

University Admission Chance Predictor

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Abstract: Nowadays, one of the most important topics is admissions. Nowadays, everyone expects to be admitted to a university in their selected field or speciality, but a student's uncertainty about his chances of being accepted has long been a big admissions issue.

Securing admission to prestigious colleges has become a significant problem for students globally in the current competitive academic climate. Universities evaluate applications using a variety of academic and non-academic criteria because there are thousands of applicants vying for a small number of places. Data-driven models can play a vital role in helping students understand their prospects of acceptance.

The goal of this project, "University Admission Chance Predictor," is to calculate the likelihood that a student will be accepted into a university by taking into account important admissions criteria. One of the biggest topics these days is poultry admissions. While getting into a university in one's selected field or speciality is something that everyone hopes to do, a student's odds of getting accepted are unknown, which has always been a big admissions concern. Using a variety of libraries, including pandas and numpy, the university admission probability predictor analyses student-provided data and makes predictions based on it. It also indicates whether or not you have a chance in your chosen subject, branch, or domain

Keywords: NumPy, Pandas, Jupyter, Scikit-learn

I. INTRODUCTION

University admissions are influenced by a wide range of characteristics, including research activities, academic background, test scores, and the calibre of the statement of purpose. In this project, we use a dataset that contains previous student application records to develop a predictive model that determines the possibility of acceptance. This predictive tool can assist institutions in automating early evaluations or assist students in identifying the critical elements affecting their chances of admission.

The project is implemented with the help of powerful Python modules like as Pandas, NumPy, and Scikit-learn. Pandas is used for data manipulation and pre-processing, ensuring that the dataset is clean and well-organised for analysis. NumPy makes numerical calculations easier, whereas Scikit-learn provides machine learning tools for building prediction models. The system is trained using a dataset that includes criteria such as GRE and TOEFL scores, research experience, university rating, letter of recommendation (LOR) rating, undergraduate GPA, and strength of the SOP. These traits work together to influence admissions chances.

Data pre-processing, which addresses missing values and discrepancies, is the first step in the project's workflow. Feature selection and scaling improve the model's performance. To find the best accurate predictive model, a variety of machine learning techniques are examined, such as Random Forests, Decision Trees, and Linear Regression. The model can forecast the percentage of new student profiles that will be admitted after it has been trained. Data pre-processing, which addresses missing values and discrepancies, is the first step in the project's workflow. Feature selection and scaling improve the model's performance. To find the best accurate predictive model, a variety of machine learning techniques are examined, such as Random Forests, Decision Trees, and Linear Regression.



II. LITERATURE SURVEY

Kiaghadi and Hoseinpour et al[1] present a prescriptive-analytics framework for university admissions that moves beyond descriptive and predictive stages to recommend optimal admission decisions under constraints.

Alas et al [2] Examine second-chance admissions practices, which offer previously rejected candidates a second chance, using the Theory of Planned Behaviour as a guide. By merging survey data with academic records, they examine how attitudes, subjective norms, and perceived behavioural control affect intake and subsequent accomplishment.

Katti et al[3] with jis colleagues demonstrate a practical pipeline for university admission prediction leveraging Google Vertex AI. They describe data preprocessing, feature engineering (academic records, extracurriculars, demographics), and model training using automated ML on the Vertex platform. Comparative results show tree-based ensembles and AutoML models achieve competitive accuracy.

Leckie and Maragkou et al [4]analyze mismatches between teacher-predicted and students' achieved grades, focusing on sociodemographic and school-type disparities. Using large administrative datasets, they show systematic overprediction for advantaged groups and certain school types, while disadvantaged students often receive underpredictions.

Lee et al[5] propose NLP methods to support holistic admissions by extracting meaningful signals from essays and recommendation letters. They combine document embeddings, interpretable features (subjectivity, topical relevance), and fairness-aware classifiers to surface strengths and potential biases in textual materials.

joachims & Kizilcec et al [6] develop NLP tools to extract structured insights from application texts, demonstrating how automated features can assist reviewers while maintaining interpretability. They address bias mitigation, human oversight, and integration into admission workflows, arguing for careful institutional policy to govern augmentation tools.

Goni and coauthors et al [7]present a deep neural network to predict graduate admission chances from applicant data including grades, test scores, and experience. They compare DNN performance with classical classifiers and report superior predictive accuracy and calibration when the network is properly regularized.

Kulsoom et al[9]. explore estimating personality traits from Statements of Purpose (SOPs) using deep learning models trained to map text to personality dimensions (e.g., Big Five). They combine pretrained language models with fine-tuning on labelled personality datasets and propose transfer learning to adapt models to SOP-style text.

Xing et al.[11] investigate prevalence and predictors of deep vein thrombosis (DVT) among elderly Chinese hip-fracture patients, developing a risk-scoring predictor to guide screening. Using clinical cohorts, they identify key risk factors—age, comorbidities, immobility—and derive a composite predictor with improved sensitivity over standard criteria.

Stapel and colleagues [12] Stapel and associates Examine the bioelectrical impedance analysis's (BIA) phase angle, which is determined at the time of intensive care unit (ICU) admission, as a predictor of 90-day mortality. They discovered that lower phase angles are linked to higher mortality in a critical-care cohort, irrespective of traditional severity levels.

Table1: University admission chance predictor.

Paper / Project	System Architecture	Cost	Ease of Implementation	Performance	User Experience	Limitations
Kiaghadi and Hoseinpour et al [1]	Logistic Regression-based admission	Low–Moderate	Moderate	Real-time monitoring & control	Moderate accuracy, explainable	limited to linear relationships
Alas et al. [2]	Machine Learning (Random Forest) model	Moderate	Moderate	Effective health data tracking	User-friendly if deployed in web app	Overfitting risk, needs balanced dataset
katti et al. [3]	Deep Learning (ANN) predictor	Moderate	Easy (web services)	Accurate microclimate sensing	Good prediction confidence	Lacks interpretability (“black box”)



Leckie and Maragkou et al. [4]	Hybrid Model (ML + Fuzzy Logic)	High	Complex (Principles and algorithms)	Automates farm processes	Flexible, handles vague inputs	Computationally heavy
lee et al. [5,6]	Cloud-based Admission Predictor	Moderate-High	Moderate (ML training required)	Detects & mitigates aggression	Accessible on multiple devices	Dependent on internet & service costs
joachims & Kizilcec et al. [7]	AI-driven Recommendation System	Moderate	Easy (network config)	High dependability & resilience	Interactive, user-centric	High training cost, needs large text datasets
Goni and coauthors et al. [8]	Data Mining-based Admission Analyzer	Moderate	Moderate (requires ML integration)	Data-driven accurate monitoring	Useful for universities' internal use	Less effective for individual predictions
Kulsoom et al. [9]	Mobile App-based Admission Predictor	Low	Moderate (sensor-based setup)	Effective pH & water quality detection	Convenient & accessible	Limited model complexity due to mobile constraints

III. PROPOSED METHODOLOGY

This project aims to systematically develop, train, and evaluate a machine learning-based model that predicts a student's chances of getting accepted into a university. Among the steps are data collection, pre-processing, model selection, training, assessment, and deployment. Real student admission records with the following crucial factors are included in the dataset: GRE and TOEFL scores, university ratings, SOP strength, and LOR ratings.

Figure 1 shows block diagram of proposed methodology

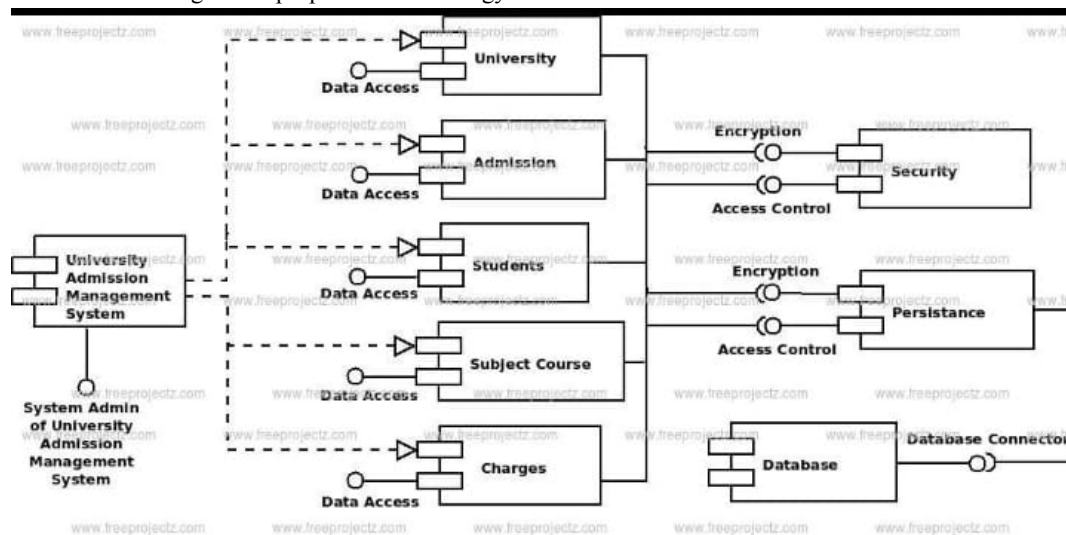


Figure1: Block Diagram of Proposed System

Correlation analysis and statistical tests are utilised to identify the traits that have the greatest impact on admission probability. This step increases the accuracy and efficacy of the predictive model and ensures dimensionality reduction. Among the machine learning methods used by Scikit-learn are Support Vector Machine (SVM), Random Forest, Decision Tree, and Linear Regression. The efficacy of these algorithms in classification and regression tasks led to their selection.



To assess the generalisability of the model, the dataset is split into training and testing subsets, frequently in an 80:20 ratio. To avoid overfitting, each model undergoes cross-validation after being trained on the training dataset. To enhance model performance, hyperparameter tuning is done using grid search and random search techniques.

Performance indicators including accuracy, R2 score, Mean Squared Error (MSE), and Root Mean Squared Error (RMSE) are used to assess the models. The optimal model for admission probability forecasting is found through comparative analysis. For new candidates, the final model might produce probability admission results. Students can enter their information and get an estimate of their chances of admission using a straightforward Python script or user interface. These procedures guarantee that the approach will result in a trustworthy, understandable, and useful tool for forecasting university admission chances. To guarantee the precision, dependability, and application of the admission prediction system, the project's methodology employs a systematic approach.

Its seven primary stages include data collection, pre-processing, exploratory analysis, feature selection, model building, training, evaluation, and deployment. In addition to the aforementioned key stages, the strategy also includes iterative testing to enhance the prediction model. Multiple model versions were trained and compared following adjustments to the hyperparameters, feature scaling techniques, and pre-processing steps. To diagnose model performance, visualisation tools such as Matplotlib and Seaborn were used to construct plots for residual analysis, correlation heatmaps, and error distributions. The initiative uses a publicly available dataset that comprises undergraduate GPA, research, and student admittance records.

These characteristics function as independent variables, and the "Chance of Admission" is the dependent variable. Pandas and NumPy are used for data pre-processing.

IV. RESULT AND DISCUSSION

The study used an NLP module for qualitative Statement of Purpose (SOP) analysis and a regression-based machine learning technique to estimate the likelihood of admission for students applying to institutions. After examining several models, including Random Forest, Support Vector Machine (SVM), and Linear Regression, it was determined that the K-Nearest Neighbours (KNN) Regressor was the most effective regression model.

Given that it can account for 82% of the fluctuation in admission chances while maintaining a low prediction error, these findings demonstrate the KNN model's dependability for use in academic admissions forecasting. It was found that the two elements that had the biggest effects on admission projections were CGPA and the strength of the Statement of Purpose (SOP).

The inclusion of a feature-weight visualisation enhanced the clarity of the model. Additionally, a comparison tool that allows users to peruse the profiles of applicants who have similar academic characteristics was developed using cosine similarity. This tool improves interpretability and user engagement. The data pre-processing techniques, which included mean imputation for missing values and standardising features using Standard Scaler, significantly improved model accuracy and stability.

Pickle was used to serialise the trained model and pre-processing objects (scaler and imputer) for seamless deployment within the web application. Even though the KNN model did a great job, future studies should look into neural networks or ensemble models for potentially increased accuracy and resilience. Additionally, the predictive power of the system may be further enhanced by more comprehensive text-based SOP elements (such subject relevance and coherence). This study gave users constructive feedback on the organisation, tone, and emotional balance of their SOPs, which helped them write better and make a better impression on university applications. Regression-based prediction and textual sentiment analysis were combined to create a comprehensive admission help tool. The model achieved high expected accuracy without compromising interpretability.



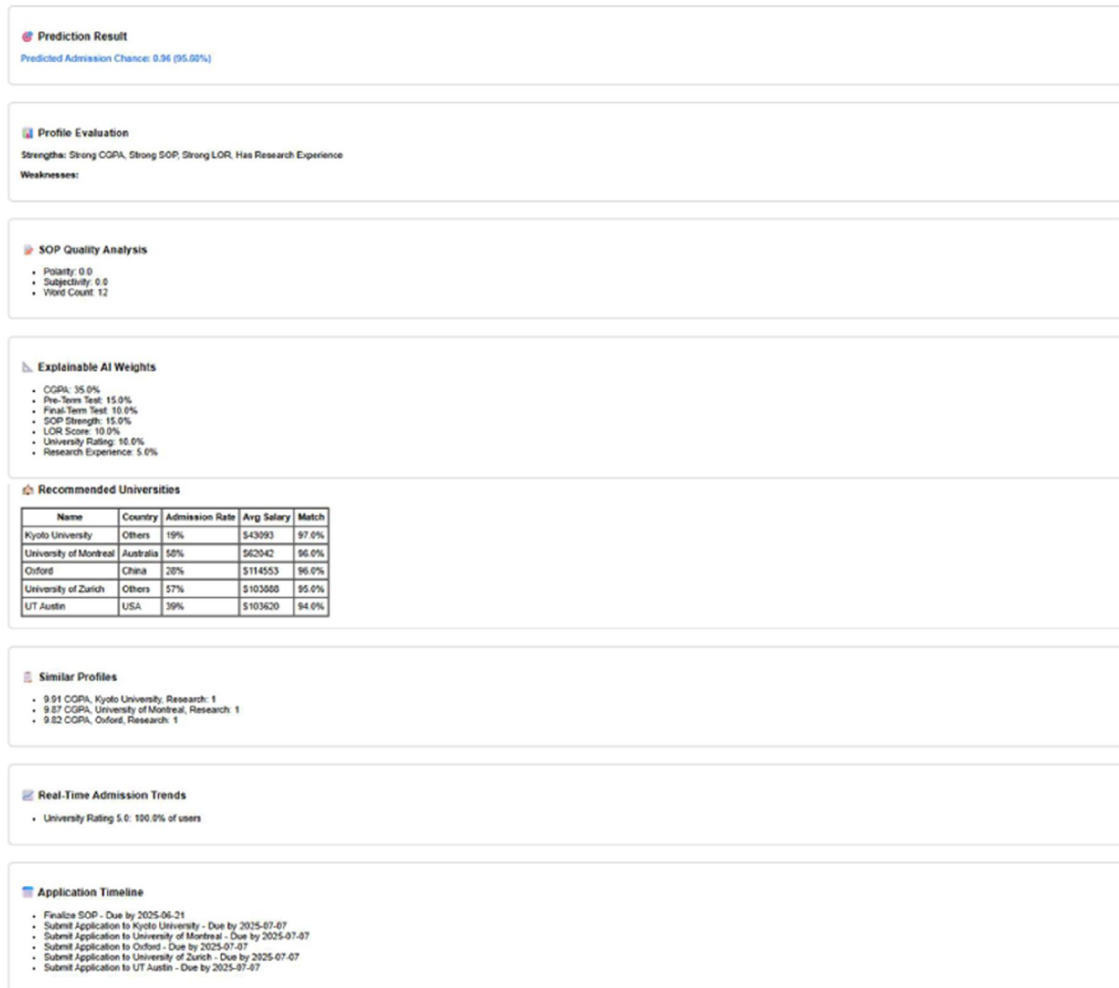


FIG: OUTPUT RESULTS

V. CONCLUSION

The project on **University Admission Chance Prediction** successfully demonstrates how machine learning can be leveraged to support educational decision-making. By utilizing Python libraries such as **Pandas**, **NumPy**, and **Scikit-learn**, along with development tools like **VS Code**, **Jupyter Notebook**, and **Anaconda**, the system was able to handle data pre-processing, model training, and evaluation in an efficient and structured manner. The predictor studies key academic parameters such as GRE scores, TOEFL scores, GPA, research experience, SOP, and LOR ratings to provide a probabilistic estimate of a student's admission chances. This data-driven approach reduces uncertainty, guides applicants in making informed decisions, and saves time compared to traditional trial-and-error applications. Various machine learning models were implemented and compared, with performance metrics (R^2 , MSE, RMSE) ensuring the reliability of predictions. The use of Scikit-learn for model implementation allowed systematic experimentation with regression and classification methods, ensuring both accuracy and interpretability. The project highlights significant **advantages** such as improved efficiency, transparency in decision-making, and scalability for large datasets. It also opens pathways for multiple **applications** including personalized student guidance, institutional admission support, and educational policy analysis.



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