IPL Match Prediction Using ML & AHP: Squad Selection, Form Analysis & Consistency Insights

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Abstract

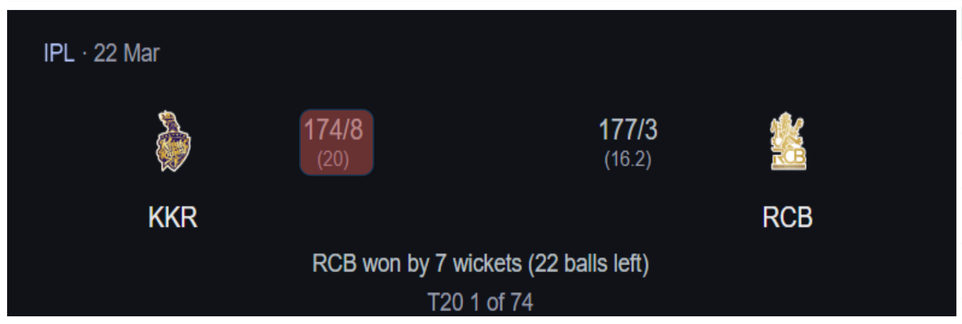
This project introduces a method to analyze cricket player performance and predict match results using machine learning techniques. Leveraging machine learning algorithms like XGBoost and Random Forest, the system predicts a batsman's score with high accuracy and evaluates players using advanced metrics for consistency and form. Feature weighting is refined using AHP and PCA methods. An interactive web interface allows users to select teams, view predicted scores, swap players, and analyze playing XI effectiveness, providing an insightful tool for strategic decision-making in cricket analytics.

Introduction

Cricket is a sport where data-driven insights play a vital role in team planning and strategic decision-making. The Indian Premier League (IPL), known for its dynamic and unpredictable nature, poses challenges in forecasting match outcomes, evaluating player performance, and selecting the optimal playing XI. This project employs Machine Learning (ML) techniques, along with the Analytic Hierarchy Process (AHP) and Principal Component Analysis (PCA), to analyze historical IPL data and derive actionable insights into player form and consistency. Using ML models such as XGBoost and Random Forest, the system enhances the accuracy of predictions related to player performance and match results. AHP ranks players based on multiple criteria, including batting form, bowling skills, all-rounder contributions, and wicket-keeping effectiveness. This integrated approach supports informed team selection using historical and real-time performance metrics.

The project addresses gaps in player evaluation through a comprehensive ranking methodology based on form and consistency. Advanced data analysis enables coaches, analysts, and team managers to refine match strategies and make evidence-based decisions.

Model Performance On real Scenario IPL(Indian Premier League) Match-1 KKR VS RCB 22,MAR 2025.

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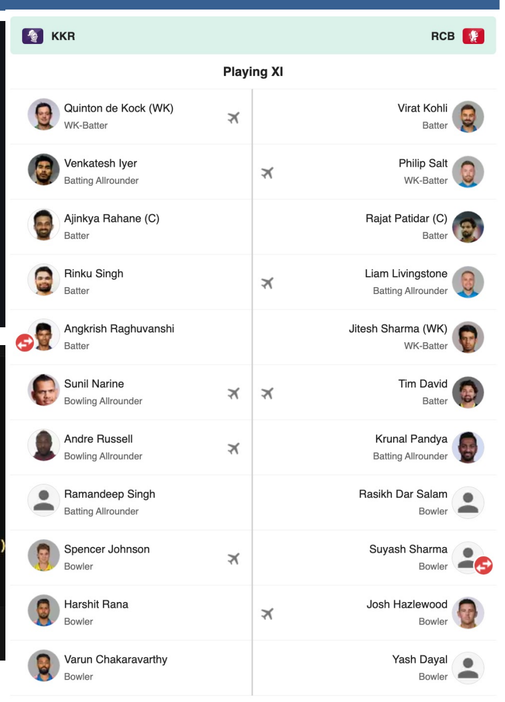
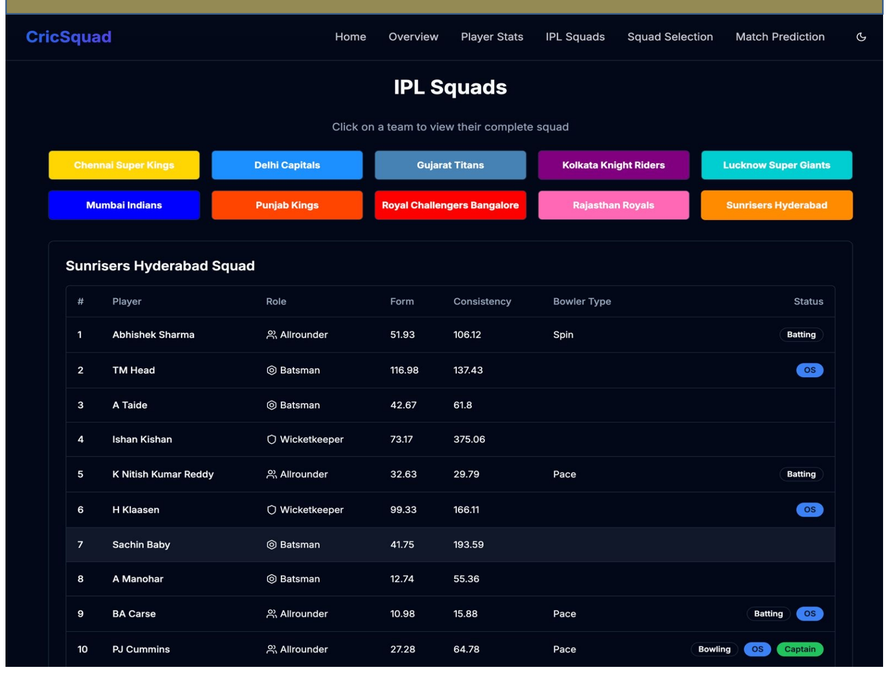
# Example prediction block
players = ['Q de Kock','SP Narine','AM Rahane','VR Iyer','RK Singh','AD Russell',
           'Ramandeep Singh','Harshit Rana','A Raghuvanshi','SH Johnson','CV Varun']
venue = 'Eden Gardens'
innings = 1
batting_team = 'Kolkata Knight Riders'
bowling_team = 'Royal Challengers Bangalore'

predicted_score = int(predict_innings(players, venue, innings, batting_team, bowling_team))
print(f"Predicted innings score : {predicted_score}")
[33]  ✓ 0.0s
...  Predicted innings score : 151
```



User Interactive Website



Results

Cricket Player Performance Analysis focuses on predicting a batsman's performance by analyzing key factors such as form, consistency, and historical data, achieving 87% accuracy using the XGBoost model and including comparative analysis with models like Random Forest. To improve overall prediction accuracy and robustness, a stacking ensemble approach is applied—combining base models such as Random Forest, XGBoost, and Gradient Boosting with a meta-model. Techniques like the Analytic Hierarchy Process (AHP) and Principal Component Analysis (PCA) are used to assign meaningful weights to performance metrics, enhancing the evaluation of player consistency and match impact. The system ranks players effectively, identifies top-performing XIs, and highlights potential match-winners. The stacking model demonstrates improved generalization and reduced overfitting, making it a reliable tool for cricket performance forecasting.

Squad Selection using Form and Consistency

Mar 22 2025 Rcb XI	**70% F and 30% C**
Squad	**Squad-1**
PD Salt	PD Salt - > 104.92
V Kohli	V Kohli - > 419.74
RM Patidar	RM Patidar - > 103.72
LS Livingstone	LS Livingstone - >38.29
JM Sharma	JM Sharma -> 73.26
TH David	TH David - >82.10
KH Pandya	KH Pandya -> 59.67
Suyash Sharma	**B Kumar - >36.83**
Rasikh Salam	Rasikh Salam -> -3.78
Yash Dayal	Yash Dayal -> -0.32
JR Hazlewood	JR Hazlewood -> -1.31
Total Score	**913.12**

Conclusions

This project leverages advanced machine learning techniques, including stacking ensemble models (Random Forest and XGBoost), AHP, and PCA, to predict T20 cricket player performance and match outcomes with high accuracy. By integrating historical and real-time data, we provide actionable insights for squad selection, strategic planning, and innings score forecasting. The model achieved an accuracy of 78%, demonstrating its effectiveness in enhancing decision-making for teams, coaches, and analysts. Future work includes refining real-time predictions and expanding the platform for broader applications in sports analytics. This research highlights the transformative potential of AI in cricket, offering data-driven solutions to optimize performance and engagement.

Publication

1. Raja Chowdary V, Siddharth Reddy A, Sohan M,S.V.K. Pavan Kumar B, V. Ravikumar Pandi, Soumya Sathyan, "A STACKING APPROACH FOR T20 CRICKET PERFORMANCE FORECASTING USING MACHINE LEARNING," Accepted and presented in 3rd international conference on AIMLA25 at K.S.R college of technology.

References

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2. "Statsguru | Searchable Cricket Statistics database | ESPNcricinfo.com," Cricinfo. https://stats.espncricinfo.com/ci/engine/stats/index.html
3. Bharadwaj, F., Saxena, A., Kumar, R., Kumar, R., Kumar, S. and Stević, Ž., 2024. Player Performance Predictive Analysis in Cricket Using Machine Learning. Revue d'Intelligence Artificielle, 38(2).
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