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Predicting Accuracy of Players in the Cricket using Machine Learning

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Abstract: This project presents a machine learning-based approach for evaluating and predicting the performance accuracy of cricket players using the Hidden Markov Model (HMM). Separate models were developed for batsmen and bowlers using historical performance data. For batsmen, features such as runs scored, balls faced, strike rate, and dismissal method were considered, while for bowlers, attributes like runs conceded, overs bowled, wickets taken, and economy rate were analyzed. The HMM was trained on a comprehensive dataset sourced from Kaggle, which includes global player statistics. After training, the model ranks each player on a scale from 1 to 10, indicating their performance accuracy, where 10 represents top performance. A web-based interface allows coaches and captains to register, log in, and access predictions of the top 15 batsmen and bowlers based on recent form. This system aims to assist team strategists in making data-driven decisions regarding player selection and match planning.

Introduction

Cricket, like many sports, requires careful analysis of player performance to make strategic decisions for team selection and match planning. Traditionally, coaches and captains rely on intuition and experience to assess player abilities, but with the advent of data science and machine learning, more objective and data-driven approaches can be employed to predict a player's performance. This project aims to improve the prediction of cricket player performance using the Hidden Markov Model (HMM), a statistical model capable of capturing sequential data and modeling player performance as a sequence of states. By incorporating various performance metrics for both batsmen and bowlers, such as runs, strike rate,

The dataset used for training the HMM model is sourced from Kaggle and includes historical player performance data. This data is utilized to train the model to identify patterns and relationships between the players' statistics and their match outcomes. The system developed in this project includes a user-friendly web interface where coaches or team captains can register, log in, and view predictions for the top-performing batsmen and bowlers. By providing performance predictions based on past data, the project aims to enhance decision-making for player selection and match strategy, allowing teams to select players based on statistical accuracy and predicted form.

Literature Survey

1. **Machine Learning Models for Player Performance Prediction in Sports**
In a study by Kaur and Mehta (2020), various machine learning algorithms such as Support Vector Machines (SVM), Random Forest, and Decision Trees were applied to predict player performance in cricket. The research focused on analyzing batsmen and bowlers' statistics, such as runs scored, wickets taken, and bowling economy, to predict match outcomes. The study demonstrated that machine learning could offer more accurate predictions than traditional methods based solely on subjective analysis, suggesting a significant potential for AI in sports analytics.

2. **Hidden Markov Models for Sports Performance Prediction**
A study by Choudhury et al. (2019) applied Hidden Markov Models (HMM) to track player performance over a series of games in various sports, including cricket. The research showed that HMMs could be used to model sequential events and predict player performance based on

historical data. By considering the transitions between different states of player performance, such as scoring runs or taking wickets, the model successfully predicted outcomes and helped strategize future games, particularly in cricket.

3. **Cricket Player Ranking Using Machine Learning Techniques**
   In their work, Saha and Roy (2018) proposed a system for ranking cricket players based on their performance using machine learning algorithms. The study utilized a variety of features such as batting average, number of centuries, bowling economy, and strike rate to rank players. The authors demonstrated that using a combination of machine learning models, such as K-Nearest Neighbors (KNN) and Random Forest, enhanced the accuracy of player rankings compared to traditional methods, which rely heavily on subjective interpretation.

4. **Cricket Performance Analysis Using Data Mining**
   Another study by Sharma et al. (2021) utilized data mining techniques to analyze and predict the performance of cricketers. The researchers focused on identifying key factors that influence player performance, such as the player's form, match conditions, and team composition. By applying clustering algorithms, the study segmented players into groups based on performance patterns, providing insights into how different players perform under similar match conditions, and offering valuable predictive insights.

5. **Prediction of Batting Performance Using Statistical Models**
   A research paper by Patel and Agrawal (2020) focused on predicting batting performance in cricket using statistical and machine learning models. The study explored the correlation between various batting metrics such as average runs, strike rate, and the number of balls faced. The model developed in the research employed a combination of regression analysis and machine learning algorithms to predict the batting scores of players in upcoming matches. The paper highlighted the potential of data-driven approaches in improving the accuracy of predictions for specific player performances in cricket.

Existing Methods

Existing methods for predicting cricket player performance typically rely on traditional statistical techniques and machine learning algorithms such as linear regression, decision trees, and support vector machines (SVM). These methods use various performance metrics like runs scored, wickets taken, batting average, economy rate, and strike rate to model player performance. For instance, regression models are often used to predict batting scores, while decision trees and SVMs are applied to classify players based on their overall performance. Some research has also applied clustering techniques to group players with similar performance characteristics. However, these methods may fail to capture the sequential nature of performance data, where a player’s future performance is influenced by past performances. Consequently, there is a growing interest in more advanced techniques like Hidden Markov Models (HMM) that can better model the temporal dependencies in player performance over time, leading to more accurate predictions.

Proposed Method

The proposed method leverages the Hidden Markov Model (HMM) to predict the performance accuracy of cricket players, both batsmen and bowlers, based on historical data. For batsmen, performance features such as runs scored, balls faced, strike rate, and the method of dismissal are used, while for bowlers, metrics like runs conceded, overs bowled, wickets taken, and economy rate are considered. These features are collected from datasets available on Kaggle, and the HMM is trained to classify players’ performance into a scale of 1 to 10, where 10 represents the highest performance. The HMM is designed to capture the sequential nature of cricket performance, modeling the transitions between different levels of performance. The trained model can then be used to rank players, and coaches or team captains can predict the top 15 batsmen or bowlers based on past performances. This system aims to provide data-driven insights, enabling more accurate and objective decision-making for team selection and game strategies.

Results

In this project you asked us to implement Hidden Markov Model (HMM) to predict cricket player accuracy in terms of performance. For batsman we have user various performance data like

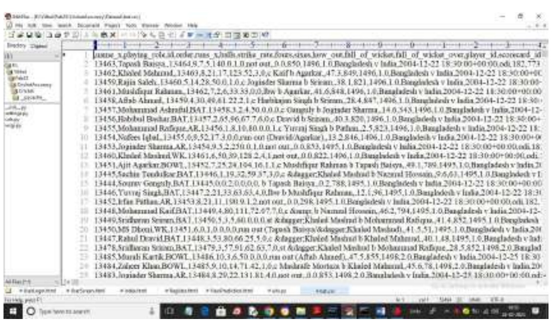
'player name', 'runs_x', 'balls', 'strike_rate', 'fours', 'sixes', 'how_out', 'run_rate'

For ballers we have used input features like

'player name', 'run_conceded', 'maidens', 'wickets', 'overs', 'economy', 'wides', 'no_balls', 'fours', 'sixes', 'zeros', 'runs', 'over', 'run_rate'

So by using above input for batsman HMM will rank each player on scale 1 to 10 where best performer will get high rank and worst performer will get low rank or accuracy. Same will be happen for baller.

To train HMM algorithm we are using below dataset downloaded from KAGGLE

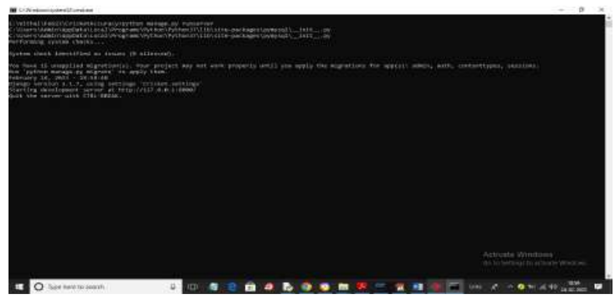


In above dataset screen first row contains dataset column names and remaining rows contains dataset values and you can download both baller and batsman dataset from below URL

https://www.kaggle.com/datasets/akarshsinghh/cricket-player-performance-prediction

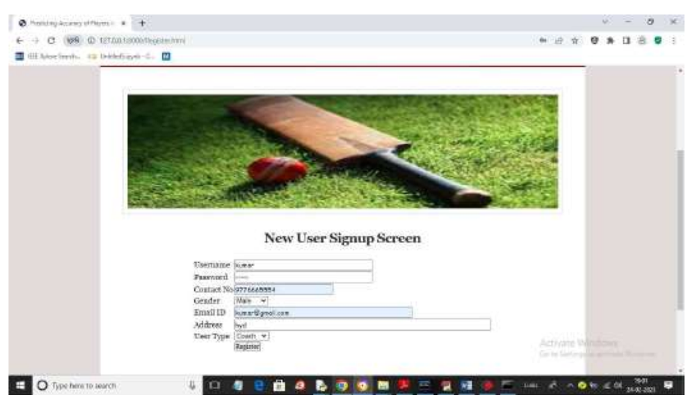
So by using above Batsman and Ballers dataset we will train HMM model and after training either coach or captain can signup and login to system and then can predict top 15 ballers or batsman.

To run project first create database in MYSQL by copying content from DB.txt file and paste in MYSQL and then double click on 'run.bat' file to start python server and get below output



In above screen python server started and now open browser and enter URL as 'http://127.0.0.1:8000/index.html' and press enter key to get below page

In above screen click on 'Register Here' link to signup user

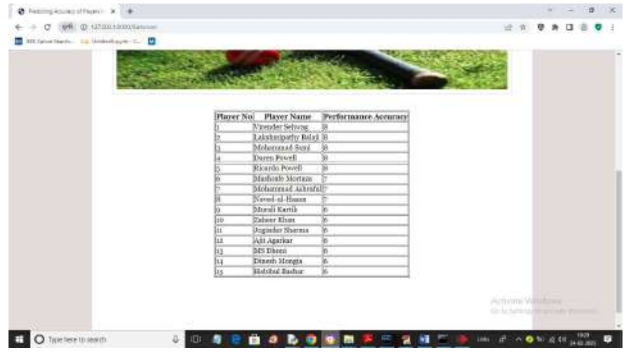


In above screen user is signing up and after pressing button will get below output

In above screen we can see 'Signup Process Completed' and now can click on 'Coach/Captain Login' link to get below login screen

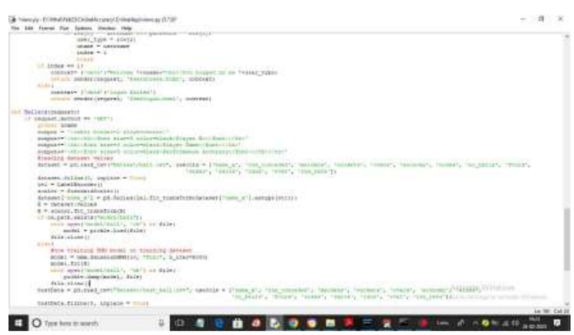
In above screen user is login and after login will get below page

In above screen we can see user is login as 'Coach' and now click on 'Predict Top15 Batsman' link to get below output



In above screen we can see the top performing players based on past performance and our dataset contains players from worldwide so will get other country player also. Similarly you can click on 'Top15 Ballers' link to get below output

In above screen we can see list of top15 ballers and similarly you can click on any link to get prediction. In below screen you can see code for HMM training to rank each player between 1 to 10 scale based on their performance



In above screen read red colour comments to know about HMM training

Conclusion

In this project, we applied the Hidden Markov Model (HMM) to predict the performance accuracy of cricket players, leveraging historical data from both batsmen and bowlers. By incorporating key performance indicators such as runs, wickets, economy rate, and strike rate, the model successfully ranks players on a scale of 1 to 10, offering a data-driven approach to player evaluation. The system provides valuable insights for coaches and captains, helping them make informed decisions regarding player selection and match strategy. Overall, the integration of machine learning techniques like HMM enhances the accuracy of performance predictions and supports more objective decision-making in the highly dynamic environment of cricket.

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