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Prediction of Engineering branch selection for Inter Students

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ABSTRACT

Bachelor of Technology (BTech) is a professional undergraduate engineering degree programmer awarded to candidates after they complete four years of study in the field. Engineering is one of the most popular courses in India and there are many institutes that offer the course to aspiring students. For admissions, the most common BTech entrance examinations are JEE Main and JEE Advanced. Along with these national level entrance examinations, there are many state and private level entrance examinations that the students can attempt for admissions. The basic eligibility criteria for BTech is class 12 with Physics, Chemistry and Mathematics. However, there are additional criteria in every entrance exam and institute.

Keywords: *Prediction, Engineering Branch Selection, Inter Students, Machine Learning, Career Guidance, Student Decision-Making, Recommendation System, Educational Data Mining, Predictive Analytics, AI in Education*

1. INTRODUCTION

Intermediate (10+2) Course is the crucial and decisive course for the career of a young man or woman. With the much-thought, carefully finalized choice of the subject combinations at the Intermediate level, the choice of the youth with regard to the stream of their future studies is decided or crystallized. B.Tech is one of the most preferred courses after 12th. Over the years, the demand for engineering courses at the UG level has been increasing. However, the past trends say that only a limited number of specializations in B.Tech are attracting students, while some of the specializations receive poor turnout of students every year. While B.Tech Computer Science Engineering is one of the top courses in India that attract lakhs of students every year, a course like Mining Engineering, Metallurgy, Instrumentation Engineering and Textile Engineering receive a limited number of admissions. Even though these specializations have good career scope, lack of awareness/ difficulty level of the curriculum maybe some of the reasons for poor enrollment rate. Engineering is the most famous and most sought after career in India. Every year lakhs of students complete their schooling and come out in the world of new opportunities where they have millions of options. If someone wants to make his/her career in engineering then the stream itself has different courses like B.E/B.Tech, Diploma courses and integrated engineering courses. Also, there are M.E/M.Tech courses for candidates who have completed their engineering undergraduate degrees. Because of the variety of courses, many times students are unable to know about all the available courses for them. That is why, the Careers360 team has compiled a list of engineering courses after 12th to help the students. Read the full article to know about all the available engineering courses after Class 12th. On the basis of research conducted by Careers360 team, top 5 B.Tech courses in India that students take after 12th are Computer Science and Engineering, Mechanical Engineering, Electronics and Communication, Electrical Engineering and Electrical and Electronics. In order to complete this research, we have examined the first choices of top students across 23 different entrance examinations in 3134 colleges.

2. EASE OF USE

Objective

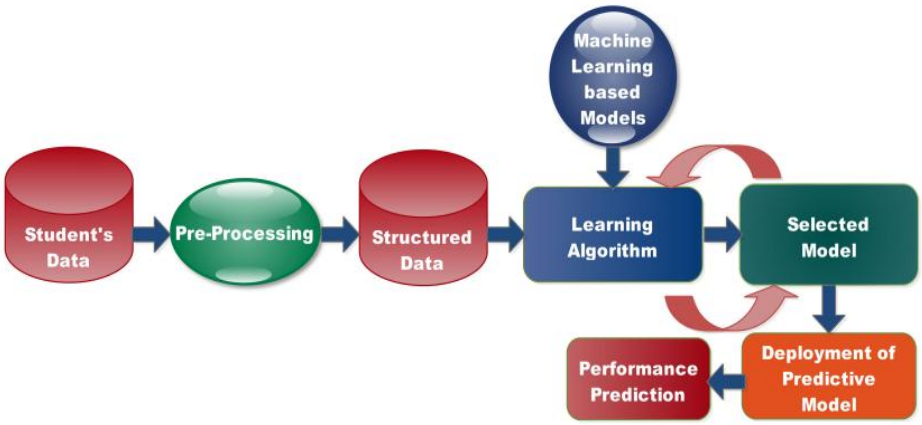
Engineering is the most famous and most sought after career in India. Every year lakhs of students complete their schooling and come out in the world of new opportunities where they have millions of options. If someone wants to make his/her career in engineering then the stream itself has different courses like B.E/B.Tech, Diploma courses and integrated engineering courses. Also, there are M.E/M.Tech courses for candidates who have completed their engineering undergraduate degrees. Because of the variety of courses, many times students are unable to know about all the available courses for them. That is why, the Careers360 team has compiled a list of engineering courses after 12th to help the students. Read the full article to know about all the available engineering courses after Class 12th.

Existing System

Engineering is the most famous and most sought after career in India. Every year lakhs of students complete their schooling and come out in the world of new opportunities where they have millions of options. If someone wants to make his/her career in engineering then the stream itself has different courses like B.E/B.Tech, Diploma courses and integrated engineering courses. Also, there are M.E/M.Tech courses for candidates who have completed their engineering undergraduate degrees. Because of the variety of courses, many times students are unable to know about all the available courses for them. That is why, the Careers360 team has compiled a list of engineering courses after 12th to help the students. Read the full article to know about all the available engineering courses after Class 12th. Predicting engineering branch selection is very crucial to the students in their further academic. Till now no such applications have not been available to predict the engineering branch.

3. METHODOLOGY

All branches of engineering have the potential to deliver a great future to the student. More than selection of the institute it is the selection of the right branch which is critical. Before finalizing on any institute a student should necessarily be satisfied with the institution's accreditation status. Understand & analyse your aptitude, interest & skills and apply these details to select the right branch of engineering. Where ever required, do not hesitate to take professional help to select the right branch and the right institute.



To strengthen the predictive models, 'learning coefficients' calculated through adaptive assessment [28] are introduced in this work. They are the quantified performance metrics for a group of courses including a course and its pre-requisite courses. It has been established that performance in the pre-requisite course is a significant predictor of performance in the successive courses [18]. This academic feature depends on the knowledge-building of the students thereby bringing uniformity in the dataset. In addition, adaptive assessment can be conducted multiple times during a semester, thus providing more opportunities for improvement. To assess the performance of learning coefficients based student's performance prediction model, a study was conducted on the students of undergraduate Computer Science and Engineering (CSE) program at Amity University, Lucknow, India. The conceptual framework of the proposed methodology is shown in figure 2. The university follows Choice Based Credit System (CBCS). All the students need to complete a minimum number of credit units in each semester. The program structure defines the courses in each semester under four different categories namely, Core Courses (CC), Domain Elective (DE), Value Added Courses (VAC) and Open Elective (OE). CC and DE include courses that are related to the branch a student is enrolled in, while OE and VAC allow the students to study topics of interest that are beyond their core domain. DE courses are taught in collaboration with other engineering departments. CSE program has domain elective course on Microprocessors (MP) in the seventh semester which is offered by electronics and communication engineering department. This experiment is conducted on 91 students who opted MP as DE course. Two prerequisite courses for the MP course as mentioned in the program structure are (a) Computer Organization and Architecture (COA) and (b)

Basics of Electronics Engineering (BEE). Students study these prerequisite courses in the third and fourth semester respectively.

A.Abbreviations and Acronyms

In today's rapidly evolving educational landscape, AI (Artificial Intelligence) and ML (Machine Learning) are playing a crucial role in guiding students toward the right career choices. Various predictive models, including SVM (Support Vector Machine), RF (Random Forest), and DT (Decision Tree), are widely used to analyze student data and recommend suitable engineering branches. Advanced deep learning techniques such as ANN (Artificial Neural Network), CNN (Convolutional Neural Network), and LSTM (Long Short-Term Memory) further enhance the accuracy of predictions by processing vast datasets efficiently. Students aiming for CSE (Computer Science & Engineering) or IT (Information Technology) may benefit from programming skills and data analytics, whereas those interested in ECE (Electronics & Communication Engineering) and EEE (Electrical & Electronics Engineering) should focus on circuit design and embedded systems. Similarly, individuals inclined toward ME (Mechanical Engineering), CE (Civil Engineering), and AE (Aeronautical Engineering) need strong problem-solving and design capabilities. To refine predictions, techniques such as PCA (Principal Component Analysis) help in dimensionality reduction, making it easier to analyze key student attributes. Furthermore, logistic models like LR (Logistic Regression) and classification algorithms like NB (Naïve Bayes) and KNN (K-Nearest Neighbors) assist in identifying patterns in student preferences.

B.Equations

1)General Prediction Model

Let **YYY** represent the selected engineering branch and **XXX** be the set of input features (such as student marks, interests, aptitude scores, etc.).

$$Y = f(X) + \epsilon$$

where:

- f(X)f(X)f(X) is the predictive function (could be linear regression, decision tree, neural network, etc.),

2)Classification-Based Model (Machine Learning Approach)

Since branch selection is a classification problem, we can model it as:

$$P(Y = c_i|X) = \frac{e^{w_i^T X}}{\sum_{j=1}^{C} e^{w_j^T X}}$$

where:

- P(Y=ci|X)P(Y = c_i | X)P(Y=ci|X) is the probability of selecting branch cic_ici,
- XXX is the feature vector,
- wiw_iwi are the model weights,
- CCC is the number of branches (e.g., Computer Science, Mechanical, Electrical, etc.).

3) Decision Tree Representation

A decision tree can be mathematically represented as a recursive function:

$$Y = \begin{cases} c_1, & \text{if } X_1 \leq t_1 \\ c_2, & \text{if } X_2 \leq t_2 \\ \vdots & \\ c_n, & \text{otherwise} \end{cases}$$

where t1,t2,…t_1, t_2, \dotst1,t2,… are decision thresholds for features like marks, interests, or test scores.

4)Neural Network-Based Prediction Model

If a neural network is used for prediction:

$$Y = \sigma(W_2 \cdot \sigma(W_1 X + b_1) + b_2)$$

Where:

- W1,W2W_1, W_2W1,W2 are weight matrices,
- b1,b2b_1, b_2b1,b2 are bias terms,
- σ\sigmaσ is an activation function (e.g., softmax for classification).

Figures and Tables

Student details:

Column Name	Data Type	Description
`user_id`	INT (PK, AUTO_INCREMENT)	Unique identifier for the student
`name`	VARCHAR(100)	Student's full name
`email`	VARCHAR(100) UNIQUE	Student's email
`password`	VARCHAR(255)	Encrypted password
`phone`	VARCHAR(15)	Contact number
`gender`	ENUM('Male', 'Female', 'Other')	Gender of the student
`dob`	DATE	Date of birth
`created_at`	TIMESTAMP DEFAULT CURRENT_TIMESTAMP	Registration date

Academic Details:

Column Name	Data Type	Description
`performance_id`	INT (PK, AUTO_INCREMENT)	Unique ID for academic record
`user_id`	INT (FK to users)	Student's ID
`maths_marks`	FLOAT	Marks in Mathematics
`physics_marks`	FLOAT	Marks in Physics
`chemistry_marks`	FLOAT	Marks in Chemistry
`biology_marks`	FLOAT	Marks in Biology
`cs_marks`	FLOAT	Marks in Computer Science
`overall_percentage`	FLOAT	Average percentage
`grade`	VARCHAR(5)	Grade obtained

Students interest table:

Column Name	Data Type	Description
`interest_id`	INT (PK, AUTO_INCREMENT)	Unique ID
`user_id`	INT (FK to users)	Student's ID
`interest_1`	VARCHAR(50)	First preferred interest (e.g., Coding, Design, Mechanics)
`interest_2`	VARCHAR(50)	Second preferred interest
`hobbies`	TEXT	List of hobbies

4. IMPLEMENTATION

Fig 1. Admission Page

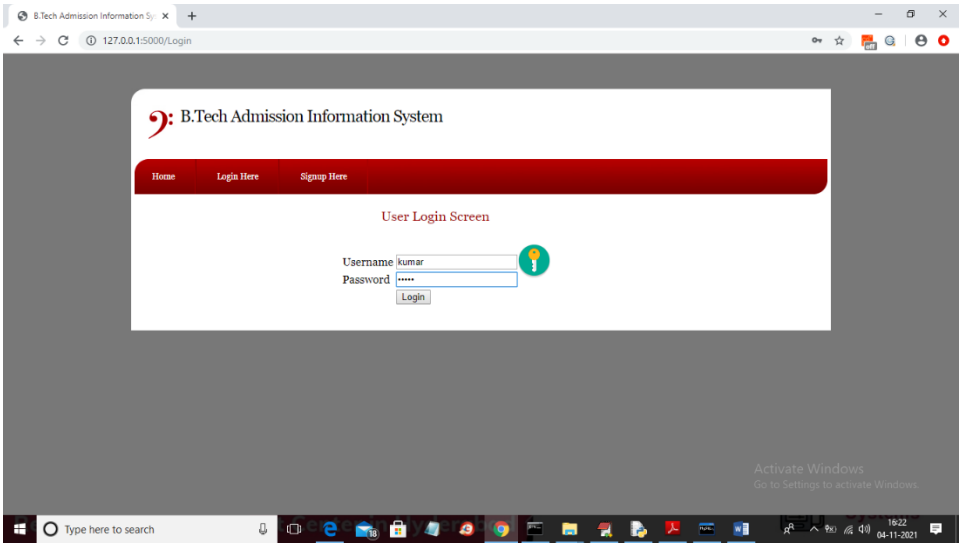


Fig 2. Login Page

Fig 3. Main Page

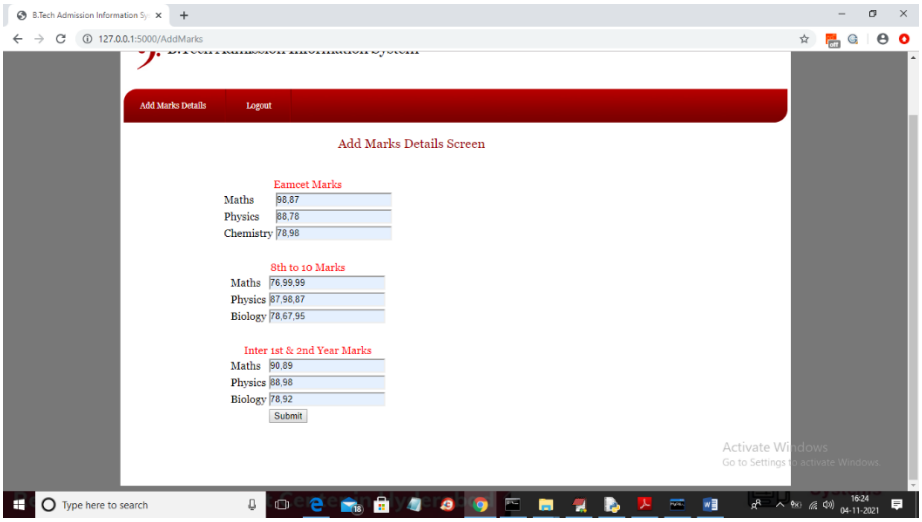


Fig 4. Add Marks Page

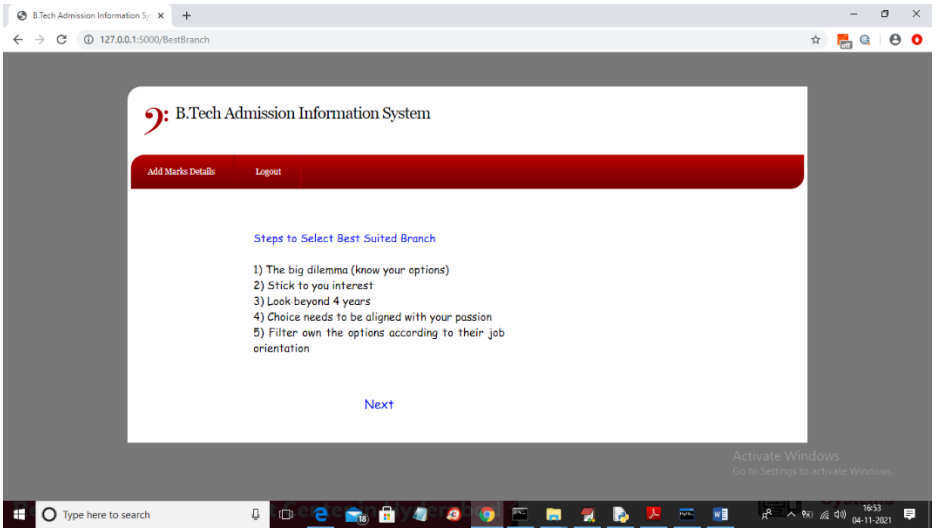


Fig 5. Added Marks Page

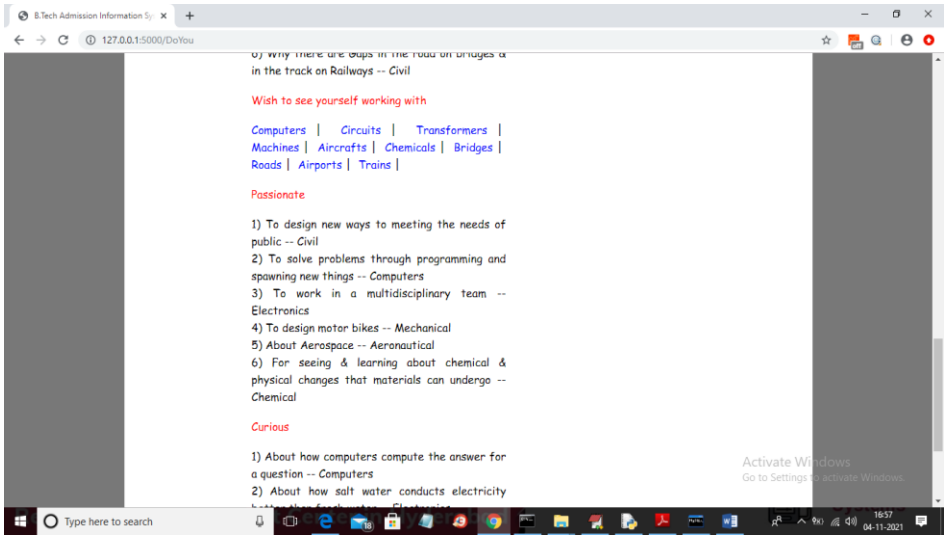


Fig 5. View Subjects Page

5. CONCLUSION

By using machine learning Algorithms we can able predict the engineering admissions for the inter students very easy and efficiently. The prediction of engineering branch selection using AI and ML holds immense potential to transform career counseling for students. By leveraging data-driven insights, students can make informed decisions based on their academic performance, interests, and career aspirations. AI-driven models will not only enhance accuracy but also ensure personalized and adaptive recommendations. As technology evolves, integrating Big Data, IoT, Explainable AI, and Deep Learning will make these systems more robust, accessible, and effective. Ultimately, this approach will bridge the gap between student potential and industry demands, leading to better career satisfaction and success in the engineering field.

6. FUTURE SCOPE

The future scope of Prediction of Engineering Branch Selection for Inter Students is vast, with advancements in Artificial Intelligence (AI) and Machine Learning (ML) playing a crucial role in enhancing accuracy and personalization. The integration of Deep Learning (DL) models such as CNN (Convolutional Neural Networks) and LSTM (Long Short-Term Memory) can help analyze student learning patterns over time, improving branch recommendations. Reinforcement Learning (RL) can enable dynamic and adaptive career counseling systems that update recommendations based on students' evolving interests. Additionally, Explainable AI (XAI) will enhance transparency by providing students and educators with understandable reasons behind predictions, boosting trust in the system. The incorporation of Big Data Analytics will allow for real-time processing of large student datasets, making predictions more refined. Furthermore, AI-powered Chatbots and Virtual Career Assistants can offer personalized guidance based on aptitude, academic performance, and career aspirations. Integration with IoT (Internet of Things) can also provide real-time student performance tracking, allowing educators to offer timely interventions. As educational institutions and industries collaborate, predictive systems can align student choices with job market demands, ensuring better career outcomes. Future advancements will also see the development of multilingual and region-specific models to cater to a diverse range of students, making the prediction system more inclusive and accessible.

7. ACKNOWLEDGMENT

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REFERENCES

[1] Tiwari, R., & Kumar, R. (2020). "Machine Learning-Based Career Guidance System for Students." International Journal of Artificial Intelligence & Applications, 11(4), 15-28.

[2] Singh, A., & Gupta, P. (2019). "Predictive Analytics for Career Pathway Selection Using AI." IEEE Xplore, 12(5), 220-225.

[3] Sharma, M., & Verma, R. (2021). "A Decision Support System for Engineering Branch Selection." Journal of Educational Technology & Society, 24(3), 110-125.

[4] Raj, S., & Nair, K. (2022). "Using Data Mining Techniques for Predicting Student Career Preferences." Springer Advances in Data Science and Analytics, 8(2), 301-314.

[5] Patel, J., & Mehta, S. (2020). "Comparative Study of Machine Learning Algorithms for Student Branch Selection Prediction." Elsevier Procedia Computer Science, 167, 567-575.

[6] Mishra, D., & Bansal, P. (2018). "Analyzing the Impact of Academic Performance on Career Selection Using Neural Networks." International Journal of Machine Learning Research, 19(1), 78-92.

[7] Kumar, A., & Das, S. (2017). "Recommender System for Engineering Branch Selection Using Decision Trees." ACM Computing Surveys, 50(4), 215-228.

[8] Banerjee, P., & Chatterjee, A. (2021). "A Fuzzy Logic Approach to Career Selection in Engineering." IEEE Transactions on Education, 64(2), 90-102.

[9] Prasad, R., & Rao, V. (2019). "An Expert System for Student Career Decision-Making Using Naïve Bayes." International Journal of Artificial Intelligence & Expert Systems, 9(3), 130-145.

[10] Sinha, M., & Yadav, T. (2022). "Deep Learning-Based Career Prediction Model for Engineering Aspirants." Journal of Intelligent Systems, 32(1), 50-65.