MID PROJECT CHECK- IN
MSDS 696- PRACTICUM 2
REGIS UNIVERSITY

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CONTENTS

RESEARCH PROBLEM

WITH THE PREMIER LEAGUE BECOMING MORE COMPETITIVE WITH MORE MONEY BEING INTRODUCED TO THE LEAGUE VIA NEW OWNERSHIP GROUPS IT'S IMPORTANT TO LEVERAGE DATA WHEN BUILDING A TEAM. USING DATA, I WANT TO CREATE A MODEL THAT CAN PREDICT A MATCH-WINNER BASED ON MATCH DAY DATA AND OTHER FEATURES GENERATED FROM PREVIOUS RESULTS.

RESEARCH QUESTION

- What kind of match day data is important to predicting a match-winner?
- What's the age profile of a championship squad?

DATA

Data will be pulled from the following sources:

Match-prediction: http://football-data.co.uk/englandm.php

Age-Profile : FB Ref: https://fbref.com/en/comps/9/Premier-League-Stats

PROPOSED METHODOLOGY

- DATA IMPORT
- DATA CLEANING/FEATURE ENGINEERING
- JOINING DATASETS
- EDA
  - CORRELATION/HEATMAPPING
  - DISTRIBUTION EXPLORATION
- MODELING/MACHINE LEARNING
  - PREDICTING MATCH WINNERS USING LOGISTIC REGRESSION, SUPPORT VECTOR MACHINE, RANDOM FOREST.
  - PERFORMANCE OPTIMIZATION
- SQUAD AGE PROFILE
  - DATA VISUALIZATION

READJUSTED TIMELINE

- Weeks 1-2: Proposal formation/Readjustment
- Week 3: Data Import, Feature Engineering
- Week 4: Joining Datasets/EDA
- Week 5: Model-building
- Week 6: Optimization
- Week 7: Squad Analysis/Data Visualization
- Week 8: Presentation creation

DATA IMPORT

```
[3]: # Reading in datasets

location = "/Users/drewsdesktop/Desktop/Data Science/Regis Classes/MSDS 696- Final Practicum/Datasets/"

prem_2011 = pd.read_csv(location + "11_12.csv")
prem_2012 = pd.read_csv(location + "12_13.csv")
prem_2013 = pd.read_csv(location + "13_14.csv")
prem_2014 = pd.read_csv(location + "14_15.csv")
prem_2015 = pd.read_csv(location + "15_16.csv")
prem_2016 = pd.read_csv(location + "16_17.csv")
prem_2017 = pd.read_csv(location + "17_18.csv")
prem_2018 = pd.read_csv(location + "18_19.csv")
prem_2019 = pd.read_csv(location + "19_20.csv")
prem_2020 = pd.read_csv(location + "20_21.csv")
prem_2021 = pd.read_csv(location + "21_22.csv")

[4]: prem_2017.tail()
```

FEATURE ENGINEERING

```
# Get goals conceded by team and Matchweek
def get_goals_conceded(playing_stat):
    # Create a dictionary with team names as a key
    teams = {}
    for i in playing_stat.groupby('HomeTeam').mean().T.columns:
        teams[i] = []

    # Value that goes with the key is a list with the match location
    for i in range(len(playing_stat)):
        ATGC = playing_stat.iloc[i]['FTHG']
        HTGC = playing_stat.iloc[i]['FTAG']
        teams[playing_stat.iloc[i].HomeTeam].append(HTGC)
        teams[playing_stat.iloc[i].AwayTeam].append(ATGC)

    # Create a dataframe for goals conceded
    # Rows will represent teams and Columns will represent the matchweek
    GoalsConceded = pd.DataFrame(data=teams, index = [i for i in range(1,39)]).T
    GoalsConceded[0] = 0
    # Aggregate to get uptil that point
    for i in range(2,39):
        GoalsConceded[i] = GoalsConceded[i] + GoalsConceded[i-1]
    return GoalsConceded
```

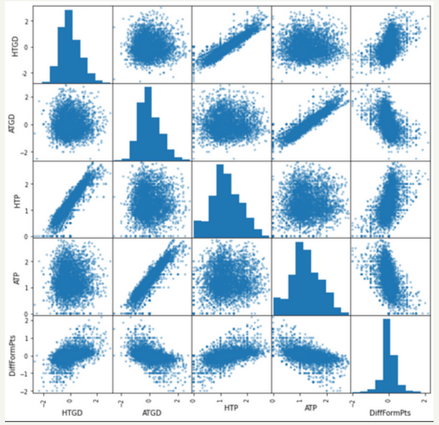
DATASET AGGREGATION

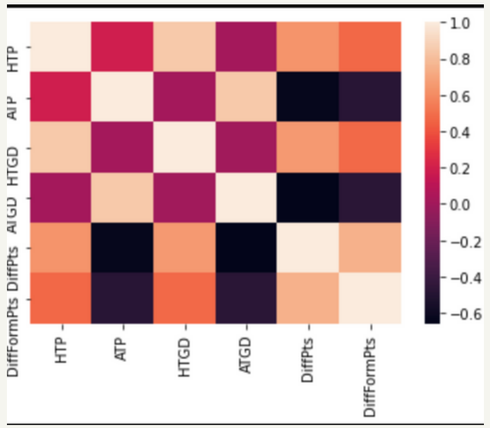
Aggregating all of the information into one table.

Next, I need to collect all of the statistical information that we've created and aggregate it into one table.

```
[30]: game_stats = pd.concat([game_stats1,
                              game_stats2,
                              game_stats3,
                              game_stats4,
                              game_stats5,
                              game_stats6,
                              game_stats7,
                             game_stats8,
                              game_stats9,
                              game_stats10],
                               ignore_index=True)
```

EDA: SCATTER MATRIX/HEATMAPS





MODEL BUILDING

```python
# Initialize Logistic Regression
clf_A = LogisticRegression(random_state = 42)

#Initialize SVM
clf_B = SVC(random_state = 912, kernel='rbf')

#Initalize Random Forest
clf_C = RandomForestClassifier(random_state = 82)

train_predict(clf_A, X_train, y_train, X_test, y_test)
print('')
train_predict(clf_B, X_train, y_train, X_test, y_test)
print('')
train_predict(clf_C, X_train, y_train, X_test, y_test)
print('')
```

PERFORMANCE EVALUATION

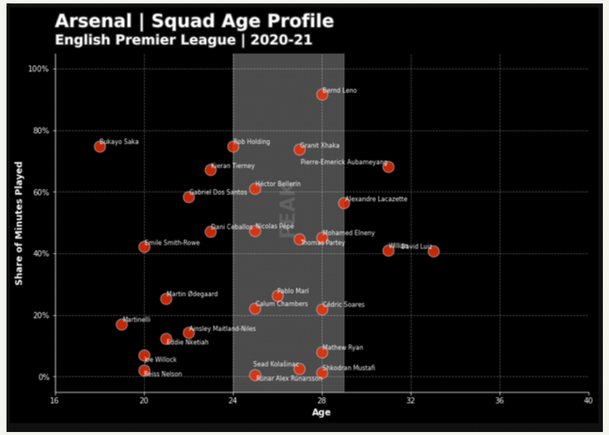
```python
model = SVC(random_state = 912, kernel='rbf')
model.fit(X_train, y_train)
predicted = model.predict(X_test)
report = classification_report(y_test, predicted)
print(report)
```

```
              precision    recall  f1-score   support

           H       0.62      0.48      0.54       112
          NH       0.64      0.76      0.70       138

    accuracy                           0.64       250
   macro avg       0.63      0.62      0.62       250
weighted avg       0.63      0.64      0.63       250
```

AGE PROFILE


Arsenal | Squad Age Profile
English Premier League | 2020-21
Share of Minutes Played
100%
80%
60%
40%
20%
0%
16
20
24
28
32
36
40
Age
Bernd Leno
Bukayo Saka
Rob Holding
Granit Xhaka
Pierre-Emerick Aubameyang
Kieran Tierney
Héctor Bellerín
Gabriel Dos Santos
Alexandre Lacazette
Dani Ceballos
Nicolas Pépé
Mohamed Elneny
Emile Smith-Rowe
Thomas Partey
Martin Ødegaard
Pablo Marí
Calum Chambers
Cédric Soares
Martinelli
Ainsley Maitland-Niles
Eddie Nketiah
Matthew Ryan
Ben Willock
Sead Kolasinac
Shkodran Mustafi
Miss Nelson
Runar Alex Rúnarsson

CONCLUSION

THE RESEARCH QUESTIONS WE WANTED TO ANSWER WERE:

- WHICH MATCH DAY DATA POINTS WERE MOST IMPORTANT IN PREDICTING A MATCH-WINNER?
- WHAT IS THE AGE PROFILE OF A PREMIER LEAGUE CHAMPION?

THE EXPLORATORY DATA ANALYSIS SHOWED THAT DIFFPTS, DIFFFORM PTS, HTGD, HTP WERE THE MOST VALUABLE DATA POINTS IN PREDICTING A MATCH-WINNER.

MANCHESTER CITY THE CHAMPIONS OF THE 2020-2021 SEASON HAD SMALLER SQUAD, AND THE PLAYERS WHO PLAYED THE MOST MINUTES WERE IN THE AGE RANGE OF 24-29. THEY DIDN'T HAVE MUCH YOUTH.

CONTACT ME

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