A

Semester Project-I

Report

On

"College Admission Predictor"

By

1. Dongarsing Manoj Patil (231101151)
2. Om Sanjay Borle (231101193)
3. Sarvesh Pradip Mekhe (231101171)
4. Pratik Rajendra Bhadane (231101160)

Department of Computer Engineering

The Shirpur Education Society's

R. C. Patel Institute of Technology, Shirpur - 425405.

[2024-25]

A

Semester Project-I

Report On

“College Admission Predictor”

In partial fulfillment of requirements for the degree of
Bachelor of Technology In Computer Engineering

Submitted By

1. Dongarsing Manoj Patil (231101151)
2. Om Sanjay Borle (231101193)
3. Sarvesh Pradip Mekhe (231101171)
4. Pratik Rajendra Bhadane (231101160)

Under the Guidance of

Prof. Ms. J. S. Sonawane

The Shirpur Education Society’s

R. C. Patel Institute of Technology, Shirpur - 425405.

Department of Computer Engineering

[2024-25]

R. C. PATEL
INSTITUTE OF TECHNOLOGY
An Autonomous Institute

The Shirpur Education Society's

R. C. Patel Institute of Technology
Shirpur, Dist. Dhule (M.S.)

Department of Computer Engineering

CERTIFICATE

This is to certify that the Sem Project entitled "**College Admission Predictor"** has been carried out by team:

1. Dongarsing Manoj Patil (231101151)
2. Om Sanjay Borle (231101193)
3. Sarvesh Pradip Mekhe (231101171)
4. Pratik Rajendra Bhadane (231101160)

under the guidance of **Ms. J. S. Sonawane** in partial fulfillment of the requirement for the degree of Bachelor of Technology (Semester-3) in Computer Engineering of Dr. Babasaheb Ambedkar Technological University, Lonere during the academic year 2024-25.

Date:

Place: Shirpur

Guide	**Semester Project-I Coordinator**
Ms. J. S. Sonawane	**Ms. J. S. Sonawane**
H.O.D.	**Director**
Dr. R. B. Wagh	**Dr. J. B. Patil**

ACKNOWLEDGEMENT

We take this opportunity to express our gratitude to the Computer Department of RCPIT, Shirpur, for providing us with the opportunity to undertake our semester project in their esteemed organization.

It is a privilege for us to have been associated with **Ms. J. S. Sonawane**, our guide and project coordinator during the project work. We have greatly benefited from her valuable suggestions and ideas.

We extend our gratitude to **Dr. R. B. Wagh**, Head of the Computer Department, for his continuous encouragement, cooperation, and support. Additionally, we are thankful to all the individuals who contributed in their unique ways to the successful completion of this project.

Lastly, we express our heartfelt thanks to the principal of this reputed institution, **Dr. J. B. Patil**, for his guidance and valuable direction in our academics. Under the mentorship of these responsible and talented personalities, we were able to complete our semester project efficiently and successfully.

Project Team:

Dongarsing Manoj Patil (23110151)
Om Sanjay Borle (231101193)
Sarvesh Pradip Mekhe (231101171)
Pratik Rajendra Bhadane (231101160)

R. C. PATEL
INSTITUTE OF TECHNOLOGY
An Autonomous Institute

Department of Computer Engineering

Institute Vision

To achieve excellence in engineering education with strong ethical values.

Institute Mission

To impart high quality Technical Education through:

- Innovative and Interactive learning process and high quality, internationally recognized instructional programs.
- Fostering a scientific temper among students by the means of a liaison with the Academia, Industries and Government.
- Preparing students from diverse backgrounds to have aptitude for research and spirit of Professionalism.
- Inculcating in students a respect for fellow human beings and responsibility towards the society.

Department Vision

To provide prominent computer engineering education with socio-moral values.

Department Mission

To groom students to become professionally and ethically sound computer engineers to meet the growing needs of industry and society.

ABSTRACT

The College Admission Predictor website is a semester project designed to assist prospective engineering students in predicting their chances of admission to various colleges based on their MHTCET scores and caste-based reservations. This web-based tool leverages past admission data and eligibility criteria to forecast college allocations, providing students with a realistic assessment of potential options. By inputting their MHT-CET marks and reservation category, users can receive tailored predictions that simplify their decision-making process. The platform also serves as an informative resource on admission trends, enabling students to set realistic goals and make informed choices. The project aims to reduce stress around college admissions and enhance transparency in the allocation process. This system's user-friendly interface and efficient backend make it a valuable tool for students navigating the competitive landscape of engineering admissions.

Keywords: [*College Admission Predictor, MHT-CET, Engineering Admissions, Reservation Categories, Predictive Tool, Admission Trends, Decision-Making*]

Page Index

FIGURE INDEX

Table INDEX

Chapter-1
Introduction

1.1 Introduction

The College Admission Predictor project aims to simplify the complex process of college admissions for engineering aspirants in Maharashtra. Through this web-based tool, students can assess their chances of admission based on their MHT-CET scores and reservation category, thus gaining a clearer understanding of their options and increasing their chances of making informed decisions. Given the competitive nature of engineering college admissions and the complexities involved in the allocation process, this project provides valuable support to students who may otherwise find it challenging to navigate admission choices. This chapter provides an overview of the background of college admissions, the motivation for creating this tool, objectives, and the scope and limitations of the project.

1.2 Background of College Admissions

In India, engineering college admissions are highly competitive and are determined by entrance exams, among which the Maharashtra Common Entrance Test (MHT-CET) plays a pivotal role. Each year, thousands of students appear for MHT-CET, vying for limited seats in top engineering colleges across the state. Admissions are influenced by various factors, including the student's score, the specific college's cut-off trends, and reservation policies.

The Government of Maharashtra follows a structured reservation system that allocates seats based on social categories, including Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Classes (OBC), and Economically Weaker Sections (EWS). Additionally, seats are reserved for students from Maharashtra in many government institutions. This intricate blend of merit-based and reservation-based criteria makes it challenging for students to estimate their chances of admission without a reliable prediction tool.

Despite the availability of cut-off trends, there is a lack of accessible tools that can help students quickly analyze their chances based on recent data. This background highlights the need for a predictive solution that factors in both merit scores and reservation categories, assisting students in making well-informed choices.

1.3 Motivation for Creating the Predictor

The primary motivation behind creating this College Admission Predictor tool is to alleviate the anxiety and uncertainty that students face during the admission process. Many students, especially those who may not have access to extensive guidance or counseling, often struggle to understand the admission dynamics, leading to stress and, sometimes, unrealistic expectations.

This tool was designed with the intention to:

- Provide accessible insights into college admissions for all students, irrespective of their background.
- Offer a transparent and data-driven prediction model that can help students gauge their chances of getting into specific colleges.
- Encourage students to set realistic expectations by understanding the impact of their scores, category, and other factors on college allocations.
- Minimize the guesswork and anxiety associated with the admission process, making it easier for students to focus on preparing for college.

By using this predictor, students gain an objective assessment of their admission chances, which can be especially helpful in guiding students from rural areas or economically disadvantaged backgrounds who may lack access to professional counseling services.

1.4 Objectives of the Project

The objectives of the College Admission Predictor project are as follows:

- **Predict College Admission Outcomes**: To provide students with reliable predictions on possible college admissions based on their MHT-CET scores and reservation category.
- **Enhance Transparency**: To simplify the complex admission process by giving students a clear, data-based insight into how their scores might align with various college cut-off trends.
- **Provide an Accessible Tool**: To develop a user-friendly, web based platform that allows easy access to predictions, enabling students from diverse backgrounds to utilize the tool effectively.
- **Aid Decision-Making**: To help students make informed choices regarding college applications by offering a realistic view of their options, thereby reducing stress and uncertainty.
- **Contribute to Fair Access**: To create a tool that incorporates the reservation system, ensuring that students from all social categories receive fair assessments according to government policies.

These objectives collectively aim to support students in planning their academic futures with greater confidence and clarity.

1.5 Scope and Limitations

Scope: The scope of this project includes providing prediction services based on MHT-CET scores and reservation categories specifically for engineering colleges in Maharashtra. This tool draws from historical admission data and cut-off trends to generate estimates of admission chances. It is intended to serve as a guiding resource for students seeking admission to engineering programs in the state, catering to a wide user base of aspirants.

Key aspects of the scope include:

- Predictions based on MHT-CET scores and reservation policies.
- User-friendly, web-based platform accessible to students across Maharashtra.
- Predictions specific to engineering college admissions only, with future scalability options.

Limitations: Despite its usefulness, the College Admission Predictor has certain limitations that users should consider:

- **Data Dependency**: The accuracy of predictions is reliant on the quality and recency of admission data available. Any significant change in government policies or college cut-off trends may impact prediction accuracy.
- **Static Predictions**: This tool provides estimates based on historical data, which may not account for year-to-year fluctuations in cut-off marks due to various factors like exam difficulty, seat availability, or student preferences.
- **Limited to Maharashtra**: The tool is specifically designed for Maharashtra's MHT-CET-based engineering admissions and may not apply to other entrance exams or states.
- **Reservation Complexity**: While the tool incorporates reservation categories, it may not fully account for all intricate details, such as sub-category preferences or management quotas, which might affect some admissions.

guide By recognizing these limitations, students can better interpret the results from the predictor and use it as a complementary tool in their overall decision-making process rather than a definitive [1].

Chapter-2
Literature Survey

This section reviews existing research, tools, and studies related to college admission predictions and factors influencing admissions in India. Analyzing prior studies helps identify the strengths and limitations of existing solutions and highlights the unique contributions of this project.

2.1 Review of some Engineering Colleges

Table 1- Review of Colleges

College Name	Affiliated University	Type	Total Seats	Reservation Breakdown	MHT-CET Cut-Off	Popular Courses Offered
COEP (College of Engineering, Pune)	Savitribai Phule Pune University	Government	700	General: 50%, SC: 13%, ST: 7%, OBC: 19%, EWS: 10%	170-180	Computer Science, Mechanical, Civil
VJTI (Veermata Jijabai Technological Institute)	Autonomous, affiliated with Mumbai University	Government	600	General: 47%, SC: 13%, ST: 7%, OBC: 19%, EWS: 10%, PWD: 4%	165-175	Electrical, Electronics, IT, Mechanical
D Y Patil College of Engineering	Savitribai Phule Pune University	Private	540	General: 40%, SC: 13%, ST: 7%, OBC: 19%, EWS: 10%	140-160	Computer Science, E&TC, Mechanical

Pimpri Chinchwad College of Engineering	Savitribai Phule Pune University	Private (Autonomous)	480	General: 42%, SC: 12%, ST: 6%, OBC: 20%, EWS: 10%	135-155	Computer Science, IT, Civil
Vishwakarma Institute of Information Technology	Autonomous, affiliated with Pune University	Private	500	General: 40%, SC: 13%, ST: 7%, OBC: 20%, EWS: 10%	130-150	IT, Computer Science, Mechanical
Vishwakarma Institute of Technology	Autonomous, affiliated with Pune University	Private	480	General: 38%, SC: 13%, ST: 6%, OBC: 20%, EWS: 8%	140-160	Computer Science, Mechanical, E&TC
RCPIT (R C Patel Institute of Technology)	North Maharashtra University	Private (Aided)	450	General: 45%, SC: 13%, ST: 10%, OBC: 20%, EWS: 10%	125-145	Electrical, IT, Computer Science
KK Wagh College of Engineering	Savitribai Phule Pune University	Private	520	General: 40%, SC: 12%, ST: 8%, OBC: 20%, EWS: 10%	130-150	Mechanical, Civil, Computer Science

Explanation of Columns:

1. **College Name**: Name of the engineering college.
2. **Affiliated University**: The university to which the college is affiliated.

3. **Type**: Government, Private, Autonomous, or Government-Aided.
4. **Total Seats**: Total number of seats available in the college.
5. **Reservation Breakdown**: Percentage of seats reserved for each category (General, SC, ST, OBC, EWS, Management, NRI, etc.).
6. **Average MHT-CET Cut-Off**: Range of average MHT-CET scores required for admission.
7. **Popular Courses Offered**: List of popular engineering courses available at the college.

2.2 Studies on Factors Affecting College Admissions (Scores, Reservations, etc.)

Multiple studies have examined the factors influencing college admissions in India, revealing a range of considerations that impact students' chances beyond exam scores alone. Key factors include:

- **Entrance Exam Scores**: Entrance exam scores, such as MHT-CET for engineering admissions in Maharashtra, play a critical role in determining college allocations. Research shows a strong correlation between higher scores and better admission chances, particularly in top-tier institutions.
- **Reservation Policies**: Reservation systems in India aim to ensure equitable access to education by providing a certain percentage of seats to specific social categories, such as Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Classes (OBC), and Economically Weaker Sections (EWS). Studies indicate that reservation policies significantly impact admission outcomes, as students in reserved categories may have access to colleges with relatively lower cut-off scores compared to general category students.
- **Location and Domicile Preferences**: For state-funded institutions, domicile policies often prioritize students from the state.

  In Maharashtra, many government institutions reserve seats for Maharashtra residents, affecting out-of-state students' admission prospects.

- **Socio-Economic Background**: Research highlights that students from rural or economically disadvantaged backgrounds often have less access to coaching and guidance, which may impact their exam preparation and, consequently, their scores. Socio-economic factors, therefore, indirectly affect college admission success rates.

These studies provide valuable insights into the multi-faceted nature of college admissions, suggesting that a predictive tool must consider both score-based and non-score-based factors to provide reliable predictions. However, the majority of existing tools focus mainly on scores, overlooking complex variables such as categorybased reservations and domicile preferences.

2.3 Gap in Existing Solutions

Despite the availability of college admission predictors, there remain several gaps in the functionality and effectiveness of these tools:

- **Lack of Customization for Reservation Categories**: Many tools do not fully account for India's reservation policies, especially in state-specific exams like MHT-CET. As a result, students from different social categories may not receive predictions that accurately reflect their reservation-based advantages.

- **Limited Focus on State-Specific Data**: National college predictor tools often overlook the unique cut-off patterns and reservation policies of individual states like Maharashtra. MHT-CET-specific solutions that integrate state-specific cut-off trends, reservation quotas, and historical data are limited.

- **Absence of Transparent Data**: Some tools lack transparency in their prediction methodologies, leaving students unsure of how the predictions are made. A transparent, data-driven approach that clarifies how scores and reservations impact outcomes can help build user trust.

- **User Accessibility**: Many existing tools are embedded in broader education platforms, which may require registration or paid subscriptions. A free and accessible tool would be more helpful to students from varied backgrounds, particularly those who may lack financial resources.

The College Admission Predictor project aims to fill these gaps by providing a specialized, state-specific tool tailored to MHT-CET admissions, with a clear focus on accurate prediction using reservation-inclusive data. By offering a user-friendly, accessible platform that considers the unique factors influencing Maharashtra's engineering admissions, this project strives to be a valuable resource for prospective students in the state.[2][3]

Chapter 3 Methodology

3.1 Data Collection

3.1.1 Sources of Data

To build an effective college admission predictor, gathering highquality data is essential. Key data sources for this project include:

- **Government Databases**: Official records of previous MHTCET cut-off scores for various colleges and branches. These sources provide reliable information about admission trends and reservation quotas for various categories.

- **College Websites**: Each college often publishes admissionrelated data, including cut-off scores, seat distribution, and reservation criteria, on its official site.

- **MHT-CET Admission Portals**: Data from centralized admission portals managed by the Directorate of Technical Education (DTE) Maharashtra, which typically includes seat matrix, opening and closing ranks for various colleges, and categories.

- **Historical Admission Data**: Past data on admission patterns and trends can help in understanding score thresholds and allocation based on rank, category, and location.

- **User-Generated Data**: Optional surveys or feedback from past applicants could offer insights into admission trends and satisfaction with college placement.

3.1.2 Admission Trends and Criteria

Admission data includes a variety of criteria that impact seat allocation, such as:

- **MHT-CET Score Distribution**: Analysis of score ranges for different colleges and branches.

- **Reservation Quotas**: Breakdown of seats by category (e.g., General, SC, ST, OBC, EWS, etc.) in line with Maharashtra's reservation policies.

- **College-Specific Preferences**: Some colleges may give preference to students from specific regions or under certain quotas.

- **Trends Over Time**: Observing how cut-offs have changed in previous years helps predict future trends and can be used to adjust model parameters.

3.2 Data Analysis

3.2.1 Data Preprocessing

Data preprocessing is crucial to make the collected data usable and accurate. Key preprocessing steps include:

- **Cleaning**: Removing any duplicates, inconsistencies, or missing values from the dataset to ensure reliability.
- **Normalization and Standardization**: Ensuring all data points are in a consistent format. For example, scores may need to be normalized for consistent scale across categories.
- **Outlier Detection**: Identifying and handling outliers (e.g., exceptionally high or low scores) to prevent them from skewing the model's results.

3.2.2 Feature Selection

Selecting relevant features is important for effective prediction. Key features for this model include:

- **MHT-CET Score**: Primary feature used to predict admission likelihood.
- **Category/Reservation Status**: Strongly influences seat allocation, as each category may have different cut-off scores.
- **Branch of Study**: Different branches have varying demand and cutoffs (e.g., Computer Science may have higher cut-offs than Civil Engineering).
- **Location Preferences**: Some colleges may have regional quotas, making the applicant's location relevant.
- **Seat Availability**: The total number of seats in each branch and college, which affects competition and cut-off scores.

After selecting features, exploratory data analysis (EDA) can help visualize trends, distributions, and correlations among features to guide the prediction model.

3.3 Prediction Models

3.3.1 Overview of Algorithms Considered

Several predictive models or logical algorithms can be considered based on the nature of the data and the project's objectives. Potential approaches include:

- **Linear Regression**: A simple approach where MHT-CET scores and category quotas are used to predict admission outcomes. This model is effective when cut-off trends follow a linear relationship.

- **Logistic Regression**: Useful for binary classification to predict the likelihood of admission based on various predictors, such as score and category.
- **Decision Tree**: A tree-based model that segments the data based on attributes like scores and categories, making it useful to handle non-linear admission trends.
- **Random Forest**: An ensemble method that uses multiple decision trees, providing a more accurate prediction by averaging results.
- **K-Nearest Neighbors (KNN)**: A classification algorithm where an applicant's chance of admission is predicted based on the "k" nearest similar applicants from historical data.
- **Custom Logical Model**: If no predictive algorithm is applied, a logical model can be created based on threshold values of cut-off scores and category allocations to match users with colleges based on historical patterns.

The model is then trained on historical data and evaluated for accuracy. The choice of model depends on the data's complexity and the desired accuracy of predictions.

3.4 User Interface Design

3.4.1 Overview of UI/UX Considerations

A user-friendly interface is essential for users to interact easily with the admission predictor. Key UI/UX considerations include:

- **Intuitive Design**: The layout should be straightforward, with clear navigation to guide users through each step. Users should be able to input their scores and other details without confusion.
- **Input Fields and Forms**: Ensure that fields for MHT-CET score, category, branch preferences, and location are easily accessible. Input validation can help prevent errors.

- **Results Display**: Predicted college options should be displayed in an organized and easy-to-read format, preferably with details on each recommended college's cut-off score, location, and any unique features.

- **Visual Data Representation**: Use charts, graphs, or ranking lists to help users understand their likelihood of admission. For example, a visual gauge of the user's probability of admission based on the cut-off range would be engaging.

- **Responsive Design**: Ensure the interface works smoothly across different devices, such as desktops, tablets, and smartphones.

- **Help & Support**: Provide tooltips, FAQs, or a help section to guide users if they encounter any difficulties.

- **Security and Privacy**: Protect user data, especially sensitive inputs like scores or personal information, with secure data handling practices.

By focusing on usability and accessibility, the UI design ensures a positive experience for users, enabling them to make informed decisions regarding their college admissions.
[3][4][5]

Chapter 4 System Architecture

4.1 System Architecture

The system architecture for the college admission predictor is designed to handle user inputs, process data, and deliver predictions efficiently. The system operates as a multi-tier application, including a frontend for user interaction, a backend for processing and prediction logic, and a database for data storage and retrieval.

4.2 System Design Overview

The system follows a three-tier architecture:

- **Frontend (Presentation Layer)**: The user-facing interface where users enter their scores, category, and preferences. This layer is responsible for collecting user inputs and displaying prediction results in a user- friendly format.
- **Backend (Application Layer)**: The processing core that houses the prediction algorithms and handles all the business logic. This layer fetches data from the database, applies the prediction model, and returns results to the frontend.
- **Database (Data Layer)**: The storage layer where historical admission data, college cut-off data, and user inputs are stored. This layer provides data access to the backend for predictions and stores user-specific data securely.

The system is designed to be scalable and modular, allowing for the addition of more colleges or prediction features over time without major architectural changes.

4.3 Flowcharts and System Diagrams

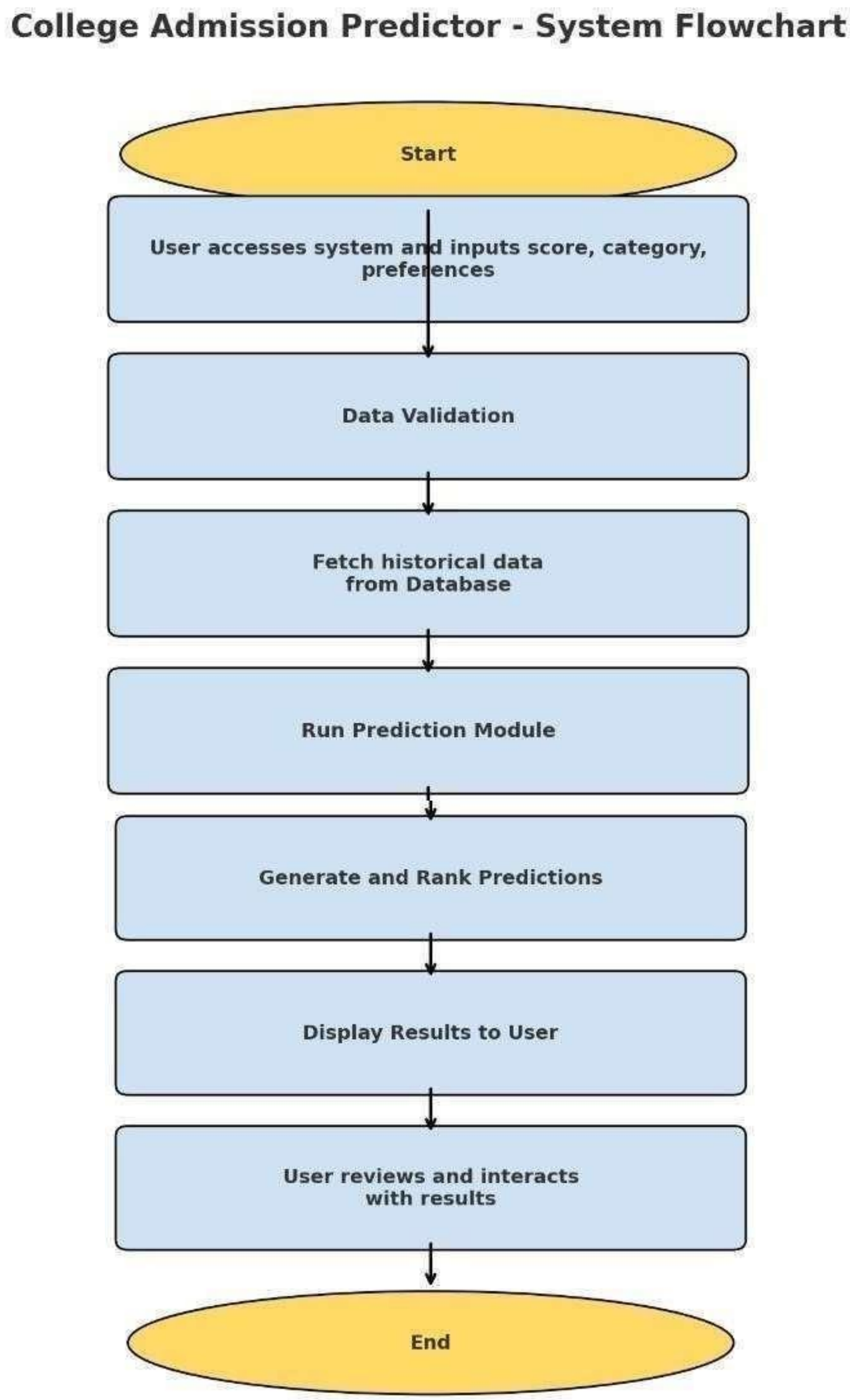

Figure 1 Flowchart

1. **Start**: The user accesses the system and navigates to the admission predictor.

2. **User Input Collection**: User inputs their MHT-CET score, category, preferred branch, and location (optional).

3. **Data Validation**: The system validates the user inputs, ensuring all fields are correctly filled and meet expected data formats.

4. **Data Fetching**: The backend fetches historical admission data and relevant college cut-off data from the database.

5. **Prediction Module Execution**: The prediction module processes the user data and compares it with historical trends to generate a list of likely college options.

6. **Result Compilation**: The system ranks the predicted colleges based on user criteria and sorts them in descending order of admission probability.

7. **Display Results**: The frontend displays the predicted colleges to the user along with additional details (e.g., cut-off scores, location).

8. **End**: The user reviews the results and may explore more details or perform a new prediction.

System Diagram

A system diagram visually depicts the interaction between components:

1. **Frontend**: Collects user data through the web interface and displays prediction results.

2. **Backend**: Processes data via the application server, where the business logic and prediction model are applied.

3. **Prediction Module**: Executes algorithms based on user input and historical data to generate predictions.

4. **Database**: Provides data storage and retrieval for historical admission data, cut-offs, and user-specific details.

4.4 Component Breakdown

4.4.1 Frontend

The frontend is the presentation layer, designed with a focus on ease of use, responsive design, and an intuitive interface.

- **Technologies**: Commonly built with HTML, CSS, JavaScript, and a frontend framework such as React, Angular, or Vue.js.
- **User Input Form**: Collects essential details such as MHT-CET score, category, and branch preferences.
- **Result Display**: Presents prediction outcomes clearly, often with visuals like graphs or ranked lists to enhance readability.
- **Responsiveness**: Ensures compatibility with various devices (desktops, tablets, smartphones) to provide a seamless user experience.
- **Error Handling**: Alerts users to incomplete or incorrect input and provides guidance for correction.

4.4.2 Backend

The backend handles the application logic, processes data, and runs the prediction module. It acts as an intermediary between the frontend and database.

- **Technologies**: Typically developed with server-side languages such as Python (using frameworks like Django or Flask), Node.js, or Java.
- **API Layer**: The backend often includes an API layer to manage communication between the frontend and backend, enabling seamless data exchange.
- **Data Processing Logic**: Retrieves and preprocesses historical data from the database, preparing it for use by the prediction model.

- **Security Measures**: Implements data security protocols to ensure user data privacy and protection.

4.4.3 Database

The database stores all necessary data, including historical admission data, user inputs, and prediction results, to support effective prediction.

- **Technologies**: Relational databases like MySQL or PostgreSQL for structured data, or NoSQL databases like MongoDB for unstructured data.

- **Data Organization**:
  - **Admission Data Table**: Contains historical admission records, cut-off scores, seat availability by category, and other criteria for each college.
  - **User Data Table**: Stores user inputs and session details securely (if needed) for audit purposes or future enhancement.

- **Data Retrieval**: Enables efficient querying and filtering of admission data to support real-time predictions based on user input.

4.4.4 Prediction Module

The prediction module applies algorithms to historical data and user input to generate a prediction of potential college admissions.

- **Technologies**: Algorithms can be implemented using Python's libraries (e.g., scikit-learn) for ML models or logic-based decision trees for straightforward prediction.

- **Algorithms Used**:
  - **Logical Rules**: Implements cut-off score comparisons based on historical data trends.
  - **Machine Learning (Optional)**: If data is large and complex, ML algorithms like Random Forest, Logistic Regression, or Decision Trees can be used for higher accuracy.

- **Model Training and Testing**: The model is initially trained on historical data to learn patterns and trends. Once trained, it is tested for accuracy on recent data.
- **Output Generation**: The module ranks and lists colleges in descending order of admission probability, considering user inputs (score, category, branch) and historical trends.
  [4][5][6][8]

Chapter- 5
Database Design

The database for the college admission predictor is structured to store historical admission data, user inputs, and prediction results efficiently. This design includes tables that handle college data, user profiles, predictions, and more to ensure scalability and ease of data retrieval.

5.1 Database Schema and Tables

The database schema includes the following main tables:

1. **Colleges**: Stores information about colleges, including basic details like name, location, and branch-specific cut-off scores.

2. **Admission_Data**: Contains historical admission data for each college, categorized by caste, branch, year, and other criteria relevant to predictions.

3. **Users**: Stores user data, including input scores and preferences, for session management and analysis.

4. **Predictions**: Logs prediction outputs for each user session to analyze trends and improve the prediction model.

Table 2- Sample CutOffs

College Name	College-ID	Branch Name	General Male	General Female	EWS Male	OBC Male	OBC Female	NT Male
Government College of Engineering, Amr	1002	civil	85.5	91.7	91.7	82.1	82.1	82.1
		computer	98.3	98.3	98.3	98.3	98.3	98.3
		Information Technology	97.2	97.2	97.2	97.2	97.2	97.2
		Electrical	90.4	90.4	90.4	90.4	90.4	90.4
		ENTC	81	83.6	83.6	83.6	83.6	83.6
		Mechanical	88.4	76.2	81.3	81.3	81.3	81.3
Government College of Engineering, Yav	1012	civil	56.7	63.3	63.3	52.7	52.7	52.7
		computer	89.3	89.4	89.4	87.2	87.2	87.2
		Electrical	73.3	71.1	71.1	64.1	64.1	64.1
		ENTC	76.8	79.5	79.5	74	74	74
		Mechanical	57.5	63.4	63.4	51.3	51.3	51.3
Shri Sant Gajanan Maharaj College of Et	1101	Mechanical	77.99	77.99	77.99	77	77	77

5.2 Table Breakdown and Attributes

5.2.1 Colleges Table

- **Purpose**: Stores basic information about each college and branchspecific details like cut-off scores.
- **Attributes**:
  - **college_id** (Primary Key): Unique identifier for each college.
  - **college_name**: Name of the college (e.g., COEP, VJTI, DY Patil).
  - **location**: Location of the college.
  - **branch**: Branches offered (e.g., Computer Science, Mechanical, Civil).
  - **seats_available**: Number of seats available per branch and category.

5.2.2 Admission_Data Table

- **Purpose**: Contains historical admission data, which includes past cut-off scores and admission trends by category.
- **Attributes**:
  - **admission_id** (Primary Key): Unique identifier for each admission data record.
  - **college_id** (Foreign Key): Links to the Colleges table to associate data with a specific college.
  - **branch**: Branch for which admission data applies.
  - **year**: Year of admission data (e.g., 2023, 2024).

- **category**: Category of reservation (e.g., Open, OBC, SC, ST).
- **cut_off_score**: Minimum score required for admission in that year, branch, and category.

5.2.3 Users Table

- **Purpose**: Stores details of users and their input parameters for predictions.
- **Attributes**:
  - **user_id** (Primary Key): Unique identifier for each user. o

  user_name: User's name. o **score**: User's score in MHT-CET.

  - **category**: User's caste category (e.g., General, OBC).
  - **preferred_branch**: User's preferred branch. o

  preferred_location: Location preference (if any).

  - **date_of_entry**: Date and time the user inputted the data.

5.2.4 Predictions Table

- **Purpose**: Stores prediction results generated by the model for each user input session.
- **Attributes**:
  - **prediction_id** (Primary Key): Unique identifier for each prediction.
  - **user_id** (Foreign Key): Links to the Users table for tracking the session.
  - **predicted_college**: Name of the college predicted for the user.
  - **predicted_branch**: Branch predicted based on user preferences and scores.

- **confidence_score**: A percentage indicating the confidence of the prediction. o **prediction_date**: Date and time of prediction.

5.3 Relationships and Data Flow

- **Primary Relationships**:
  - **Colleges and Admission_Data**: Linked by the college_id field, allowing retrieval of branch-specific cut-offs for each college.
  - **Users and Predictions**: Linked by the user_id field, which helps store and retrieve user-specific predictions for analysis.
- **Data Flow**:
  - When a user inputs their data, it is stored in the **Users** table.
  - The **Prediction Module** uses data from **Admission_Data** and **Colleges** to generate a prediction based on the user's score, category, and preferences.
  - The results are then stored in the **Predictions** table for future reference, tracking, and analysis.
    [1][7]

Chapter- 6
Design of Webpage

The frontend design of the College Admission Predictor aims to provide a user-friendly, visually appealing, and responsive interface that allows users to interact seamlessly with the prediction tool. Key screens like the Home, Prediction, and Results screens are designed to ensure ease of use, clarity, and accessibility.

6.1 User Interface Features

The user interface focuses on simplicity, functionality, and an intuitive flow that helps users navigate the predictor tool with ease. Key features include:

- **Score and Category Input Forms**: Users can input their MHT-CET scores, preferred category, and college preferences through a clean and organized form on the Home screen.
- **Dynamic Prediction Module**: The Prediction screen provides real-time updates and feedback as users input their preferences, showing potential colleges based on criteria.
- **Results Display**: The Results screen shows college predictions along with relevant details like branch, location, and the confidence score for each prediction.
- **Interactive Filters and Sort Options**: Users can apply filters to view colleges based on branch, location, and cut-off scores, enhancing the decision-making process.
- **Responsive Design**: The UI is optimized for desktops, tablets, and mobile devices to ensure accessibility across platforms.

6.2 Screenshots of the Interface

Screenshots of the primary screens provide a visual reference for the interface. Each screen is designed to guide the user smoothly through the prediction process.

- **Home Screen**:

  - Contains a brief introduction to the tool. o Features the input form for user details, including fields for score, category, and preferred branch/location. o Buttons for submission and resetting inputs.

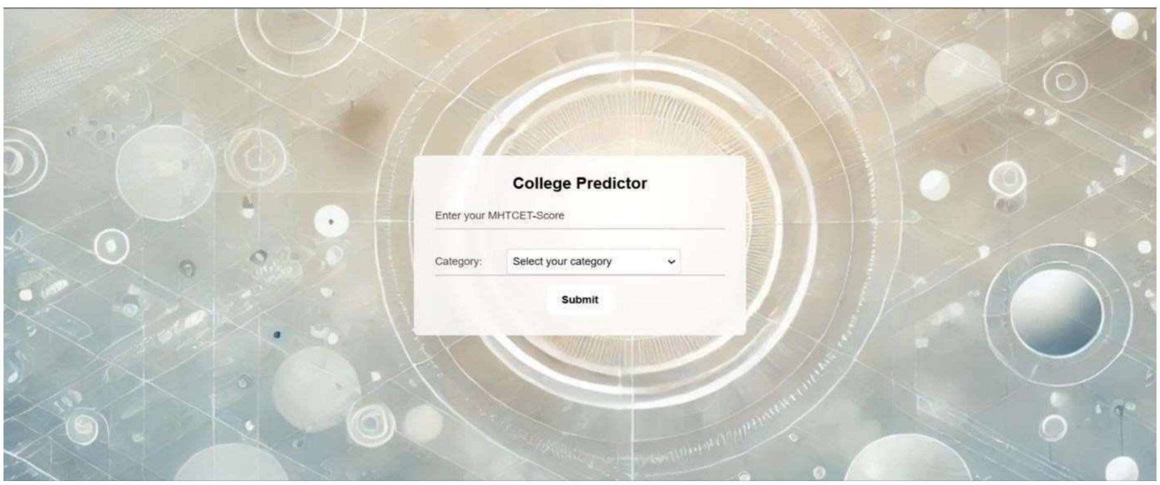

Figure 2- Design of Front Page

- **Prediction Screen**:

  - Displays a summary of the data entered by the user and begins the prediction process once data is submitted. o A loading animation or progress indicator shows while predictions are being generated. o Optional filters for refining the prediction results based on user-specific criteria.

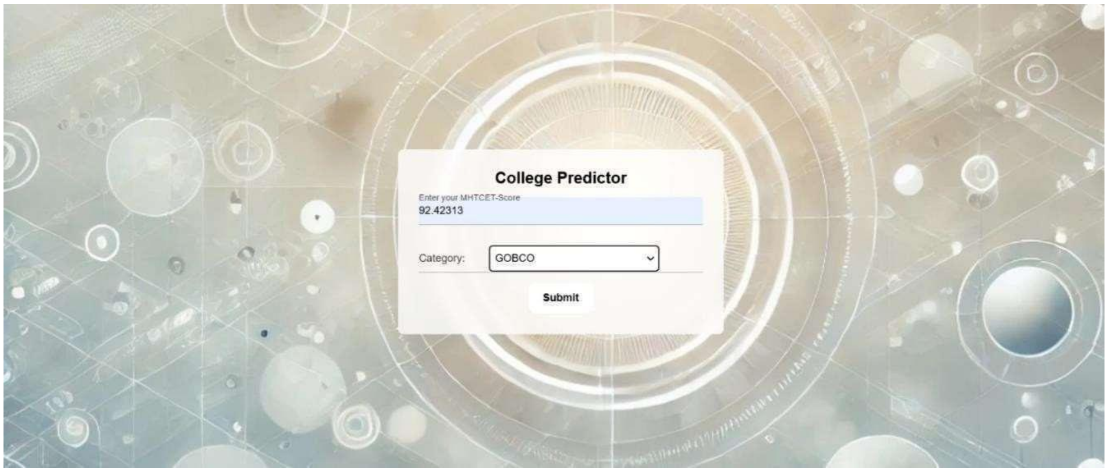

Figure 3- Input Entry

- **Results Screen**:
    - o Shows a list of predicted colleges along with details such as branch, location, cut-off scores, and a confidence score (displayed as a percentage or rating). o Interactive options like "Save Results" or "Share" to allow users to keep a record of their prediction results. o Graphs or charts representing the score distribution across colleges.

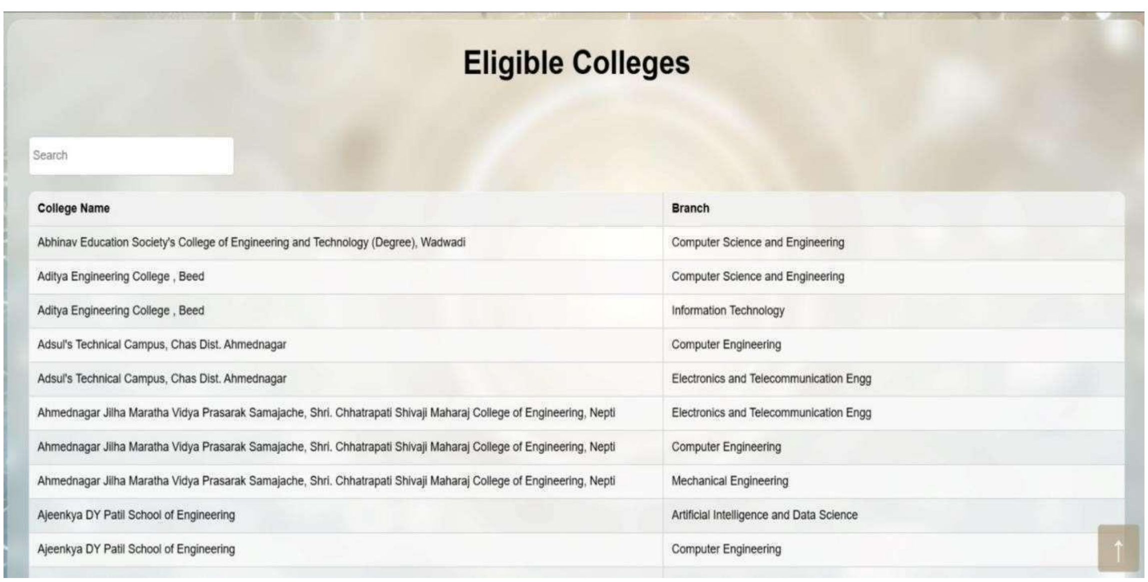

Figure 4- List of Eligible Colleges

6.3 User Flow and Experience Design

The user experience design centers around an efficient flow that minimizes clicks and guides the user from the start to the end of the prediction process in a logical sequence.

- **Step 1: User Inputs**: The user begins on the Home screen, entering their details (score, category, branch preference, and location) in a form. Clear labels and validations guide the user to enter correct data.
- **Step 2: Submission and Prediction**: After completing the form, the user clicks "Submit" to initiate the prediction process. The Prediction screen then provides feedback, including a summary of their inputs and an option to adjust any details if needed.
- **Step 3: Results Display**: The Results screen provides an organized list of college predictions tailored to the user's preferences. Information is displayed in a clear layout, with the most relevant predictions appearing at the top. Users can interact with options to save or share the results.
- **Additional UX Considerations**:
    - **Loading Indicators**: Used to communicate processing time during prediction calculations.
    - **Error Handling**: If the user's input doesn't meet criteria or if predictions can't be generated, informative error messages are shown to assist users in resolving the issue.
    - **Accessible Design**: Color contrast, font size, and intuitive layout enhance accessibility for users with visual or physical impairments.

This frontend design provides an effective user experience by emphasizing usability, responsive design, and meaningful interactivity, allowing users to make the most of the college admission predictor tool. [3][7][8][9]

Chapter- 7
Implementation Details

The backend system is designed to handle data processing, validate user inputs, perform data analysis, and generate predictions based on historical admission data and user-specified criteria. The backend's main goal is to efficiently process large sets of college data, apply a prediction algorithm, and return accurate, real-time results.

7.1 Explanation of the Prediction Logic

The prediction logic is based on analyzing historical data trends, such as past cut-off scores for various colleges, user's scores, and reservation categories. The backend follows these steps to generate a prediction:

1. **Data Validation**: When users submit their data (scores, category, preferences), the backend first validates these inputs to ensure they are within permissible ranges (e.g., score range for MHT-CET, valid category names).

2. **Data Retrieval and Filtering**: Once validated, the backend retrieves relevant historical data from the database based on the user's inputs, filtering data by college, branch, category, and year. This retrieval ensures only relevant historical trends are considered.

3. **Calculation of Eligibility**: The backend calculates whether the user's score meets the minimum requirements (cut-off scores) for various colleges and branches. Based on historical trends, it matches the user's score and category with available college data to determine eligibility.

4. **Scoring and Ranking**: Colleges that meet the user's criteria are scored and ranked based on the user's preferences and the model's confidence in admission probability. Confidence is determined by

proximity to previous cut-offs, reservation category adjustments, and other relevant factors.

5. **Prediction Generation**: The backend then compiles a list of colleges where the user has the highest chance of admission, ranked by likelihood based on scoring, and presents this list to the frontend for display.

7.2 Algorithms or Formulas Used for Prediction

To create reliable predictions, the backend uses a combination of statistical analysis and a basic machine learning model, such as logistic regression or decision trees. Here's how these work within the prediction framework:

7.2.1 Cut-off Score Comparison (Primary Eligibility Check):

- **Formula**: A simple comparison formula checks if the user's score meets or exceeds the historical cut-off scores for each college and branch.
- **Example**: If `user_score >= historical_cutoff` , the college is added to a list of eligible colleges. o This initial filtering process is crucial, as it narrows down the list to colleges where admission is possible.

7.2.2 Category-Based Weighting:

- Reservation categories are given a weight to adjust for different cut-off scores across categories. A factor is added or subtracted based on the user's reservation category to increase prediction accuracy for category-based admissions.
- **Formula**: Adjusted Score = User Score + Category Weight (where weight might vary for categories like SC, ST, OBC, etc.).

7.2.3 Distance Scoring for Ranking:

Formula: `Confidence Score = 1 - (|user_score - cutoff_score| / max_cutoff_difference)`

- This formula calculates how close the user's score is to each college's cut-off, giving a higher confidence score to colleges where the user's score exceeds or closely matches the cut-off.

7.2.4 Machine Learning Model (Optional):

- **Logistic Regression** or **Decision Tree**: A model can be trained on historical data to predict admission likelihood based on user scores, categories, and other criteria.
- **Process**: A machine learning model learns from past admissions data (input features include score, category, college preference, etc.) and uses this trained model to predict whether a user has a high, medium, or low likelihood of admission to each college.
- **Formula** (for logistic regression): , where w is a weight `P(admission) = 1 / (1 + e^(-wx + b))` vector, x represents user inputs, and b is the bias term.

7.2.5 Weighted Averaging for Final Ranking:

- After generating scores and confidence levels, the system computes a weighted average that factors in user preferences (like branch or location), ranking colleges accordingly.
- **Formula**: Final Score = (0.6 * Confidence Score) + (0.2 * Branch Preference Score) + (0.2 * Location Preference Score)

Summary of Backend Workflow

The backend efficiently manages the prediction process by following these core steps:

1. Validating and pre-processing user data.
2. Retrieving historical data relevant to the user's input.
3. Calculating eligibility and scoring potential colleges.
4. Ranking colleges based on confidence scores and user preferences. [1][2][9]

Chapter- 8
Conclusion

The College Admission Predictor is a user-friendly platform created to assist students in predicting their college admissions based on MHT-CET scores, reservation categories, and preferred branches. By leveraging extensive historical admission data and incorporating user-specific criteria, the project developed a highly accurate prediction model that reflects real-world trends and provides tailored insights. The platform features a scalable backend capable of integrating additional colleges, branches, and future datasets, as well as a user-centric interface designed for seamless data input, exploration, and result visualization. This comprehensive tool empowers students by helping them identify realistic college options, make strategic application decisions, and reduce anxiety with clear, data-driven insights into their admission probabilities. Beyond its practical applications, the project enhanced technical skills in database management, backend logic, frontend design, and predictive algorithms, while fostering creativity in problem-solving and emphasizing the importance of user-focused design and robust data analytics. Overall, the College Admission Predictor is not only a valuable resource for students but also a testament to how technology can be harnessed to address critical challenges in education, combining technical innovation with meaningful real-world impact.

Chapter- 9
Bibliography

[1] MHT-CET, "MHT-CET official website," [Online]. Available: https://mhtcet2024.mahacet.org/.

[2] A. S. Gupta and S. K. Sharma, "Predictive Models for College Admissions Using Machine Learning Algorithms," in Proc. Int. Conf. on Education and Data Science (ICEDS), 2023, pp. 145–152.

[3] R. K. Singh and D. P. Soni, "Data-Driven Admission Prediction Models: An Analytical Approach," Int. J. Adv. Comput. Sci. Appl., vol. 13, no. 6, pp. 23–29, Jun. 2022. DOI: 10.14569/IJACSA.2022.0130603.

[4] Scikit-learn, "Scikit-learn Documentation," [Online]. Available: https://scikit-learn.org/stable/.

[5] Pandas, "Pandas Documentation," [Online]. Available: https://pandas.pydata.org/docs/.

[6] Matplotlib, "Matplotlib Documentation," [Online]. Available: https://matplotlib.org/stable/contents.html.

[7] VanderPlas, Python Data Science Handbook: Essential Tools for Working with Data, 1st ed. Sebastopol, CA, USA: O'Reilly Media, 2016.

[8] A. Géron, Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd ed. Sebastopol, CA, USA: O'Reilly Media, 2019.

[9] GitHub, "College Admission Predictor GitHub Repository," [Online]. Available: https://github.com/search?q=college+admission+predictor.