

# Recommendation of Branch of Engineering using machine learning

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**Abstract** - Student by himself is not mature enough to take right decision in his early life. Selecting wrong courses means mismatch between student aptitude, capability and self interest. Faculty or parents have neither the required knowledge nor experience. Since there is no other reliable source generally available that can guide the student towards the most suitable direction, so this recommender system has been evolved to provide him guidance in selecting a right engineering branch. This system recommend them suitable branch based on their score. In this system, K nearest neighbors is used to recommend branch and collaborative filtering is used to recommend colleges.

**Key Words:** Recommendation, K nearest neighbors, Collaborative filtering, cosine similarity.

## 1. INTRODUCTION

Now a day's on the internet there are lot of information available, so user get confuse which information he has choose or which information is proper. Due to improper information about any college, student and parent get confuse about admission. Due to improper knowledge student do not get desired branch of the college. With the rapid growth of various application on the internet recommendation systems become fundamental for helping users alleviate the problem of information overload. Since there is no other reliable source generally available that can guide the student to enter into proper educational field, Student counselling must include opinion on career guidance, handling inter-personnel relation, qualities of learning strategies and also the attitude and aptitude. Normally this activity is provided by counselors or advisors who have lots of experience in the organization. But with growing number of students and number of choices, and the amount of work on these advisors who are not able to handle the situation, the faculty of education institutions at higher secondary level does not have time to counsel their students due to workload. Hence it is desirable to have some form of intelligent recommendation tools that needed to be developed to help them in the process of admissions. This problem determined the inspiration for this research and for developing the recommender system to help students and staff.

We proposed the system which discovers the influence of career discovery. It proposes the predictions for student's course selection based on their marks. The targeted population for this study was 12<sup>th</sup> passed students eager to join various fields of engineering. With the help of

this recommendation system student will get more clear idea about which branch of the college is proper to take admission. In this system, the system take the input from students, that is the score of the student. Based on score it will recommend the branch name.

The module is a computer- assisted program for career decision making on the basis of marks. Provision of career counseling services is one of the main factors furnishing students' academic success. Main feature of student utilities is to give them the engineering branch best suited for their future and matches his marks.

There are two main objectives behind proposing this system:

1. To work out the requirements of recommender Systems for Educational Guidance.

2. To design and develop a Recommender System for Counselling purpose in Technical Education Field.

Recommender Systems for Educational Guidance is essentially required for helping students to select the courses which will match with their score. A recommendation system has been designed and developed as a Recommender System on Counselling in Technical Education Field and has been found effective.. This system is recommended to be extended for other selection systems as well.

In this system, K nearest neighbors is used to recommend branch and collaborative filtering is used to recommend colleges. In K nearest neighbours, cosine similarity is used. In collaborative filtering, content based collaborative filtering is used. This project aims to reduce all the manual working and will generate a list of branches and colleges in which candidate is eligible.

## 2. LITERATURE REVIEW

"College Recommendation System" by "Leena Despande, Nilesh Dikhale, Himanshu Shrivastav", in this paper they had proposed different data analysis and data mining techniques that can be used for college recommendation system. This system is made for students, parents and educationalist who aims to search engineering colleges. Recommendation systems solve the problem of information overload by searching through large volumes of data. There are different prediction techniques that help recommendation systems to obtain data. It includes data mining and machine learning techniques for presenting the required information and

filtering data. Similar data mining techniques can be used in order to get the list of colleges [10].

In "Recommendation in Higher Education Using Data Mining Techniques" by "Cesar Vialardi, Javier Bravo, Leila Shafti, Alvaro Ortigosa" this paper provides the use of another data mining techniques that can be useful to extract the required information in efficient way. This paper issues on the problem faced by the students in university to decide which courses they should opt for. Similar problem appears for the 10th pass outs on which stream which subject and which college for particular subject they should select. This paper describes how to perform data pre-processing, pattern extraction and evaluation. [11].

In "Bayesian-Inference-Based Recommendation in Online Social Networks" by "Xiwang Yang, yang Guo, Yong Liu" they have proposed recommendation system based on Bayesian Inference for online social networks. In this the user can share their content ratings with their friends. The ratings among a pair of friend is measured and set of probabilities is derived from them based on mutual ratings. When a user fires a query for a particular content rating, a Bayesian network is developed and rating is generated from his direct and indirect friends. Similarly, same technique can be used to get the ratings of colleges. Here the ratings of various college that would be colleges that would be collected from various modes such as social networks, goggle forms, end-to-end ratings etc., Bayesian's Algorithm can be applied to get the most probable rating of colleges. [7].

Kuyoro, et al. published optimal algorithm suitable for predicting students academic performance, designing a framework of intelligent recommender system that can predict students' performance as well as recommend necessary actions to be taken to aid the students and identifying background factors that affect students' academic performance in tertiary institution at the end of first year. Research used ten classification models and a multilayer perception; an artificial neural network function generated using Waikato Environment for Knowledge Analysis (WEKA). The work shows that identifying the relevant student background factors can be incorporated to design a framework that can serve as valuable tool in predicting student performance as well as recommend the necessary intervention strategies to adopt[3].

Nguyen, et al. and others proposed a novel approach which uses recommender system techniques for educational data mining, especially for predicting student performance. They compare recommender system techniques with traditional regression methods such as logistic/ linear regression by using educational data for intelligent tutoring systems. Experimental results show that the proposed approach can improve prediction results[1].

Kanokwan suggests that in Thailand, choosing a program of study for tertiary students is significant due to future job opportunities. Many students have enrolled in course majors without receiving counseling or advices from appropriate authorities or university services. This could be the mismatch between students' aptitude, personal interest and capability, and the particular course being taken up. This may lead to low retention rate and failures. In order to improve and support the academic management processes, many universities in Thailand are developing innovative information systems and services with an aim to enhance efficiency and student relationship. Some of these initiatives are in the form of a Student Recommendation System (SRM). This paper reports a study on an investigation of possible correlation between student historic data and their final results. Clustering techniques have been used with the aim to find structures and relationship within the data. Results from two clustering methods, k-means and Two-Step methods had been compared.[2].

Queen Esther Booker designed a system that could essentially perform a pre-selection program plan for prospective students that would give them a potential road-plan for an academic career at Minnesota State University, Mankato. Study grew from inquiries from students who learned about the Management Information Systems (MIS) major too late in their academic careers to switch into the program, and from students who had taken the wrong pre-requisites to enrol in the MIS upper division courses and thus resorted to another major. From these inquiries, they help students identify a program that matches their interests earlier in their academic careers which potentially reduce attrition, increase student satisfaction and improve recruitment for the university[4].

In "WEKA Approach for Comparative Study of Classification Algorithm" by "Trilok Chand Sharma, Manoj Jain" this paper compares Naive Bayes and J48 algorithm. Naive Bayes uses probability and J48 algorithm uses decision tree. Accuracy is checked using WEKA tool. The experiment results described in this paper are about classification accuracy and cost analysis[8].

In "Data Mining in Education: Data Classification and Decision Tree Approach " by "Sonali Agarwal, G. N. Pandey, and M. D. Tiwari " decision tree approach is used, which may be taken as an important basics of selection of student in any course/program. Different data mining schemes can be used on business intelligence process of educational system to enhance the efficiency. Similar decision making tree can be used in helping students to select college based on various criteria specified by the student. [6].

## 2. PROPOSED SYSTEM

The proposed system aims to develop a software for HSC passed students to recommend branch and college to them.. This project will help the high school students to get the list of branches as well as colleges based on their scores.

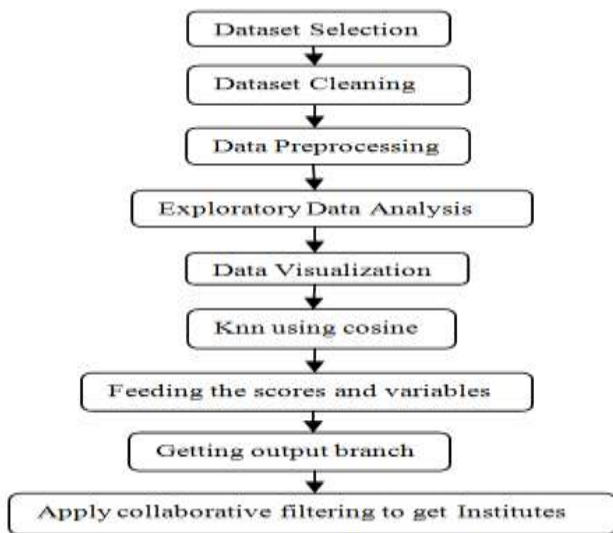


Fig -1: Flow Diagram of the System

A. 3D graph for Analysis

The 3D graph is plotted by taking branch name on X-axis, exam type (JEE or CET) on Y-axis and score on Z-axis. The colors are given based on exam type (JEE or CET). The 3D graph gives better visualization and analysis.

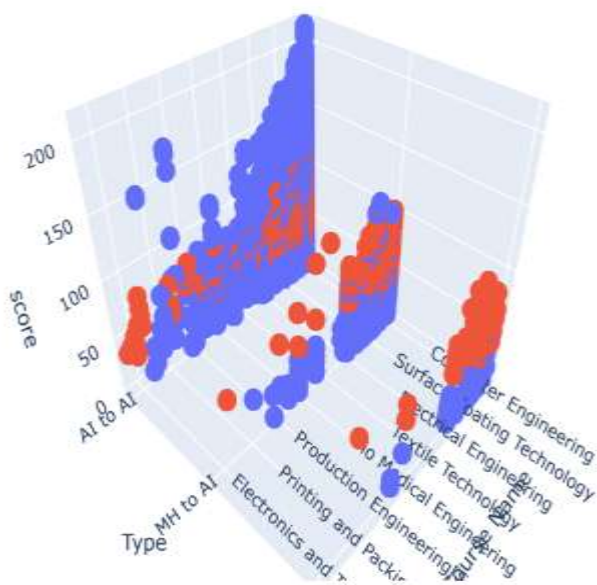


Fig -2: 3D graph for Analysis

B. Algorithms used

a) K nearest neighbors:

K nearest neighbors is a simple algorithm that stores all available cases and classifies new cases based on a similarity measure (e.g., distance functions). KNN is a non-parametric

technique. The 'k' is a number used to identify similar neighbors for the new data point. KNN takes k nearest neighbors to decide where the new data point with belong to. This decision is based on feature similarity. KNN assumes that the data is in a *feature space*. More exactly, the data points are in a metric space. The data can be scalars or possibly even multidimensional vectors. Since the points are in feature space, they have a notion of distance – This need not necessarily be Euclidean distance although it is the one commonly used. In this system, cosine similarity is used as the distance metric.

Cosine similarity is the cosine of the angle between two *n*-dimensional vectors in an *n*-dimensional space. It is the dot product of the two vectors divided by the product of the two vectors' lengths (or magnitudes). For two vectors A and B in an *n*-dimensional space cosine similarity is given by:

$$\text{similarity} = \cos(\theta) = \frac{\mathbf{A} \cdot \mathbf{B}}{\|\mathbf{A}\| \|\mathbf{B}\|} = \frac{\sum_{i=1}^n A_i B_i}{\sqrt{\sum_{i=1}^n A_i^2} \sqrt{\sum_{i=1}^n B_i^2}}$$

Fig 3: Formula for cosine similarity

Cosine similarity ranges between -1 and 1, where -1 is perfectly dissimilar and 1 is perfectly similar.

b) Collaborative Filtering

Collaborative filtering is a technique used by recommender systems. Collaborative filtering approach builds a model from a user's past behaviors (items previously purchased or selected and/or numerical ratings given to those items) as well as similar decisions made by other users. This model is then used to predict items (or ratings for items) that the user may have an interest in.

3. CONCLUSION

In this system, content based collaborative filtering is used. Content-based recommenders propose items to a target user based on similarities between the content of the yet unseen items and the user's preferences. Content based approach utilizes a series of discrete characteristics of an item in order to recommend additional items with similar properties. In Content-based filtering the system generates recommendations from two sources: the features associated with the products and the ratings that a user has given them. This typically is treated as a user-specific problem in which a user profile/model is built by understanding user's interest in the product features.

#### 4. FUTURE SCOPE

At present our system is providing recommendations based on scores. In future, the system can provide recommendations based on interests as well as score. The recommendations can also be done based on scores and certifications. Deep Learning can be good option to increase the accuracy.

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