**Summary Report**

## 1. Introduction

These days pretty much every team in NBA has one data examiner whose work is to break down the group execution in past games. As a data investigator for a NBA team, I have been mentioned by coaching and managing staff to utilize recorded data to examine performance metrics. This project intends to be wining of any NBA group execution dependent on certain highlights. In this undertaking arrangement of regression models were created to predict the hard and fast number of wins for NBA group using a huge arrangement of authentic data. In python script scatter plots were developed to graphically envision the relationship between the total number of wins and the average scored and average relative ability of group. By building linear model predictions were made for the absolute number of wins dependent on average points scored by group. To make forecasts for total number of wins by group dependent on average points scored and average relative ability of team, I developed multiple linear regression model. The coach of group additionally needed to see impact of average points differential alongside average points scored and relative ability of group on group's exhibition, another various regression model was built to anticipate wins of group to see the impact of these highlights.

## 2. Data Preparation

The key features, or metrics of performance used in regression models are ‘total\_wins’, ‘avg\_points’, ‘avg\_elo\_n’, and ‘avg\_pts\_differential’. ‘total\_wins’ is used as a response variable and avg\_points, avg\_elo\_n, and avg\_pts\_differential are used as predictor variable. The total\_wins variable represents the total number of wins in a regular season. The avg\_points variable represents the average points scored in a regular season. The avg\_elo\_n variable represents the average relative skill of each team in a regular season. The avg\_pts\_differential variable represents the average point differential between the team and their opponents in a regular season.

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Figure 1: Data Interpretation

## 3. Scatterplot and Correlation for the Total Number of Wins and Average Points Scored

Data visualization techniques are used to understand patterns in data visually. Different kinds of charts and plots are used for data visualization and comparing data. These techniques are very helpful to see relationship between two features in dataset.

In order to calculate the strength and direction of association or relationship between two variable we use correlation coefficient. The values of this coefficient ranges from -1.0 to 1.0. The negative values show decreasing trend or negative relation between two variables while a positive correlation variable shows increasing trend or positive relationship between two features.

The manager of team thinks that the team which have high average number of points compared to their opponent have more chance to win more games. Because chances of winning the game are higher if a team scores more points in the game, this is a sound assumption. Due to this, it is expected that the total number of wins and the average points scored are correlated. A scatter plot was constructed to determine if these claims are true.

![Chart, scatter chart

Description automatically 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Figure 1: Total Number of wins by average points scored.

The Pearson Correlation Coefficient is 0.477. Although this coefficient between total wins and average point scored is not much but this number in combination with the results of the constructed scatter plot confirms that the relationship between total number of wins and average relative skill is a positive one.

The P-value is statistically significant at 0.01. With a P-value of 0.00, it is determined that the correlation coefficient is insignificant.

## 4. Simple Linear Regression: Predicting the Total Number of Wins using Average Points Scored

A simple linear regression models were built to anticipate the absolute number of wins for a NBA group utilizing an enormous arrangement of recorded data. Simple linear regression model is utilized to anticipate the reaction variable utilizing the indicator variable by demonstrating the connection between the extent of a specific variable and a second. The mentor of the group proposes that a group will have more successes in a season if the group scores higher average points during that season. A basic straight linear model was developed to assist the mentor with foreseeing the number of games the group may win in a standard season if a specific normal score is kept up. The invalid theory is that the group will have more successes in a season if the group has a higher normal point check during the season. The elective speculation is that the group won't have more successes in a season if a specific normal score is maintained.The test measurement is 13.495 and the P-esteem is 0.00. At a 0.01 degree of importance, the invalid speculation can be dismissed.

Table 1: Hypothesis Test for the Overall F-Test

|  |  |
| --- | --- |
| Statistic | Value |
| Test Statistic | 13.495 |
| P-value | 0.00 |

Based on these results, the total number of points cannot predict the average number of wins for the season.

**5. Scatterplot and Correlation for the Total Number of Wins and Average Relative Skill**

To determine the correlation between the total number of wins and the average relative skill, we have developed scatter plot.

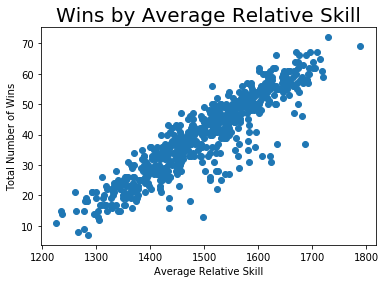
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Figure 2: Wins by Average Relative Skill

The Pearson Correlation Coefficient is 0.9072. This number in combination with the results of the constructed scatter plot confirms that the relationship between total number of wins and average relative skill is a positive one.

Using a 1% level of significance it is determined that the correlation coefficient is not statistically significant.

## 6. Multiple Regression: Predicting the Total Number of Wins using Average Points Scored and Average Relative Skill

Typically, a multi-variable regression model is used to predict response variables using a predictive variable predictive variant in response.

The multi-regression model is made with the total number of wins as the response variable, and the average points obtained as well as the average rating ability as the prediction variable. This will help the coach predict how many games a team can win in a typical season based on variables such as average points obtained and general rating ability. This model is very suitable because more than one consideration should be considered when determining the general ability of a group. The median coefficient of average values ​​is 0.3497 and the relative potential is 0.1055. The value of each P is 0.000. The null hypothesis that the total number of wins is related to the average points obtained and the relative ability. Another hypothesis is that the total number of wins is not related to the average points obtained and the average rating ability.

Table 2: Hypothesis Test for the Overall F-Test

|  |  |
| --- | --- |
| **Statistic** | **Value** |
| Test Statistic | -33.903 |
| P-value | 0.00 |

With the P-value of 0.00 and a level of significance of 0.01 the null hypothesis can be rejected

## 7. Multiple Regression: Predicting the Total Number of Wins using Average Points Scored, Average Relative Skill, and Average Points Differential

A numerous relapse model was developed with the absolute number of wins as the reaction variable and normal focuses scored, normal relative ability, and normal focuses differential as indicator factors.

The invalid theory is that the normal points scored, normal relative ability, and normal points differential all influence the all-out number of wins. The elective speculation is that the normal focuses scored, normal relative ability, and normal focuses differential don't all influence the complete number of wins. The degree of importance is 0.01 and the test measurement is - 35.8921. The P-esteem is 0.00.

Table 3: Hypothesis Test for Overall F-Test

|  |  |
| --- | --- |
| **Statistic** | **Value** |
| Test Statistic | -35.89 |
| P-value | 0.000 |

The null hypothesis can be rejected and the alternative accepted.

## 8. Conclusion

Linear and multiple linear regression models were developed in order to predict team performance on average points scored and average relative skill. The results of scatter plot show that the there is relationship between team’s performance and average points scored and average relative skill. These results can help coach to work on improvement of team in coming seasons.