CSE 343/ECE 343 : Machine Learning Project Proposal
Title : The Dream Team Creator

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Abstract

Player selection is one of the most important tasks for any sport. According to a recent report, the gross revenue of fantasy sports operators stood at Rs. ~2,400 crores (US$ 340.47 million) for FY20 compared with Rs. ~920 crores (US$ 131.64 million) in FY19 ~3X YoY increase. The market has witnessed a 700% increase in the past decade in the number of fantasy sports operators and a 2,500% spike in the number of fantasy sports users. The performance of the players depends on various factors such as the opposition team, the venue, his current form, etc. The team management, the coach, and the captain select eleven players for each match from a squad of 15 to 20 players. They analyze different characteristics and the statistics of the players to select the best playing 11 for each match. The main focus of this project is to create a winning fantasy team by looking at the huge amount of data present online and predicting which team will win by analyzing player's performance history, statistics against the opponent team, home ground status, weather impact, and many other factors and attempt to predict the outcome

1. Introduction

We plan to use previous years' tournament data to train a machine learning model and then use the model in order to predict the outcomes of matches. We plan to identify several factors which could affect the results of matches and compare various Machine Learning models using our features based on metrics like Accuracy, Precision, Recall and F1 score for our problem.

2. Literature Survey

During the past, several researchers have contributed their efforts towards result prediction and the formation of an optimal team that will most likely win in a particular sport:

1) Players Performance Prediction in ODI Cricket

This paper proposes a model to predict a cricket player's upcoming match performance using machine learning algorithms like recursive feature elimination and univariate selection, linear regression, support vector machine with the linear and polynomial kernel, etc. The authors have collected data of the Bangladesh National Cricket team from trusted sports websites. Then this data is processed into numerical values to implement the algorithms mentioned above. Feature selection algorithms are applied for extracting the attributes that are more related to the output feature.

This model tries to predict the runs scored by a batsman and runs conceded by a bowler in the upcoming match.

2) A Machine Learning Application for Football Player's Selection

This paper proposes a model that divides player selection criteria into four key areas: player's technique, the player's speed, the player's physical status, and the player's resistance using neural network technique to determine these significant attributes for each player. Every player will be judged based on the features mentioned above. There are some attributes that a football player may have which cannot be neglected when it comes to choosing a rightful player for a football team. This system has employed the idea of a neural network in considering this large amount of attributes needed in selecting the appropriate player for a football team.

3) Machine learning-based Selection of Optimal sports Team based on the Players Performance

This paper provides a model that can select the best playing 11 in the Indian Cricket team. There are various factors on which a player's performance depends, like pitch type, the opposition team, the ground, etc. The model contains data from the One Day International of the past several years of team India, and this dataset is created using data from trusted sites like espn.com. The proposed model gives complete information about the batting, bowling, and fielding skills of a player. The player performance is classified into several classes, and a random forest classifier is used to predict the player's performance. The proposed work can address the issue of selecting the optimal team in cricket without any prejudice and give equal importance to all-rounders.

4) INCREASED PREDICTION ACCURACY IN THE GAME OF CRICKET USING MACHINE LEARNING[4]

This paper attempts to predict the performance of players as how many runs will each batsman score and how many wickets will each bowler take for both the teams.It defined a new measure called Combined Bowling Rate to measure the performance of bowlers. The combined bowling rate is a combination of three traditional bowling measures: bowling average, strike rate and economy. .Random Forest turned out to be the most accurate classifier with an accuracy of 90.74% for predicting runs scored by a batsman and 92.25% for predicting wickets taken by a bowler. Results of SVM were surprising as it achieved an accuracy of just 51.45% for predicting runs and 68.78% for predicting wickets

3. Dataset Features

We have picked two kind of data set one contains the data of all the ipl matches played in between 2008 to 2020

some of its features are:

1. id
2. city
3. date
4. player_of_match venue
5. neutral_venue
6. team1
7. team2
8. toss_winner
9. toss_decision
10. winner
11. result
12. result_margin
13. eliminator
14. method
15. umpire1
16. umpire2

With the help of this data we have calculated the toss won by teams, which venue is best for which team and other data has been collected from this data set.

This data consists of 817 rows and 17 columns

we have used another large data set that consist of 18 columns and 193469 columns

This data has details of what happened on that particular ball i.e. this is ball by ball data

features of this data are:

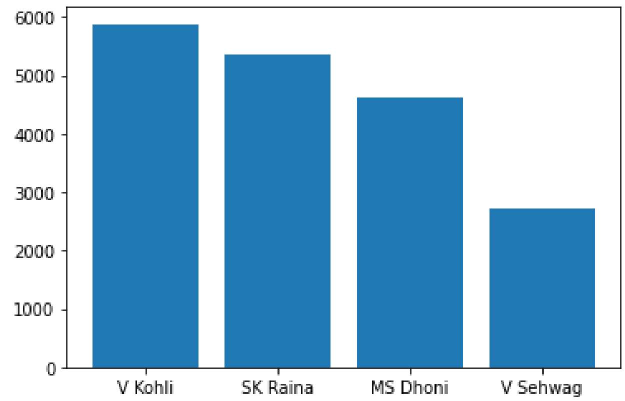
1. id
2. inning
3. over
4. ball
5. batsman
6. non_striker
7. bowler
8. batsman_runs
9. extra_runs
10. total_runs
11. non_boundary
12. is_wicket
13. dismissal_kind
14. player_dismissed
15. fielder extras_type
16. batting_team
17. bowling_team

we have used this data for several purposes

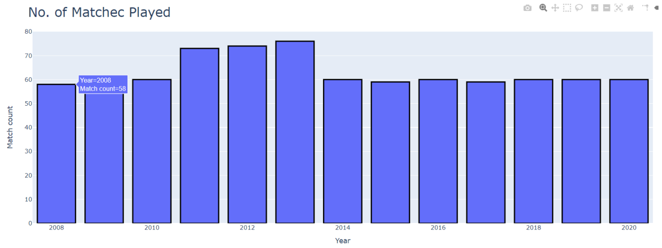
1. Total_Runs
2. Total_Boundries
3. Striker_Rate
4. Average
5. Wickets
6. Economy
7. Wickets_over
8. Catches
9. Stumped
10. Balls_Faced
11. Matched_played
12. Run_Given
13. ball delivered

all this data about every single has been stored with help of this data set

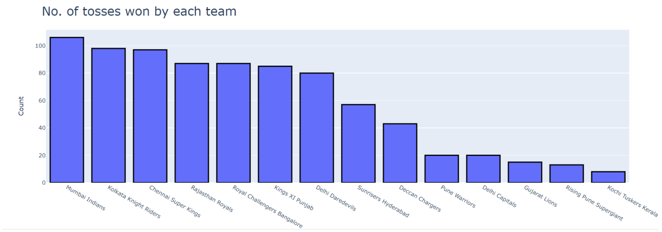
This is total runs scored by some of the players:-



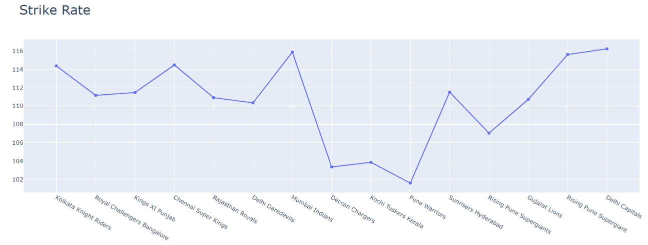
This is the total no. of matches played in the IPL every year between 2008 and 2020



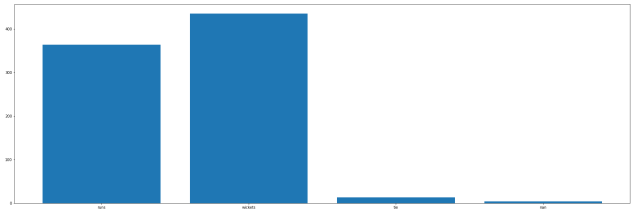
This is total no. Tosses won by each team from year 2008 to 2020



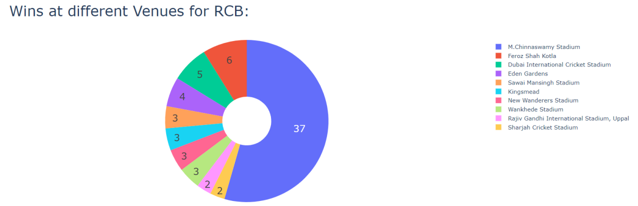
This is Strike Rate of Different teams from year 2008 to 2020



This is the result of all IPL matches from 2008 to 2020



Performance of RCB on different pitches



PREPROCESSING AND FEATURES EXTRACTION

3.1 for strike rate, economy, wickets per over

we have used the data from the ball by ball and calculated various stuff like total run scored by a batsman, total wickets were taken total ball faced and by using this we have calculated the data for

1.strike rate=total runs/total balls faced
2.economy= total run given/total ball delivered
3.wickets per over=total wickets/total overs

3.2 Reduction of dimensions of the dataset

We had some data which we didn't required so we have removed those columns as the part of data preprocessing

3.3 Data Standardization

Standardization is another scaling technique where the values are centered around the mean with a unit standard deviation. This means that the mean of the attribute becomes zero and the resultant distribution has a unit standard deviation.

3.4 Dividing Players into different Categories:

We have divided the players into four categories: Batsman, Bowler, Wicket Keeper, and All Rounder by calculating the batting and bowling score for each player.
For calculating the batting score, we have considered various factors such as total runs, boundaries, 30+runs, 50+runs, and centuries scored by the player.
For calculating the bowling score, we have considered various factors such as total wickets, 3-wicket haul, 5-wicket haul, and the player's economy.

4. Methodology, model details

We are interested in using multiple models such as logistic regression, naive mayes, decision trees, etc to compete against each other to get the model that gives us the best results

We initially ran the models using the following features:

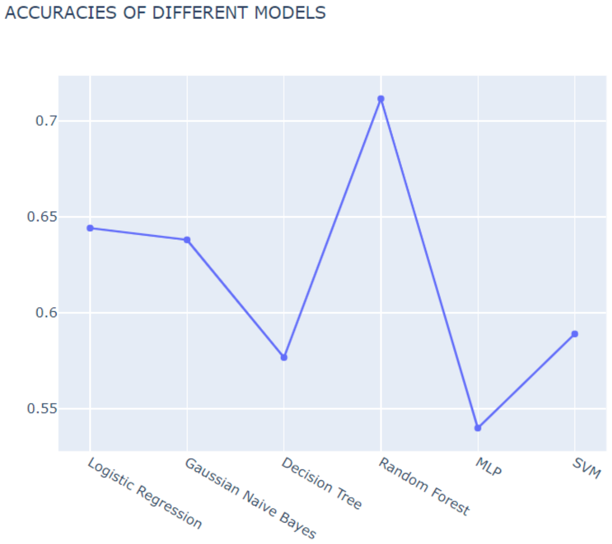
- Average (Runs per match)
- Balls Faced
- Catches
- Economy
- Runs Given
- Strike Rate
- Players Stumped
- Total Boundaries
- Total Runs
- Wickets
- Wickets Per Over

In order to create the dataset, we earlier first find the average values of these parameters for all the players in a team. Then, we find the difference between these average values between the two teams. We then perform BGD on the resultant dataset.
However, we later analysed the correlation of different features with winning and losing and accordingly narrowed down to strike rate, economy, catches, runs given and balls delivered

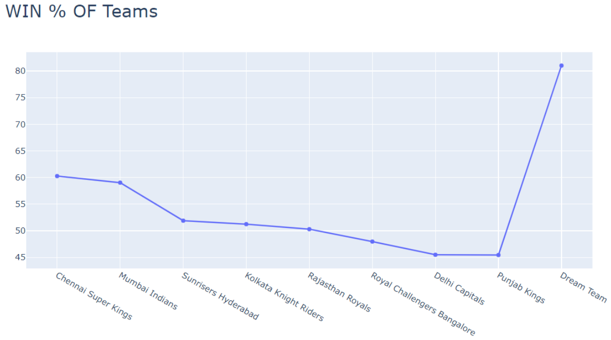
5. Results and analysis

We achieved the following accuracies with different models:

Logistic Regression: 0.6441717791411042
Gaussian Naive Bayes: 0.6380368098159509
Decision Tree: 0.5766871165644172
Random Forest: 0.7116564417177914 (Final model)
MLP: 0.5398773006134969
SVM: 0.588957055214724



We finally achieved our objective of creating a Dream Team, consisting of **'AB de Villiers', 'SR Watson', 'KA Pollard,' 'SL Malinga,' 'A Mishra,' 'PP Chawla,' 'DJ Bravo,' 'V Kohli','S Dhawan,' 'SK Warne' and 'SK Raina,'** which had a whopping win rate of **81.01965601965602%**



6. Learnings

We learned about the collection of data from trustworthy sources and reading material regarding our subject. We also learned that not all the data that we wish to find is always available. Hence, we often have to compromise and make do with what we have. This is what we tried to do while preprocessing the data. We also learned how to extract useful information from raw datasets and to process it in order to use it in the best way possible. We also know to look for relationships between data and the predicted results. Also, as we worked in groups, we learned about how people work on ML projects in the industry.

Work done by every member of the team

1) **Anurag Yadav**: Dataset Preprocessing- Data Extraction, Features extraction, Data collecting, Data analysis, Noise Reduction, Report writing, helped in the logistic regression model, helped in other models

2) **Yash Aggarwal**: Data Collection, Feature extraction, Report Writing, Data Preprocessing, helped in Naive Bayesian model and metric Collection,helped in other models

3) **Agamdeep Bains:** Data collection, Feature extraction, Decision tree, Random Forest, MLP, SVM, Metric Collection, Report Writing, Analysis, Dream Team Creation

4) **Ajay Kumar:** Naive Bayesian model, Logistic regression model, Report Writing,
data collection

7. References

[1] A. I. Anik, S. Yeaser, A. G. M. I. Hossain and A. Chakrabarty, "Player's Performance Prediction in ODI Cricket Using Machine Learning Algorithms," 2018 4th International Conference on Electrical Engineering and Information & Communication Technology (iCEEiCT), 2018, pp. 500-505, doi: 10.1109/CEEICT.2018.8628118.

[2] Kapania, N., 2012. Predicting Fantasy Football Performance with Machine Learning Techniques. URL: http://cs229. Stanford. edu/proj2012/KapaniaFantasyFootballAndMachineLearning. Pdf.

[3] Fantasy Football Trade analyzer by Jim Kim.

[4] Passi, K. and Pandey, N., 2018. Increased prediction accuracy in the game of cricket using machine learning. arXiv preprint arXiv:1804.04226.

[4] INCREASED PREDICTION ACCURACY IN THE GAME OF CRICKET USING MACHINE LEARNING