TAKING A SHOT AT FREE THROWS

ANALYTICS TEAM:

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MOTIVATION & SUMMARY

- Do free throws impact a team's win total
- If a team has a higher free throw percentage, then they will have more wins

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QUESTIONS

- Do teams that win more games have a higher free throw percentage?
- Do other Free Throw statistics show a greater impact on a teams ability to win games?
- Is there a bias in free throw attempts toward the home team?

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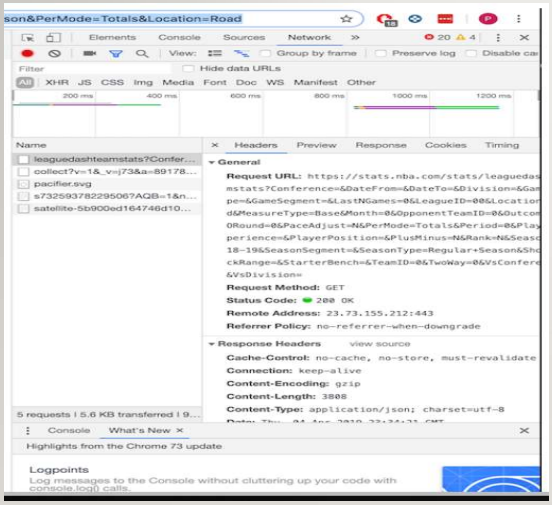


```
#i is the index for season
i=0
#j is the index for home_away
j=1

#Loop through seasons and venues and use the url described in the first section.
for season in seasons:
    for venue in venues:
        urlliteral= f"https://stats.nba.com/stats/leaguedashteamstats?Conference=&DateFrom=&DateTo=&Divisi
on=&GameScope=&GameSegment=&LastNGames=0&LeagueID=00&Location={venue}&MeasureType=Base&Month=0&OpponentTea
mID=0&Outcome=&PORound=0&PaceAdjust=N&PerMode=Totals&Period=0&PlayerExperience=&PlayerPosition=&PlusMinus=
N&Rank=N&Season={season}&SeasonSegment=&SeasonType=Regular+Season&ShotClockRange=&StarterBench=&TeamID=0&T
woWay=0&VsConference=&VsDivision="
        new=rq.get(urlliteral, headers=header_data).json()
        #This loops through the teams. There are 30 of them and it's static. The data comes out as rows
        for t in range(0,30,1):
            team.append(new["resultSets"][0]["rowSet"][t][1])
            win.append(new["resultSets"][0]["rowSet"][t][3])
            loss.append(new["resultSets"][0]["rowSet"][t][4])
            win_pct.append(new["resultSets"][0]["rowSet"][t][5])
            ftm.append(new["resultSets"][0]["rowSet"][t][13])
            fta.append(new["resultSets"][0]["rowSet"][t][14])
            ft_pct.append(new["resultSets"][0]["rowSet"][t][15])
            w_rnk.append(new["resultSets"][0]["rowSet"][t][29])
            l_ank.append(new["resultSets"][0]["rowSet"][t][30])
            w_pct_rnk.append(new["resultSets"][0]["rowSet"][t][31])
            ftm_rnk.append(new["resultSets"][0]["rowSet"][t][39])
            fta_rnk.append(new["resultSets"][0]["rowSet"][t][40])
            ft_pct_rnk.append(new["resultSets"][0]["rowSet"][t][41])
            total_points.append(new["resultSets"][0]["rowSet"][t][26])
            year.append(new['parameters']["Season"])
            location.append(new['parameters']["Location"])
        print(f"Getting data for {new['parameters']['Season']} {new['parameters']['Location']}")

print("Data scrape is done")

# This makes it look a lot cleaner than it was. There was a lot of navigating the JSON and printing
# Until we were able to find the right data locations.
# Additionally, we did a few trial loops and printed the responses to make sure the requests aligned
# with the responses
```

OUR DATA SOURCE

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DATA CLEAN-UP & EXPLORATION

- Game venue data
  - Problem discovery due to team ranks
- Franchise name changes
  - More than 30 teams

```
# Create 3 dataframes for home away and total
# This allows us to compare all of it.

away=NBA_Data.loc[NBA_Data["Venue"] == "Road"]
home=NBA_Data.loc[NBA_Data["Venue"] == "Home"]
total=NBA_Data.loc[NBA_Data["Venue"] == "Total"]
```

```
# Display the team name repeats
print(nba_data["Team"].nunique())
print(nba_data["Team"].unique())
```

```
33
['Atlanta Hawks' 'Boston Celtics' 'Brooklyn Nets' 'Charlotte Bobcats'
 'Chicago Bulls' 'Cleveland Cavaliers' 'Dallas Mavericks' 'Denver Nuggets'
 'Detroit Pistons' 'Golden State Warriors' 'Houston Rockets'
 'Indiana Pacers' 'Los Angeles Clippers' 'Los Angeles Lakers'
 'Memphis Grizzlies' 'Miami Heat' 'Milwaukee Bucks'
 'Minnesota Timberwolves' 'New Orleans Hornets' 'New York Knicks'
 'Oklahoma City Thunder' 'Orlando Magic' 'Philadelphia 76ers'
 'Phoenix Suns' 'Portland Trail Blazers' 'Sacramento Kings'
 'San Antonio Spurs' 'Toronto Raptors' 'Utah Jazz' 'Washington Wizards'
 'New Orleans Pelicans' 'Charlotte Hornets' 'LA Clippers']
```

```
# Replace the team names and display the changed data frame.
nba_data["Team"].replace("Los Angeles Clippers","LA Clippers", inplace=True)
nba_data["Team"].replace("Charlotte Bobcats","Charlotte Hornets" ,inplace=True)
nba_data["Team"].replace("New Orleans Hornets" ,"New Orleans Pelicans", inplace=True)
print(nba_data["Team"].nunique())
print(nba_data["Team"].unique())
```

```
30
['Atlanta Hawks' 'Boston Celtics' 'Brooklyn Nets' 'Charlotte Hornets'
 'Chicago Bulls' 'Cleveland Cavaliers' 'Dallas Mavericks' 'Denver Nuggets'
 'Detroit Pistons' 'Golden State Warriors' 'Houston Rockets'
 'Indiana Pacers' 'LA Clippers' 'Los Angeles Lakers' 'Memphis Grizzlies'
 'Miami Heat' 'Milwaukee Bucks' 'Minnesota Timberwolves'
 'New Orleans Pelicans' 'New York Knicks' 'Oklahoma City Thunder'
 'Orlando Magic' 'Philadelphia 76ers' 'Phoenix Suns'
 'Portland Trail Blazers' 'Sacramento Kings' 'San Antonio Spurs'
 'Toronto Raptors' 'Utah Jazz' 'Washington Wizards']
```

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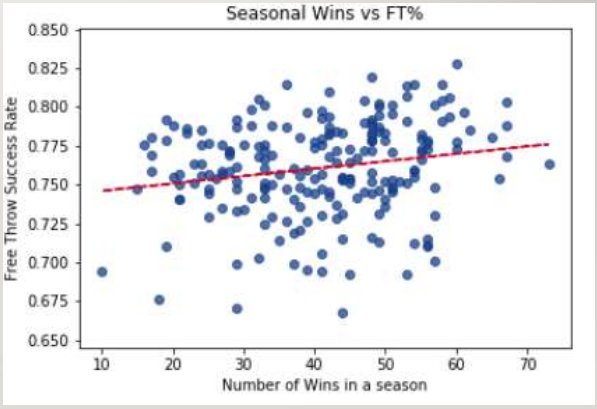
DATA ANALYSIS

Do teams with a higher free throw percentage win more games?

- There is an upward trend but it is not very distinct.



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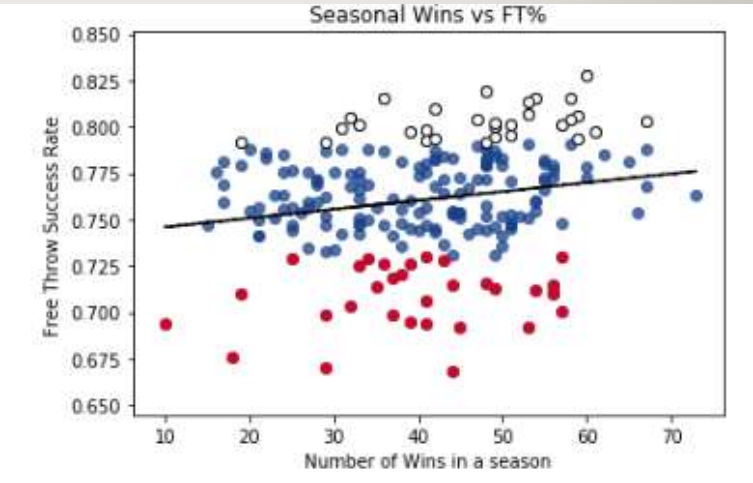
DATA ANALYSIS (CONT.)

- The upper mean plus one standard deviation is White
- The lower mean plus one standard deviation is Red
- Average Wins are 41



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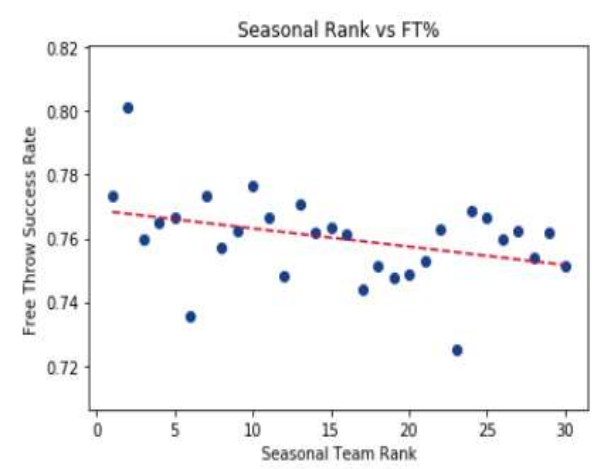
DATA ANALYSIS (CONT.)

Win Rank & Free Throw Percentage

- Average Free Throw Percentage for each rank
- Doesn't follow an individual team



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DATA ANALYSIS (CONT.)

Outside the Norm

- What Contributes More
- Mean and Standard deviation
- Teams outside the Standard Deviation
- Compared the average of those populations with an average of the total population.
- What contributes most on the edges

Average Wins=40.99523809523809

	Attempts	Made	Percentage
Best	43.878788	43.264706	47.20000
Worst	38.655172	34.888889	39.84375

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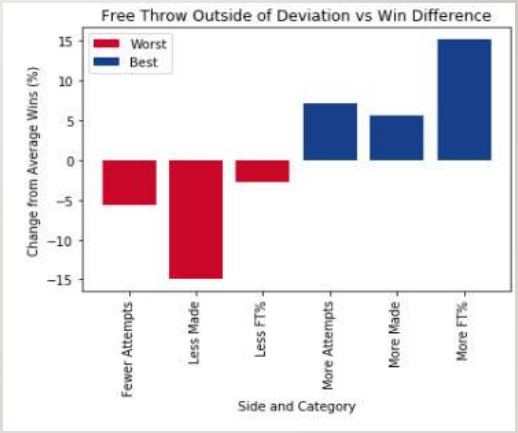
DATA ANALYSIS (CONT.)

Percent, Attempts or Made

- Teams outside the Standard Deviation both ways
- Free Throw Percentage impacts high win teams
- Low shots made impacts low win teams



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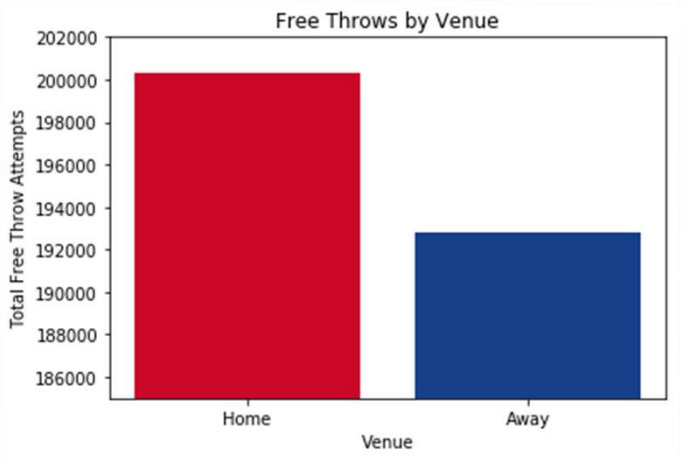
DATA ANALYSIS (CONT.)

HOME VS. AWAY

- Referee Bias
- 7507 more home attempts



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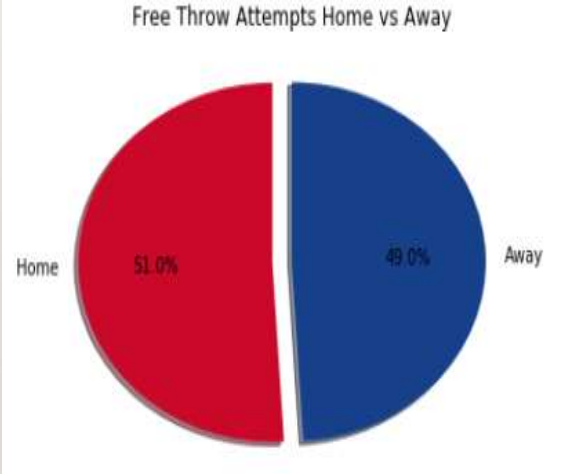
DATA ANALYSIS (CONT.)

Perception Matters

- There is a 2% difference
- 8610 games
- 0.872 Attempts Per Game
- Yes there is an advantage, No it isn't large



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FINDINGS

- Better free throw shooting teams tend to have more wins
- Free Throw Percentage is most closely tied to wins
- Yes there is a home court bias but it is not very large

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POST MORTEM: WHAT ELSE COULD BE RESEARCHED

- Does more points equal more wins?
- Obtain individual game data set
- Free throw attempts home vs away based on the point differential for the game

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Audience Q&A

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