

Student Career Prediction System using Machine Learning

Prof. S. D. Jadhav¹, Shreya U. Bachche², Apeksha M. Bhosale³, Vaishnavi U. Chougule⁴, Samiksha A. Patil⁵, Gayatri S. Sutar⁶

Lecturer, Computer Science Engineering, Tatyasaheb Kore Institute of Engineering and Technology Polytechnic, Warananagar, Maharashtra, India

Students, Computer Science Engineering, Tatyasaheb Kore Institute of Engineering and Technology Polytechnic, Warananagar, Maharashtra, India

Abstract—Students often face multiple challenges such as peer pressure and expectations from parents during their educational journey. As a result, many students drop out or struggle to progress to the next level of education for various reasons. A proposed approach leverages machine learning techniques like Decision Trees, Random Forests, Support Vector Machines, and AdaBoost to predict a student's potential career path. Implemented using Python, the system aids students in selecting a suitable course based on their personality traits, interests, and academic abilities. Research indicates that students frequently feel confused about their career options, which can lead to misguided career choices and reduced workforce productivity. The goal of the system is to provide students with the tools to make well-informed decisions about their future careers.

Index Terms—Random Forest, Career Prediction, Machine Learning

I. INTRODUCTION

A Career Prediction System for Students, powered by Machine Learning, is designed to assist students in making well-informed decisions about their career paths as they approach the end of their school years, particularly after completing the 10th and 12th grades. At these critical junctures, many students face uncertainty in choosing a career direction, whether it's selecting a stream such as science, commerce, or arts, or deciding on a specific profession like engineering, medicine, business, or design. This system leverages machine learning techniques to evaluate a student's academic performance, interests, strengths, and personal preferences, and then recommends potential career options that align with

their profile.

II. PROBLEM DEFINITION

The issue at hand is that students frequently lack the necessary resources and tools to make well-informed decisions regarding their careers. As a result, they tend to depend on subjective factors such as advice from family, peer influence, or incomplete knowledge about the job market and the skills needed for various professions. This often results in a misalignment between their chosen career path and their true potential, which can lead to dissatisfaction or wasted years in pursuing a field that may not be the best fit.

To summarize, the key challenges are:

- **Uncertainty:** Many students are unsure about which career path or field to pursue after completing 10th or 12th grade.
- **Lack of Data-Driven Insights:** Students often do not have access to personalized career guidance that is backed by data and can effectively match them with appropriate career options.
- **Mismatch of Skills and Career Choices:** A significant number of students select careers that do not align with their natural talents and abilities, leading to frustration and underachievement in the future.

III. SCOPE

The Student Career Prediction System utilizing Machine Learning is designed to close the gap between a student's abilities and suitable career options by offering personalized, data-driven insights.

The key objectives of the system include:

1. **Providing Guidance After 10th Grade:** Helping students make informed decisions about their future paths after completing 10th grade.
2. **Assisting Post-12th Grade Students:** Offering support to students after 12th grade, helping them choose appropriate educational or career paths.
3. **Offering Customized Recommendations:** Delivering tailored career suggestions based on each student's skills, preferences, and performance.
4. **Facilitating Career Planning:** Assisting students in developing a well-defined career strategy, considering their aspirations and the available opportunities.
5. **Minimizing Career-Related Uncertainty:** Reducing doubts and confusion about future career choices by providing reliable, data-driven information.

IV. LITERATURE SURVEY

[1] **Personalized Career Path Recommendation System for Engineering Students:** Choosing a university specialization can be a daunting decision for students. Due to a lack of adequate guidance and limited online resources, students often rely on the advice of family and friends, which can lead to poor decisions. This increases the risk of high dropout rates, students switching disciplines, or choosing careers that are not aligned with their interests. To tackle these challenges, this paper introduces a Personalized Career Path Recommendation System (PCRS), which provides students with proper guidance to help them make informed decisions about their academic and career paths. PCRS works by mimicking the role of professional counselors who analyze both academic performance and personal interests. It uses fuzzy logic with two key input parameters: academic achievements and specific student profiles.

[2] **Predicting Student Academic Performance Using Machine Learning Algorithms:**

Learning analytics and supportive educational technologies are rapidly advancing in the fields of big data, data mining, machine learning, and artificial intelligence, aimed at enhancing students' learning experiences. Education plays a vital role in the

sustainable development of society as students acquire knowledge and skills to contribute to the community. While many students achieve high academic success, some struggle, failing courses or requiring retakes. This paper proposes the ICGAN-DSVM algorithm, a combination of an improvised conditional generative adversarial network (ICGAN) and a deep support vector machine (DSVM). The ICGAN technique addresses challenges related to small datasets by generating synthetic data, while DSVM enhances traditional SVM by introducing deep learning capabilities. This results in a more efficient approach to student performance prediction.

[3] **A Machine Learning-Based Approach to Recommending Graduate Courses:**

Students often experience confusion when selecting courses, especially at the graduate level, due to uncertainty about the future impact of their decisions. This paper presents a system designed to recommend courses to students based on their interests and academic strengths. By utilizing data mining and machine learning techniques, the system helps students make better course selections. The recommendation is based on performance data and individual preferences. Machine learning techniques like neural networks and other learning algorithms are applied to ensure that students receive guidance that aligns with their abilities and career goals.

[4] **Analyzing Student Learning Styles and Suggesting Fields of Study Using Machine Learning:**

Learning styles refer to the methods through which students prefer to acquire, process, and retain information. One well-known model of learning styles is the VAK model, which classifies learning into visual, auditory, and kinesthetic styles.

However, research shows that individuals often combine multiple learning preferences, and traditional methods of classification may not always be accurate. This paper applies machine learning to more accurately identify learning styles and use this data to recommend appropriate career paths. The study focuses on predicting learning style combinations and suggesting potential fields of study using algorithms that can more efficiently analyze individual learning preferences.

V. BLOCK DIAGRAM

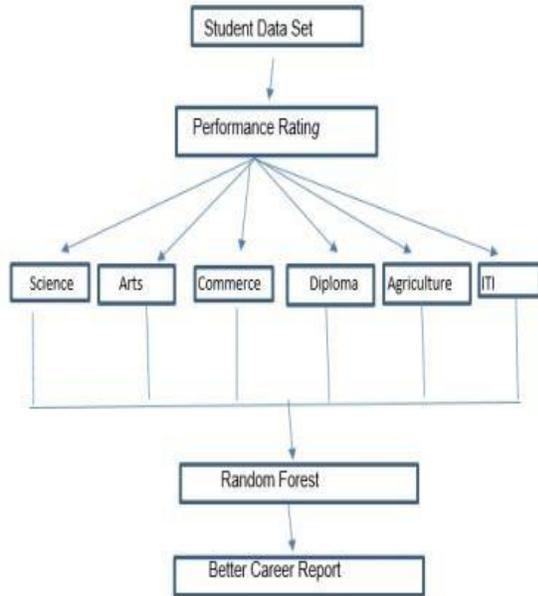


Fig. Student Career Prediction System

VI. CONCLUSIONS

To summarize, the development of a student career prediction system utilizing the Random Forest algorithm has shown considerable promise in helping students identify appropriate career paths based on their academic records, skills, interests, and other pertinent factors. The Random Forest algorithm, celebrated for its accuracy, robustness, and capacity to manage complex datasets, has proven effective in classifying students into suitable career categories with high precision.

This system not only provides students with valuable insights for making informed career decisions but also enables educational institutions to offer more targeted counseling and resources. The algorithm's ability to process diverse and non-linear data ensures that predictions remain accurate and impartial.

Moreover, the feature importance functionality of the Random Forest algorithm helps in identifying the key factors that influence career recommendations.

Looking ahead, integrating more personalized data—such as extracurricular activities, psychological evaluations, and real-world experiences—could further improve the model's effectiveness and relevance. Overall, this system serves as a vital tool in career counseling, facilitating a stronger

connection between students' potential and available professional opportunities.

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