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My Smart Counselling Support

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Abstract - Choosing the right stream after the 10th or 12th grade is a major step in a student's academic path. However, plenty of students will find decision difficult because they lack proper guidance, are unaware of career options, and do not receive personalized counselling. For solving the trouble, this research introduces My Smart Counselling Support System, a machine-learning–based tool that uses the K-Nearest Neighbors (KNN) algorithm to suggest suitable streams. The system studies students' marks in key subjects and recommends the best-fit stream for 10th- grade students (Science, Commerce, Arts) and 12th-grade students (PCM, PCB, Commerce with Maths Humanities). KNN is chosen because it is simple, easy to understand, and performs well for classification tasks. The results show that the model makes accurate predictions and can be effectively used in schools or online platforms to provide real-time guidance to students.

Keywords - Career Guidance, Stream Selection, Student Counselling, Machine Learning, K-Nearest Neighbors (KNN).

I. INTRODUCTION

Academic counselling helps students choose the right path as they move from secondary to higher secondary education. Traditionally, teachers or counsellors handle this process manually, which can sometimes lead to subjective or inconsistent guidance. With the growth of educational data, machine learning offers a way to create fair and data-driven counselling systems.

This study presents a KNN-based smart counselling model designed for Indian students choosing their streams after the 10th and 12th grades. The system analyzes students' marks in key subjects and gives personalized recommendations. It helps with two important decisions:

- Selecting a stream after the 10th grade (Science, Commerce, Arts)
- Choosing a specialization after the 12th grade (PCM, PCB, Commerce with Maths, & without Maths, Humanities)

By automating this process, the system reduces confusion, improves decision accuracy, and provides dependable support to students, regardless of their location or financial background.

Problem Statement

Students often struggle to choose the right academic stream because they do not receive structured guidance and this may not be fully understanding their own strengths. Common problems include:

- No personalized counselling: Many schools do not have trained counsellors, so students rely mainly on parents or friends.
- Confusion about subject strengths: Uneven marks across subjects make it difficult to identify the best stream.
- Lack of data-based tools: Most counselling still depends on guesswork rather than objective analysis.

Therefore, an automated system is needed—one that evaluates a student's performance, gives unbiased suggestions, and helps them make confident academic decisions.

Objectives

The key objectives of this research are:

- To build a two-level counselling system for students after the 10th and 12th grades.
- To develop a KNN-based prediction model that recommends the most suitable stream based on students' marks.

- To improve decision-making by using clear, data- driven techniques.
- To create a simple and easy-to-understand system that can be deployed on websites or mobile apps for real-time guidance.

II. LITERATURE REVIEW

Many researchers in educational data mining is used in machine learning to predict students performance, course results, and dropout chances. Models like SVM, Decision Trees, Logistic Regression, and Naïve Bayes are common used for these tasks. However, very few studies specifically focus on predicting suitable academic streams for Indian school students. KNN has gained popularity in educational applications due to:

- It is easy to implement and requires low computation.
- It performs well for classification tasks.
- It works effectively on small and medium datasets.
- Its results are simple for educators to understand.

Eventually there many models are used for educational prediction, there is still a lack of automated systems that recommend academic streams. The project fixes that gap by using an easy-to-understand KNN-based model to guide students after their 10th and 12th grades.

III. METHODOLOGY

Dataset Description

The dataset includes students' subject marks along with the streams they ultimately selected.

For the 10th-grade model, the attributes include:

- Mathematics
- Science
- English
- Social Science
- Output: Science / Commerce / Arts
- For the 12th-grade model, the attributes include:
- Physics
- Chemistry
- Mathematics
- Biology
- Accountancy
- Business Studies
- Economics
- English
- Output: PCM / PCB / Commerce with Maths / Commerce without Maths / Humanities

These datasets collectively reflect academic performance trends and serve as the basis for classification.

Data Preprocessing

Before training the model, a few preprocessing steps were implemented:

- Data Cleaning: Missing or incorrect entries were fixed or removed.
- Normalization: Min–Max scaling was used to keep all marks on the same scale, which is important for KNN.
- Label Encoding: Stream names have been converted into numeric values for model training.
- Train–Test Split: The data has divided into an 80:20 ratio for training and testing.

These steps helped prepare the dataset for accurate and efficient machine learning processing.

Algorithm Used: K-Nearest Neighbors (KNN)

he KNN algorithm is the main method used in this model. It works by finding the k nearest data points to a student's marks using Euclidean distance and then predicting the stream based on majority voting.

Hyperparameters used:

- k values tested: 3 and 5
- Distance metric: Euclidean
- Weighting: Uniform Why KNN?
- Easy to understand and implement
- Works well with multi-class academic data
- Handles non-linear patterns effectively
- Requires no complex training process

Its clear and interpretable nature makes KNN suitable for counselling systems where transparency is important.

System Architecture

The overall counselling system is divided into three functional modules:

- Input Module:
- Students enter their marks through a web interface or form.
- Prediction Engine:
- The KNN model processes the input and predicts the most appropriate academic stream.
- Output Interface:
- Displays the recommended stream along with additional suggestions or guidance.
- This modular approach ensures seamless integration with user applications and supports easy scalability.
- Results and Analysis

The KNN model is trained and tested on both datasets, and it's performance has measured using accuracy, precision, and recall.

Results for 10th Grade Stream Prediction Metric Value
Accuracy 93%
Precision 91%
Recall 92%

The model performed especially well in predicting the Science stream because students often show clear strength in subjects like Maths and Science.

Results for 12th Grade Specialization Prediction Metric Value
Accuracy 90%

Metric Value Precision 88%
Recall 89%

The model was highly accurate in identifying PCM and PCB streams. Minor drops in Commerce-related predictions occurred due to overlapping subject combinations among students.

IV. CONCLUSION

The My Smart Counselling Support System Highlights that machine learning can effectively help students choose the right academic stream after the 10th and 12th grades. Using the KNN algorithm, the system offers accurate, unbiased, and easy-to-understand guidance. Its simplicity and strong performance make it suitable for use in schools, educational websites, and mobile apps.

- Key Achievements
- Two-level prediction model for 10th and 12th grades
- High accuracy in stream recommendations
- Clear, real-time, and easy-to-interpret results
- Scalable and user-friendly design
- Future Scope
- Adding psychological and aptitude-based evaluations
- Increasing dataset size for better accuracy
- Exploring hybrid models like KNN + Random Forest
- Developing a mobile app and AI chatbot for wider access

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