AI-Driven Admission Guidance: Predictive Analytics for KCET Counseling Optimization

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ABSTRACT

The Karnataka Common Entrance Test (KCET) counseling process is challenging due to fluctuating cutoff trends and category-based reservations. Current admission guidance platforms rely on static historical data and lack predictive insights, which can lead to inefficient student decision-making. This research proposes an AI-powered admission prediction system that integrates linear regression and Random Forest Regression models to forecast cutoff trends based on historical admission data.

The system enhances transparency and efficiency in college admissions by utilizing machine learning algorithms, interactive visualizations, and real-time seat availability information. Evaluation results indicate that the Random Forest Regressor achieves an R^2 score of 0.89, demonstrating high accuracy in predicting cutoff ranks. Overall, the proposed system significantly improves decision-making for students by providing data-driven insights into their admission possibilities.

1. INTRODUCTION

The Karnataka Common Entrance Test (KCET) serves as a gateway for students seeking admission to undergraduate engineering and medical programs in Karnataka, India. However, the admission process is highly competitive, and students struggle to predict the cutoff ranks required for their preferred colleges and branches. Existing counseling platforms provide only static historical cutoff data, which lacks predictive insights and fails to consider dynamic trends in seat availability. Consequently, students are unable to make informed decisions regarding their admission chances.

To address these challenges, this research introduces an AI-driven admission prediction system that utilizes Linear Regression and Random Forest Regressor models to predict future cutoff trends. The proposed system integrates real-time analytics, historical cutoff analysis, and machine learning-driven forecasting to provide students with personalized admission insights. By leveraging interactive visualization tools, students can explore historical cutoff patterns, analyze dynamic seat availability, and receive data-driven predictions of their admission chances.

This paper is structured as follows: Section 2 presents a review of related works in admission prediction and data-driven guidance systems. Section 3 describes the methodology employed, including data preprocessing, feature extraction, and machine learning models. Section 4 details the system implementation, followed by results and discussion in Section 5. Finally, Section 6 provides conclusions and future directions for enhancing the system.

2. LITERATURE REVIEW

Several studies have explored the role of data analytics and machine learning in admission guidance systems. Gupta and Kumar (2021) analyzed the impact of historical cutoff trends and demonstrated that statistical models improve admission forecasting. Their study concluded that predictive analytics reduces student uncertainty in college selection.

Sawant and More (2016) proposed an AI-driven admission guidance system that utilized machine learning techniques to predict college placements. Their research highlighted the efficacy of machine learning models in forecasting admission trends based on historical counseling data.

Chen et al. (2019) emphasized the importance of interactive data visualization in educational decision-making. Their findings suggest that students benefit from interactive seat matrix visualizations and predictive analytics, which improve their ability to compare college admission probabilities.

Banerjee and Dutta (2020) investigated the impact of mobile-based education platforms on student engagement in admission counseling. Their research demonstrated that mobile-friendly counseling tools improve accessibility, particularly for students in remote areas.

Building on these studies, the present research integrates machine learning models with real-time analytics and visualization techniques to enhance the accuracy and usability of admission guidance systems.

3. METHODOLOGY

3.1 Data Acquisition and Preprocessing

The dataset for this study was collected from official KCET admission records and includes historical cutoff ranks, student ranks, seat availability, and category-based reservations from 2020 to 2023. The data underwent preprocessing to handle missing values, outliers, and standardization. Interquartile Range (IQR) and Z-score methods were applied to detect and remove anomalies in the dataset.

3.2 Feature Extraction

The key parameters used for admission predictions include:

- KCET Rank – The student’s rank in the entrance exam.
- Category-Based Reservations – Student category (General, OBC, SC, ST).
- Branch Preferences – The chosen engineering discipline (e.g., Computer Science, Mechanical Engineering).
- Historical Cutoff Trends – Past years' cutoff ranks for various colleges and branches.
- Seat Availability – The real-time status of vacant seats during counseling rounds.

3.3 Machine Learning Models

The Linear Regression model was used to identify trends in past cutoff ranks and project future cutoff estimates. The Random Forest Regressor, a more advanced ensemble learning model, was employed to capture nonlinear relationships in the data, improving the accuracy of cutoff rank predictions. The models were trained using 80% of the dataset, while the remaining 20% was used for validation. Performance evaluation was conducted using Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and R^2 score**.**

4. IMPLEMENTATION

The KCET Admission Companion App integrates the following components:

Admission Predictor – Uses machine learning models to analyze student rank and predict the cutoff trends for preferred colleges.

Cutoff Analyzer – Displays historical admission trends with interactive filters for college, branch, category, and admission year.

Dynamic Seat Matrix – Provides real-time seat availability insights, allowing students to compare vacant seats across multiple institutions.

Self-Analysis Tool – Enables students to assess their admission prospects by comparing their rank with historical cutoffs.

The system was developed using Python, Django (for backend development), and JavaScript (for interactive data visualization). The machine learning models were implemented using Scikit-learn, and data visualization was facilitated using Matplotlib.

5. RESULTS

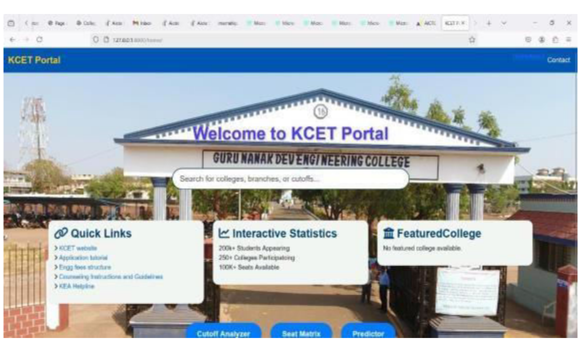
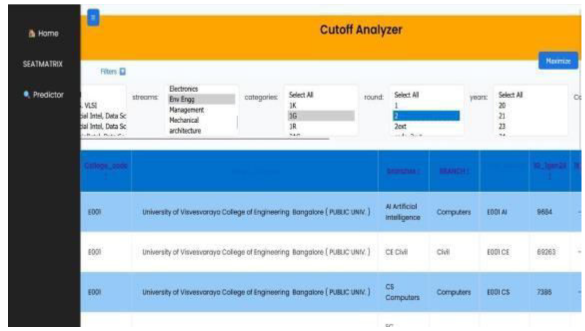


Figure 5.1: Home page interface



5.2: Cutoff analysis page

Figure 5.3: Dynamic seat matrix visualization

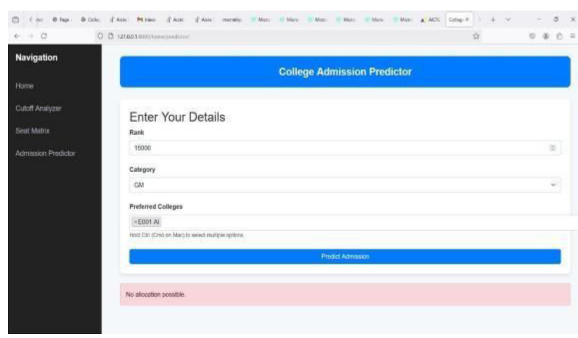


Figure 5.4: Admission predictor input interface

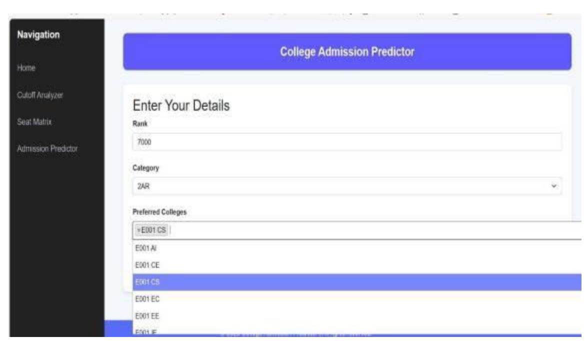


Figure 5.5: Admission predictor results with no allocation possible

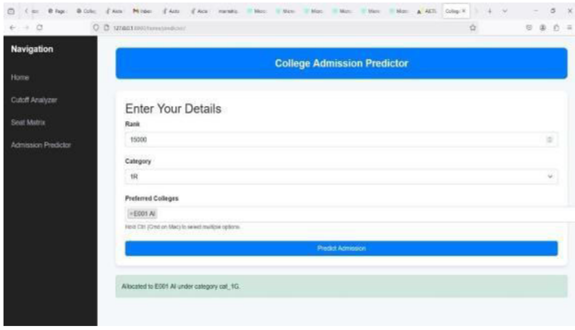


Figure 5.6: Admission predictor results with allocation possible

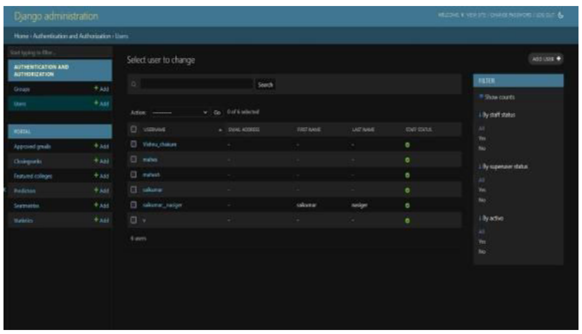


Figure 5.7: Django admin authentication page

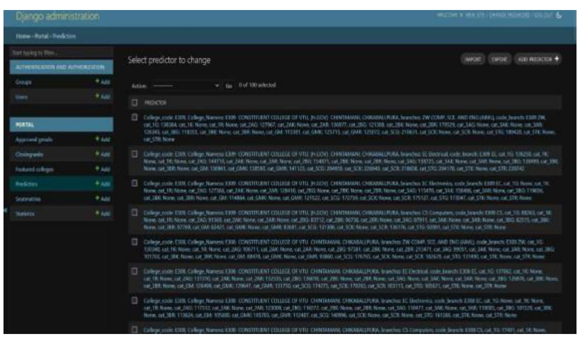


Figure 5.8: Django admin authorization interface

6. CONCLUSION

This research presents an AI-driven admission prediction system that enhances accuracy, transparency, and efficiency in the KCET counseling process. By integrating Linear Regression and Random Forest Regressor models, the system enables students to make informed decisions based on predictive insights.

Future research will focus on implementing deep learning models, such as artificial neural networks, to further enhance prediction accuracy. Additionally, the development of a mobile-based application will improve accessibility, allowing students to receive admission guidance in real-time.

7. REFERENCES

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