

# SUPERBOYL PREDICTIONS

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### **Model Summary (Ankit)**

### Methodologies:

- Polynomial Regression, with different degrees of some variables based on linear patterns, noticed.
- Variables based on statistics of team and opponent based on matches previously played in the season.

#### **Model Metrics:**

- Score Chiefs: R2=0.999, MAPE = 2.23%
- Score\_Bucs: R2=0.7507, MAPE = 10.80%

- 1. Consider data about players and previous seasons
- 2. Fine-tune model to predict to score of new teams with zero previous statistics



### Model Summary (Mira)

### Methodologies:

- 1. Feature selection using forward stepwise linear regression to determine important variables
- 2. ETS, simple exponential smoothing, to predict each variable inputs for the final regression model
- 3. Linear regression models for each team using selected features and forecasted variable inputs

#### **Model Metrics:**

- Score\_Chiefs: R2=0.918 MSE=14.370 MAPE = 6.067%
- Score\_Bucs R2=0.9241 MSE=10.747 MAPE = 23.49%

- 1. Gather more data, ex: consider home/away
- 2. Fine-tune model to include more significant variables
- 3. Watch **SB55!**



### Model Summary (Allen)

### Methodologies:

- 1. Used Boruta algorithm to identify important predictors
- 2. Played around with different predictors to build linear models
- 3. Utilized ARIMA to predict for selected predictors then fed into linear model for score prediction

#### **Model Metrics:**

- LM\_Chiefs: R2=0.89 MAE=1.78 MAPE = 6.7
- LM\_Bucs: R2=0.82 MAE=3.97 MAPE = 20

- 1. Consider using more data; for TB model only 2020 data was used since it depended heavily on QBR.
- 2. Try to capture more aspects of the game; right now models are mainly focused on offense.



### Model Summary (Karl)

#### **Methodologies:**

- 1. Combined data from 2018-2020 seasons for both Tampa and Chiefs.
- 2. Used association by correlation to determine statistically significant variables and used them in a regression.
- 3. Used Arima on variables that were applied in linear regression to get predicted inputs for the game on Sunday and plugged them in.

#### **Model Metrics:**

- Score\_Chiefs: R2=0.38 MAPE = 15.3%
- Score\_Bucs R2=0.76 MAPE = 25.2%

- 1. Gather more data from previous seasons.
- 2. Try a different form of regression.
- 3. Consider different variables like weather.



# Model Summary: Success Rate + In-game stats (Marianna)

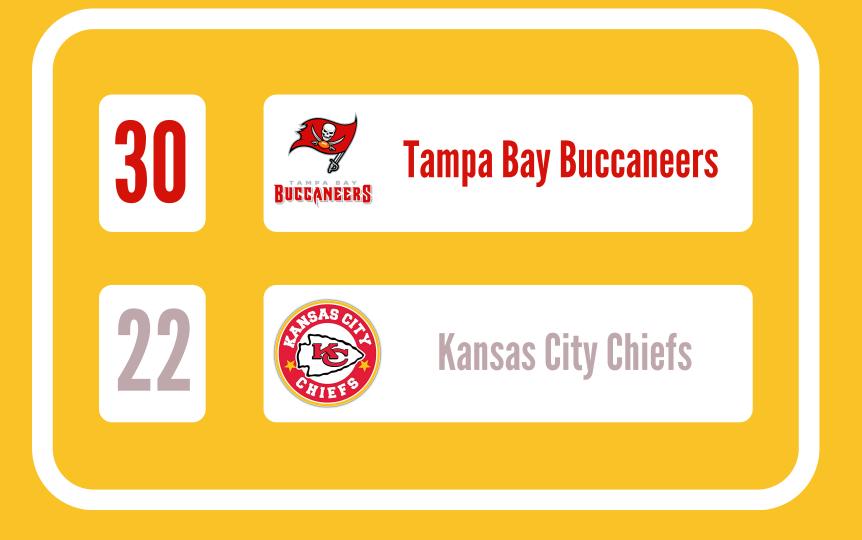
### Methodologies:

- 1. Manually selected variables using p-values and stepwise linear regression
- 2. Built model for each team using success rate metrics along with in-game stats for 2020 season
- 3. Prediction based on season averages for in-game statistics (running, passing, turnovers and current success rates

#### **Model Metrics:**

- Score\_Chiefs: R2=0.40 MAPE = 0.135
- Score\_Bucs R2=0.82 MAPE = 0.238

- 1. Consider adding more variables in model that help with KC model R2
- 2. Impute in-game yards using ARIMA and/or ETS



## Model Summary: Success Rate Only (Marianna)

### Methodologies:

- 1. Manually selected variables using p-values and stepwise linear regression
- 2. Built model for each team using success rate metrics only for 2020 season
- 3. Prediction based on current success rates

#### **Model Metrics:**

- Score\_Chiefs: R2=0.47 MAPE = 0.184
- Score\_Bucs R2=0.68 MAPE = 0.285

- 1. Consider adding more variables in model that help with KC model R2
- 2. Gather historic success rate data
- 3. Make model for all teams



## Model Summary: "Lazy Man's" Ensemble (Marianna)

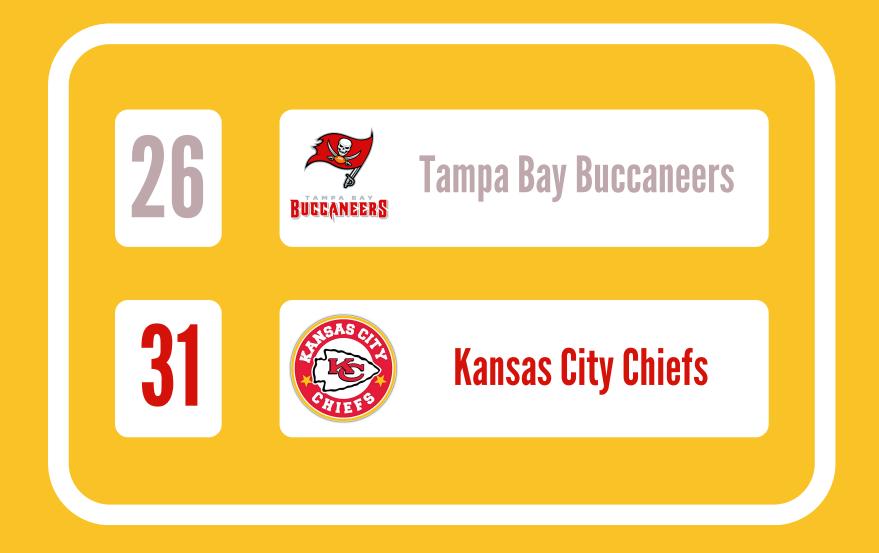
### Methodologies:

- 1. Collected expert score predictions for Super Bowls back to 2015
- 2. Reviewed MAPE by source and year. Determined that the average of the sources is the most reliable
- 3. Prediction based on weighted average depending on source's historic MAPE

#### **Model Metrics:**

• MAPE = 0.171

- 1. Add more historic data on score predictions
- 2. Try linear regression with source as variable



### **Ensemble Modelling**

### Weighted Average based on MAPE

Model	Source	KC	Tampa	MAPE	Weight KC	Weight TB
Lazy Man's (Avg.)	Marianna	32	26	0.17	0.12	0.13
Lazy Man's (MAPE Avg.)	Marianna	31	26	0.17	0.12	0.13
Success Rate Only	Marianna	29		0.18	0.12	0.00
Success Rate Only	Marianna		34	0.29		0.11
Success Rate + In-game Stats (Avg.)	Marianna	22		0.14	0.12	0.00
Success Rate + In-game Stats (Avg.)	Marianna		30	0.24		0.12
Poly. Reg	Ankit	32		0.02	0.14	
Poly. Reg	Ankit		24	0.11		0.14
Lin. Reg	Mira	32		0.06	0.13	
Lin. Reg	Mira		26	0.23		0.12
Lin. Reg	Karl	31		0.15	0.12	
Lin. Reg	Karl		29	0.25		0.12
Lin. Reg	Allen	30		0.07	0.13	
Lin. Reg	Allen		28	0.20		0.13

Score 30 28

### **Ensemble Model Prediction**



Tampa Bay Buccaneers



**Kansas City Chiefs** 

Kansas City Chiefs will win Superbowl 55 against Tampa Bay Buccaneers with a score of 30 to 28.

