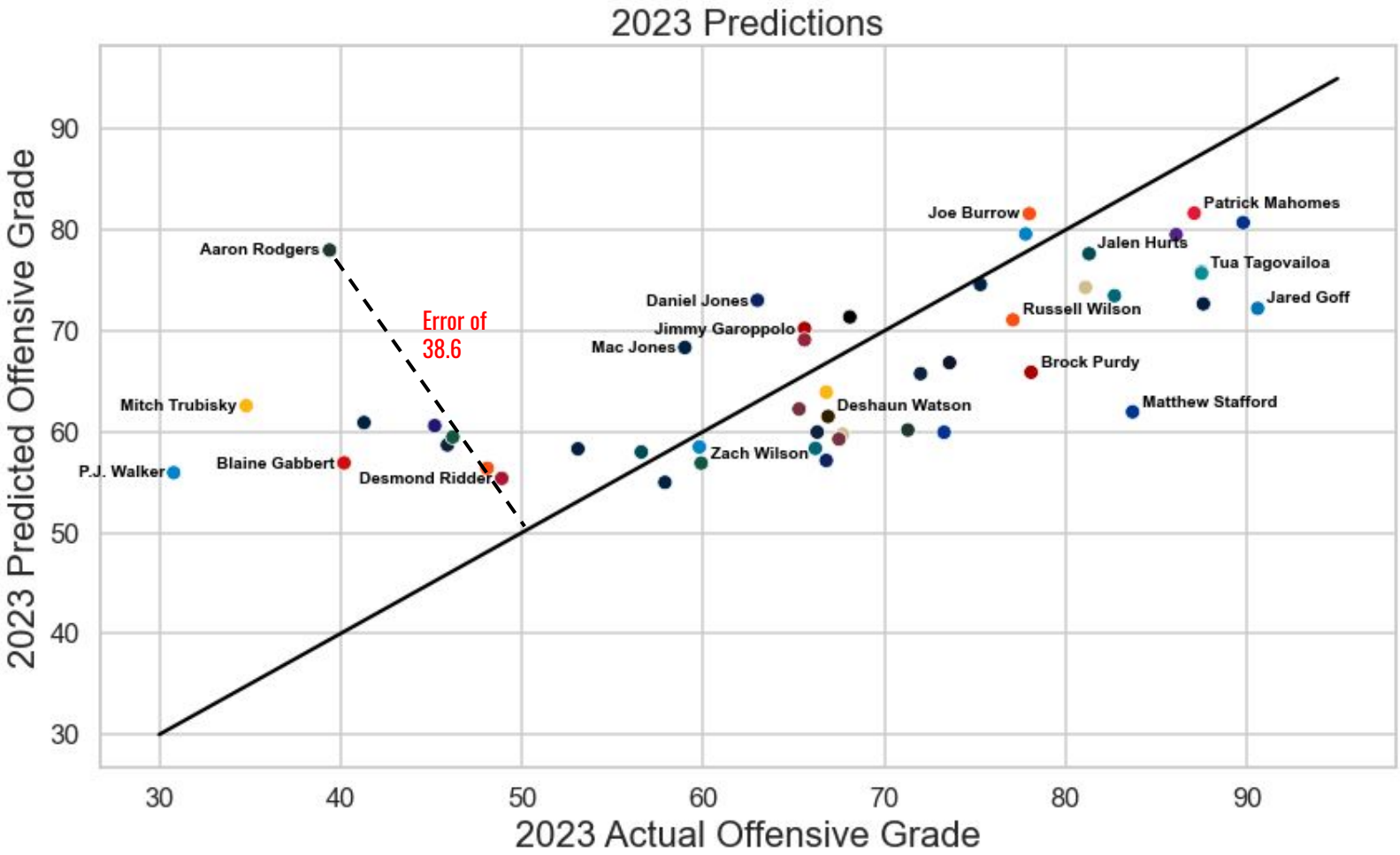
48 Total QBs:

- RMSE: 10.92
- R^2: 0.49
- 66.0% of preds within 10 pts


2023 Predictions
2023 Predicted Offensive Grade
2023 Actual Offensive Grade
30
40
50
60
70
80
90
Aaron Rodgers
Error of
38.6
Mitch Trubisky
P.J. Walker
Blaine Gabbert
Desmond Ridder
Daniel Jones
Jimmy Garoppolo
Mac Jones
Zach Wilson
Deshaun Watson
Joe Burrow
Jalen Hurts
Patrick Mahomes
Tua Tagovailoa
Jared Goff
Russell Wilson
Brock Purdy
Matthew Stafford

NEXT STEPS

- Deploy Model
- Evaluate on complete 2023 season
- Iteratively improve model
- Data Upsampling
- 2024 Predictions

THANK YOU!

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SOURCES

Data: pff.com

Slides: