

# CounselWiseAI: Empowering Students with Smart College Selection based on Data Driven Analytics

Aniket Kachole<sup>1</sup>, Prasad Upasani<sup>2</sup>, Aditya Chidre<sup>3</sup>, Shreya Dhurde<sup>4</sup>,  
Pranjali Bahalkar<sup>5</sup>

<sup>1,2,3,4</sup>Undergraduate, Dept. of AI & DS, DYPCOE, Pune, India

<sup>5</sup>Assistant professor, Dept. of AI & DS, DYPCOE, Pune, India

## Abstract

In today's evolving educational landscape, students encounter numerous challenges during the college admissions process. Traditional counseling methods often fail to deliver the personalized support needed to address diverse student needs effectively. This project endeavors to transform the college counseling experience through the utilization of technology, offering tailored guidance and assistance. By employing advanced machine learning algorithms alongside individualized education, students receive precise recommendations aligned with their goals and aspirations. The implementation of an automated counseling system streamlines the admissions process, alleviating anxieties and expediting decision-making. This initiative holds promise in enhancing students' academic journeys and promoting equity in college admissions, thus fostering success in both academic and professional realms. Furthermore, this research contributes to the discourse on technology integration in education, exploring how data analytics and machine learning can bolster student achievement and advance inclusive educational opportunities.

**Keywords:** Natural Language Processing (NLP), Deep Learning (DL), Web Development , Database Management, User Interface (UI) Design , Software Engineering

## 1. Introduction

The contemporary educational landscape presents students with multifaceted challenges during the college admissions process, necessitating innovative solutions to enhance their experience. This research delves into the intricate dynamics of college counseling, addressing the limitations of traditional methods in meeting diverse student needs. By leveraging technology, particularly data analytics and machine learning, this study aims to revolutionize the college counseling paradigm, offering personalized guidance tailored to individual aspirations and objectives. The primary objectives include streamlining the admissions process, reducing anxiety among students, and fostering equity in college admissions. The significance of this research lies in its potential to transform students' academic journeys and contribute to the broader discourse on technology integration in education. This paper provides a comprehensive overview of the research problem, outlines the objectives and scope of the study, elucidates the motivation behind the research, and presents the structure of the paper to guide

readers through its contents. Through this study, we aspire to pave the way for more inclusive and effective educational practices in the digital age.

## 2. Literature review

The literature review provides a comprehensive analysis of existing research studies and systems pertinent to the project's domain. Through an examination of relevant literature, this section aims to identify gaps, challenges, and opportunities for improvement within the project area. Several studies have explored "predictive models of student college commitment decisions using machine learning algorithms" [1]. These models focus on categorizing students based on their acceptance or rejection of admission offers, leveraging machine learning techniques. However, challenges such as computational complexity and model interpretability have been identified, along with limitations in adapting to dynamic user preferences. Other research endeavors have investigated "decision support systems for admission in engineering colleges based on entrance exam marks [2]". These studies utilize decision tree algorithms to predict graduation and identify factors contributing to graduation. However, traditional machine learning techniques may face limitations in adapting to diverse datasets and evolving user preferences, impacting real-time updates and dynamic user interactions. Additionally, efforts have been made to develop "college predictor and analyzer systems [3]", utilizing machine learning models to predict students' chances of college admission. While effective, these models may be constrained by their reliance on historical data and complex algorithms, potentially overlooking individualized factors influencing admission decisions. Furthermore, projects aiming to optimize "college admissions in Maharashtra, India, through data-driven decisions have been explored [4]". These projects focus on enhancing the counseling process for the "Common Entrance Test (CET)" but may lack interactive features and comprehensive solutions due to limitations in data accessibility and system infrastructure. In contrast, our project represents a significant advancement by prioritizing efficient database retrieval and streamlining recommendation generation processes. By incorporating user inputs such as percentile and branch preferences, we offer personalized recommendations without the computational overhead of sophisticated machine learning models. Through these enhancements, our project aims to provide a faster, more user-friendly, and dynamic experience, catering to diverse user needs and fostering informed decision-making in the college admission process.

## 3. Methodology

The methodology section outlines the research design, approach, data collection methods, tools, techniques, and analytical and computational methods used in the project. Research Design and Approach: The research design encompasses a systematic approach to address the objectives of the study. The project follows a mixed methods research design, integrating qualitative and quantitative techniques to explore and analyze the college recommendation system comprehensively. The approach involves a combination of literature review, data collection, algorithm development, implementation, testing, and analysis. Data Collection Methods, Tools, and Techniques: Data collection involves acquiring relevant datasets and information necessary for developing and testing the college recommendation system.

The primary data sources include:

1. "Joint Seat Allocation Authority (JoSAA)" for JEE Mains and Advanced data.
2. Kaggle for "Maharashtra Common Entrance Test (MHT-CET)" data.

The following tools and techniques were utilized for data collection:

1. Web scraping techniques to extract data from online sources.
2. API integration to access data from external platforms.
3. Database querying to retrieve structured datasets.
4. Manual data entry and compilation for supplementary information.

Analytical and Computational Methods: The project employs various analytical and computational methods to process, analyze, and generate recommendations:

1. Machine learning algorithms for predictive modeling and recommendation generation.
2. Statistical analysis techniques to identify patterns, trends, and correlations in the data.
3. Natural language processing (NLP) algorithms for chatbot response generation.
4. Mathematical modeling for simulating user preferences and college recommendations.
5. Database management and query optimization for efficient data retrieval and storage.

The methodology ensures a systematic and rigorous approach to developing, implementing, and evaluating the college recommendation system, integrating both qualitative and quantitative research methods for comprehensive analysis and validation.

#### 4. Mathematical model

##### System Description:

The project involves the development of a system, denoted as  $S$ , which facilitates the creation and simulation of personalized college recommendations based on user preferences and past year cutoff data. The system encompasses functionalities related to nanobots, neurons, chatbot, and data processing algorithms.

##### Inputs:

- User input data: Includes exam rank or percentile, branch preferences, location preferences, seat type, and gender.
- Previous year cutoff data: For exams such as JEE Advanced, JEE Mains, and MHT CET.
- Chatbot queries and responses.

##### Outputs:

- O1: Personalized recommendations of colleges that match the user's preferences and criteria.
- O2: User feedback and preferences collected during the counseling process.
- O3: Chatbot responses to user queries regarding branch information, job roles, top colleges, etc.

##### Processes:

morphology(), simulation(), acquisition(), chatbot(): Processes involved in examining user preferences, mathematical modeling, data acquisition, and chatbot interaction.

##### Model:

$S = I_i, O_1, O_2, O_3, P, P = \text{morphology}(), \text{simulation}(), \text{acquisition}(), \text{chatbot}()$

Where,

- $I_i$  represents user input data
- $O_1, O_2, O_3$  denote system outputs
- $P$  represents the processes involved in generating college recommendations and chatbot interaction.

#### 5. Results

The college recommendation system developed in this project produces personalized recommendations

tailored to each user's preferences and constraints. The output of the project encompasses various components aimed at assisting students in making informed decisions during the college admissions process.

### 1. Personalized College Recommendations:

- The primary output of the system is a list of recommended colleges based on user input data, including exam scores, preferred branches of engineering, location preferences, seat type, gender, and quota details.
- These recommendations are generated using a recommendation algorithm that analyzes user preferences and past year cutoff data to identify colleges that closely match the user's requirements.

### 2. Detailed College Profiles:

- Along with the recommended colleges, the system provides detailed profiles of each college, including information such as infrastructure, faculty, placement statistics, and student reviews.
- This information allows users to explore additional details about recommended colleges and make well-informed decisions regarding their college choices.

### 3. Interactive User Interface:

- The system offers an interactive frontend interface that allows users to view and interact with the recommended colleges.
- Users can explore additional information about each college, compare multiple colleges, and express interest in specific colleges for further consideration.

### 4. Chatbot Interaction:

- In addition to personalized recommendations, the system includes a chatbot feature that responds to user queries regarding branch information, job roles, top colleges, etc.
- The chatbot provides real-time assistance to users, addressing their queries and providing relevant information to enhance their understanding of the college admissions process.

Overall, the output of the project provides students with valuable insights and recommendations to navigate the complexities of the college admissions process effectively. By leveraging technology and data-driven approaches, the system aims to empower students to make intelligent decisions aligned with their academic goals and aspirations.

## 6. Conclusion

Our project offers a transformative solution to the challenges students face during the college admissions process. By integrating technology and personalized education, we provide tailored guidance through cutting-edge machine learning algorithms. This streamlines admissions, empowering students to make informed decisions. While acknowledging challenges like data accuracy and biases, we are committed to ongoing refinement. Looking ahead, opportunities for expansion include incorporating additional data sources and partnerships with educational institutions. Through dedication and collaboration, we aim to empower students and contribute to their academic success.

## 7. References

1. K. Basu, T. Basu, R. Buckmire, and N. Lal, "Predictive models of student college commitment decisions using machine learning," *Data*, vol. 4, no. 2, 2019.
2. M. Tanna, "Decision support system for admission in engineering colleges based on entrance exam marks," *International Journal of Computer Applications*, vol. 52, pp. 38–41, August 2012.

3. V. S. M. K. Anagh Mirji, Darshan Paithankar, “College predictor and analyzer,” International Research Journal of Modernization in Engineering Technology and Science, 2023.
4. K. Bhiwsankar, “Data driven decisions for optimising college admissions in maharashtra,” 2023.
5. “Joint seat allocation authority website, <https://josaa.nic.in/>.”
6. “Mht cet dataset, <https://www.kaggle.com/datasets/notcostheta/engineeringcolleges-in-maharashtra/data>.”