

EngiWave: Engineering College Recommendation System using Decision Tree and Random Forest Algorithm

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Abstract - Students face numerous challenges when trying to enroll in their desired institution, particularly in engineering programs. The admissions process is complex, often resulting in students being accepted into lower-ranked institutions than they deserve. To address this, the Council Entrance Predictor utilizes historical acceptance data to forecast the most likely institutions for students. Engiwave, another tool, employs similar data to predict potential institutions based on academic performance, background, and admission criteria. These predictions are facilitated by a machine learning model trained on a dataset containing student profiles and university details, including admission outcomes. By leveraging machine learning and database techniques, the system provides students with a prioritized list of engineering institutions where they have the highest probability of admission, aiding them in preparing their applications effectively.

Introduction

Education plays a vital part in moment's period. While we talk about career- a person's degree, course, university and the knowledge that he possesses is the crucial factor on which the establishment hires a fresher. In the contemporary geography of advanced education, choosing the right engineering council has come decreasingly pivotal for scholars aiming to shape their academic and professional circles. As soon as a pupil completes his/ her Advanced Secondary training, the first thing of any pupil is to get into an applicable

College so that he can get a better education and guidance for his future. Online sources are also not as dependable as the data from particular sources isn't always accurate. scholars also perform their analysis before applying to any institutions, but this system is slow and clearly not harmonious for getting factual results and conceivably includes mortal error. Our end is to use machine literacy generalities to prognosticate the probability of a pupil to get admission into those preferred sodalities and suggest a list of sodalities in a sequence of the probability of getting admission to that specific council. To prop in this decision- making process, EngiWave emerges as an innovative recommendation system, employing the power of machine literacy algorithms, specifically decision tree and arbitrary timber, to give substantiated suggestions to engineering council applicants grounded on their MHTCET scores, demographic information, and other material criteria. This paper delineates the commencement, development, methodology, and issues of the EngiWave design, expounding its eventuality to streamline and enhance the council selection trip for scholars.

II. Related Work

A. Prediction of the Admission Lines of College Entrance Examination grounded on machine literacy(1)

In this paper, Zhenru Wang and Yijie Shi compared two important machine learning algorithms to prognosticate

the council admission from the former times ' records. The paper shows different statistics grounded on the result of both algorithms. The first algorithm enforced by them was Random timbers vaticination algorithm. This model shows the delicacy of around 80 i.e. around 80 results out 100 prognosticated was correct. The alternate algorithm enforced was Adaboost. The model trained with Adaboost algorithm shows an delicacy of around 90 i.e. 90 accurate prognostications from 100 results. The coffers used for training of model and testing data are as follows the system is windows 7, and python is used for the program. The conclusion of the paper suggests that the AdaBoost algorithm is much more effective and dependable than Random timbers while dealing with admission vaticination process using machine literacy.

B. Hybrid Recommender System for Predicting College Ad- charge(2)

In this paper, Abdul Hamid M Ragab, Abdul FatahS. Mashat and Ahmed M Khedra proposed the new design for council admission mongrel recommender grounded on data mining ways and knowledge discovery rules, for diving council admissions vaticination problems. This system consists of two waterfall mongrel recommenders working together with the help of council predictor, for achieving high performance. The first recommender assigns scholars tracks for introductory time stu- dents. While the alternate recommender assigns the technical council for scholars who passed the introductory time examinations successfully. This predictor algorithm uses former scholars admission data of sodalities GPA for prognosticating most probable sodalities. It looks over pupil academic graces, background, pupil records, and the council admission criteria. also, predicts the possibility of university sodalities that a pupil may enter. In addition to the high vaticination delicacy rate, inflexibility in an advantage, as the system can prognosticate suitable sodalities that match the pupil's profile and the suitable track channels through which the scholars are advised to enter. The trust- capability is achieved since scholars responses appreciatively adding as long as they allocated to the most suitable council which satisfies their desire. The design is proposed only of Saudi Arabian Universities.

C. Shiksha.com(3)

This is a web- grounded operation which provides the guidance and results for the educational queries. They

developed a council predictor which takes the pupil data as an input and shows the possible council according to the sodalities criteria. The operation presumably uses data mining algorithm with the former times cutoffs as a training data for the model. The website provides a list of sodalities grounded on rank rather than scores. The pollutants are confined to selection of branches and sodalities, also the list generated by the website can not be exported.

III. System Structure (Activity Diagram)

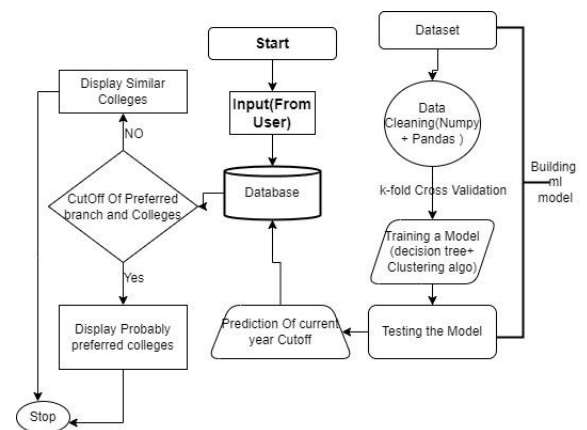


Fig. Working Flowchart Of Project

IV.

Methodology

The proposed methodology of the EngiWave design involves several crucial way, each aimed at developing and planting an effective engineering council recommendation system. Below is a detailed explanation of each stage

1. Data Preprocessing and unyoking:

This dataset includes colorful attributes similar as MHTCET scores, percentile rankings, quarter, estate, university, and round number. Data preprocessing tasks may include handling missing values, garbling categorical variables, and homogenizing numerical features.

2. Training of the Model:

Once the dataset is preprocessed and split, the coming step is to train the recommendation model using decision tree and arbitrary timber algorithms and clustering algorithm for clusters the input and predicts the sodalities.

For each decision tree, Scikit-learn calculates a nodes importance using Gini Importance, assuming only two child nodes (binary tree):

$$ni_j = w_j C_j - w_{left(j)} C_{left(j)} - w_{right(j)} C_{right(j)}$$

ni sub(j)= the importance of node j

w sub(j) = weighted number of samples reaching node j

C sub(j)= the impurity value of node j

left(j) = child node from left split on node j

right(j) = child node from right split on node j

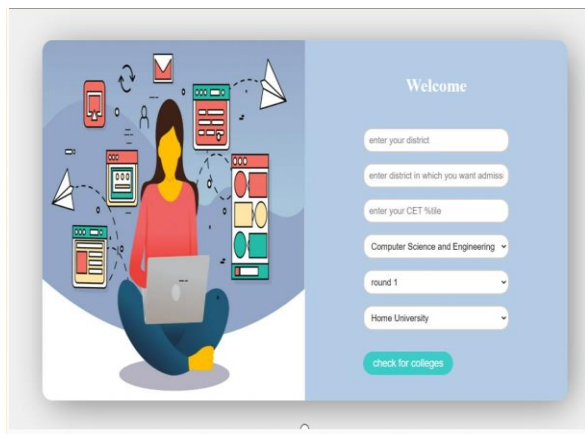
The importance for each feature on a decision tree is then calculated as:

$$fi_i = \frac{\sum_{j: \text{node } j \text{ splits on feature } i} ni_j}{\sum_{k \in \text{all nodes}} ni_k}$$

- fi sub(i)= the importance of feature i
- ni sub(j)= the importance of node j

3. User Input Collection:

EngiWave interacts with druggies by collecting input parameters applicable to their preferences and qualifications. This generally includes the stoner's MHTCET percentile, category, branch, university preferences, and round number.



The form is titled 'Welcome' and contains the following input fields and buttons:

- enter your district
- enter district in which you want admit
- enter your CET %ile
- Computer Science and Engineering (dropdown menu)
- round 1 (dropdown menu)
- Home University (dropdown menu)
- check for colleges (button)

4. Integration with Flask:

Flask, a featherlight web operation frame for Python, is employed to grease the communication between the stoner interface and the recommendation model. EngiWave integrates Flask to produce a web service that accepts stoner inputs and passes them to the trained machine literacy model for vaticination.

5. vaticination of Recommended Colleges:

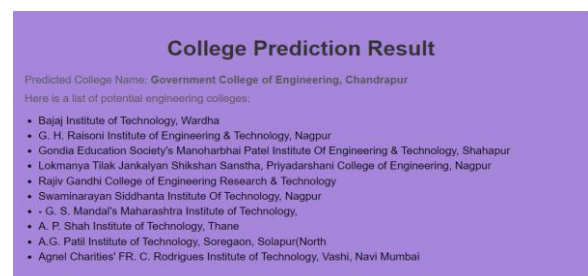
Upon entering stoner input, Flask on the input parameters to the trained decision tree and arbitrary timber models.

6. Display of College Recommendations:

Eventually, EngiWave displays the recommended sodalities to the stoner through the Beaker- powered web interface. The list of recommended sodalities is presented in a clear and stoner-friendly format, furnishing scholars with precious perceptivity to prop in their decision- making process. druggies can review the recommendations and explore fresh details about each recommended council to make an informed choice regarding their advanced education.

V. Results and Discussion

The culmination of EngiWave's analytical process is the provision of a curated list comprising the top 10 colleges deemed most suitable for the student based on their specified criteria. These recommendations take into account various factors, including MHTCET score compatibility, quota considerations, category preferences, geographical proximity, and institutional reputation, among others. By presenting students with a concise yet comprehensive selection of recommended colleges, EngiWave aims to facilitate a more informed and confident decision-making process, thereby enhancing the overall efficacy and satisfaction of the college selection journey.



The result page is titled 'College Prediction Result' and displays the following information:

- Predicted College Name: Government College of Engineering, Chandrapur
- Here is a list of potential engineering colleges:
- List of colleges:
 - Bajaj Institute of Technology, Wardha
 - G. H. Raisoni Institute of Engineering & Technology, Nagpur
 - Gondia Education Society's Manoharbai Patel Institute Of Engineering & Technology, Shahapur
 - Lokmanya Tilak Jankalyan Shikshan Sanstha, Priyadarshani College of Engineering, Nagpur
 - Rajiv Gandhi College of Engineering Research & Technology
 - Swaminarayan Siddhanta Institute Of Technology, Nagpur
 - G. S. Mandal's Maharashtra Institute of Technology,
 - A. P. Shah Institute of Technology, Thane
 - A.G. Patil Institute of Technology, Soregaon, Solapur(North
 - Agnel Charities' FR. C. Rodrigues Institute of Technology, Vashi, Navi Mumbai

VI. Conclusion

In conclusion, EngiWave represents a significant advancement in the realm of engineering college recommendation systems, offering a data-driven and personalized approach to assisting students in selecting the most suitable institutions for their higher education endeavors. By harnessing the capabilities of decision tree and random forest algorithms, EngiWave provides students with valuable insights and recommendations tailored to their unique profiles and preferences, thereby empowering them to make informed decisions that resonate with their academic and career aspirations.

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Future Work

The EngiWave design has potential for expansion and refinement, with future plans to extend its applicability beyond MHT-CET Colleges to include exams like NEET and IIT-JEE. Advancements in data mining and machine learning could enhance the Decision Tree Classifier, improving system accuracy and versatility.

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