

NHL Player Shooting Hand Predictor

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2024-12-06

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Summary

Is there a correlation between a National Hockey League (NHL) player's height/weight and their shooting hand? We endeavoured to solve this using a logistic regression model and a database of NHL players from the 1917 season till the 2023 season. After creating our model, we found there to be a weak correlation between these items as our model scored at 0.52 which is barely better than guessing.

Introduction

In the NHL, a player's shooting hand is likely the most important aspect of their game as it decides how they play the game. Understanding the relationship between physical attributes and player performance is important because it can provide valuable insights to team coaches for optimizing team strategies in professional sports. Our research question explores whether NHL players' shooting hand (left or right) can be predicted based on their height and weight using a logistic regression model.

Right-handed shooters hold a slight advantage in certain scenarios, making the ability to predict shooting hand potentially useful for teams aiming to refine player selection or training strategies. If our research question is correct, this analysis would create a reproducible way of determining a player's shooting hand based on their physical factors. This is important because it would allow managers and coaches to scout for talent who are right-handed as this would give their team an additional edge during games.

This analysis includes data acquisition, preprocessing, model creation, and training, followed by an evaluation of results. By examining the patterns linking height, weight, and shooting hand preference, this report aims to provide actionable insights for NHL teams and lay groundwork for future research.

Methods

Data

The data set for this shot predictor project is of National Hockey League (NHL) roster information created by the Data Science Learning Community (Community 2024) for the Tidy Tuesday project repository. The data here was created using the NHL's API and loaded on to the Tidy Tuesday repository [here](#). Each row in the data set contains information about all hockey players on every team from the 1917-1918 season to the 2023-2024 season. The rows include information such as name, birth date, and body dimensions.

The primary columns used in our analysis, height and weight, are measured in centimeters for height and kilograms for weight. We use these columns within our model to predict a player's shooting hand.

Assumptions and Limitations

For this analysis, we are assuming that a player's height and weight influence their shooting hand. This is more likely to be based on dominant hand as well as cultural and environmental factors that are not easily quantifiable. We are also assuming that the data set used is a complete representation of all NHL players from 1917 to 2023. If it were missing certain

players, teams or years, it could negatively impact our analysis. We assume that the data recording and collection methods remained constant across all years, however this may not be the case. Technological advances would mean that these methods have improved over the years and therefore newer data may be more accurate than older data.

One limitation of our analysis is that we are only using height and weight as our explanatory variables. In reality, there may be other variables that come into play, which are not captured in our model. Additionally, we do not perform hyperparameter optimization and assume that the default hyperparameters are best suited for our model. This is most likely not the case and in future iterations, hyperparameter optimization should be added.

Analysis

A logistic regression classifier was used to create a model which will predict whether a hockey player shoots left or right based on their height and weight. A logistic regression model was used because we are predicting a categorical variable (shooting hand as left or right). As the team is only interested in those two specific columns for predicting shooting side, all other columns were dropped. The test set was created using 30% of the records from the initial data set, leaving 70% of records for model training. For this analysis, the class weight parameter was set to balanced to ensure that the classes are equal and to avoid class imbalance. Data cleanup was done to remove duplicate records and null values and preprocessing was done on the height and weight input features to standardize them. To perform the analysis, the Python programming language (Van Rossum and Drake 2009) was used along with the following packages: Pandas (McKinney 2010), Altair (VanderPlas et al. 2018), and scikit-learn (Pedregosa et al. 2011).

Results and Discussion

Looking at the data

To start, we performed an exploratory data analysis on the training data to see if there was anything that stood out in the data, such as large class imbalances or unexpected distributions. From Table 1, we can see that there is no missing data in our training set and we have a relatively large set of data to work from, specifically 38200 records. Notably, we observed a class imbalance in the distribution of shooting hand: 25259 players shoot left, while 12941 players shoot right. While having a large training set does not guarantee that our model will not overfit, it helps to reduce the consequences of overfitting by providing more generalizable data. It is also important that missing data is minimized otherwise the model could be using undesired information to make its prediction.

Table 1: Missing record counts for training data

Column	Non-null count	Null count
weight_in_kilograms	38200	0
height_in_centimeters	38200	0
shoots_left	38200	0

Figure 1 below shows the class distributions for our two features, indicating that there are more players who shoot left than players who shoot right. This is in line with the common knowledge that there are more right handed dominant people than left handed dominant. In hockey, players tend to put there dominant hand closer to the blade, so right hand dominant players will shoot left. Given this large class imbalance, it is important to adjust the model to account for this otherwise it would greatly favour making a prediction towards the class with more data.

What we found?

The logistic regression model yielded a weak correlation between an NHL player’s height and weight and their shooting hand. The model’s accuracy score on the test set was 0.52, barely above random guessing. We can also see from our confusion matrix in Figure 2 that our model is making incorrect predictions at about the same rate that it is making correct predictions as indicated by the difference between columns in the matrix.

In our current model we’re using the default parameters which is resulting in a low score. We currently lack hyperparameter optimization and could perform this for future models to improve our scores. This could allow us to increase the predicting power of the model with little effort as we could use the data we already have and try out different hyperparameter combinations to find one that increases our model’s scores.

Is this what we expected to find?

Given the complexity of human physical attributes and their possible influences on preferences, it was somewhat expected that height and weight alone would not be strong predictors of shooting hand. Shooting hand preference could be influenced by various factors, such as handedness, training, or cultural norms, which are not captured by the dataset.

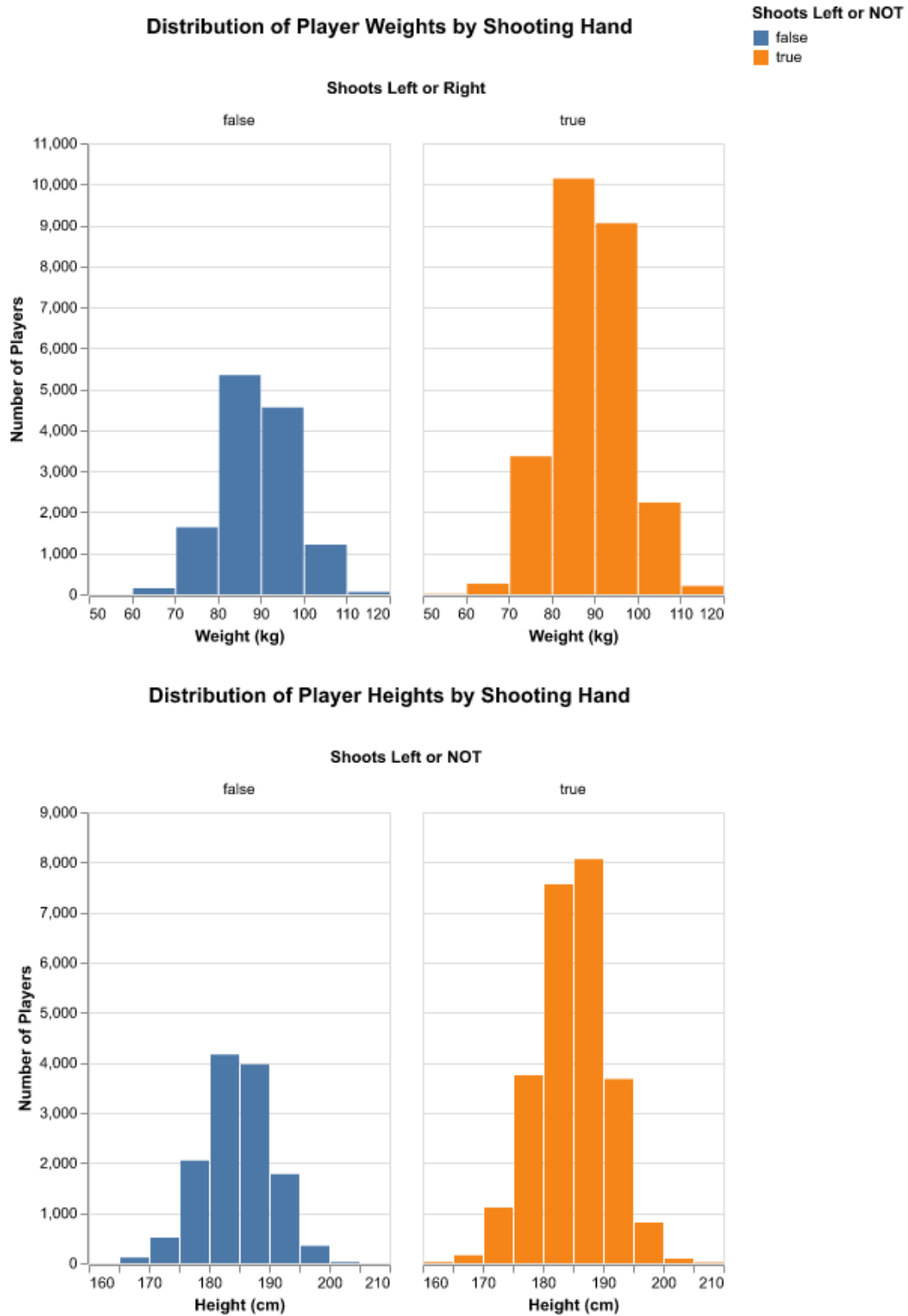


Figure 1: Comparison of count distributions of input features for players that shoot left or right.



Figure 2: Confusion matrix for model performance on test set.

What impact could such findings have?

These findings suggest that physical attributes like height and weight are not sufficient for predicting shooting hand. This highlights the importance of exploring additional features such as handedness, training history, or team strategy. For NHL teams, relying solely on height and weight for such predictions would not be effective for player scouting or strategy optimization.

What future questions could this lead to?

- What additional features (e.g., handedness, practice hours, family handedness trends) could improve the prediction of shooting hand?
- How do environmental or cultural factors influence shooting hand preference?
- Are there relationships between shooting hand and performance metrics, such as goals scored or defensive success?
- Can machine learning models combining multiple physical and behavioral attributes provide better predictions?

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