Intelligent Career Guidance System using Machine Learning

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ABSTRACT

After completing higher secondary education, many students worldwide face confusion when it comes to choosing an appropriate career path. At the age of 18, students may not possess the necessary maturity to determine the steps required to select a career path that is suitable for them. As students move through this process, they often experience doubts and uncertainty about what to pursue after completing 12th grade. Moreover, they may question their abilities to excel in their chosen field. To address this issue, we developed a computerized career counseling system that uses an objective test to assess an individual's skills. By completing this online assessment, individuals can find suitable career paths that align with their strengths and interests, thereby reducing the chances of selecting the wrong course and failing. In addition to our career counseling system, chatbots or chat agents have gained interest in various fields. Particularly in educational settings, it is essential to provide a supportive environment for students when considering various institutions like schools and universities. The infrastructure of these institutions must cater to the needs of both instructors and students. Currently, this work is done manually, making it prone to errors. To mitigate these errors, a computerized system that is available online and can monitor infrastructure allocation is necessary. In conclusion, our company's career counseling system is an effective tool for guiding individuals towards suitable career paths based on their skills and interests. Moreover, chatbots can improve the efficiency and accuracy of infrastructure allocation in educational settings, thereby providing a supportive environment for students and instructors.

Keywords: - *Chatbots, Web predicted, career path, Skills.*

1. INTRODUCTION

In the present era, selecting the right career path can be a challenging task for many people as there are numerous options to choose from. However, with the progress in machine learning, it is now possible to develop intelligent career guidance systems that can aid individuals in making informed decisions about their career choices. This project intends to create an intelligent career guidance system that utilizes machine learning algorithms to provide personalized career recommendations based on the user's interests, skills, and aptitudes. The system will take advantage of various data sources such as career surveys, job postings, and educational requirements to generate tailored recommendations that fit each user's profile. Moreover, the system will incorporate chatbot technology and natural language processing, enabling users to ask questions and receive prompt feedback regarding their career choices. The primary objective of this project is to assist individuals in making the right decisions about their career paths and increasing their chances of achieving success and job satisfaction. A system called" Chatbot for Efficient Utilization of College Laboratories" is being developed to lessen the workload on the staff members who are in charge of creating or preparing the infrastructure allocation while taking into account the variety of factors that are crucial for the particular system. The chatbot will respond to each individual question asked by the user. This solution will simplify the infrastructure allocation process and hence cut down on manual labor.

2. PROBLEM STATEMENT

The process of selecting the right career path is a daunting task for many individuals, and it often involves uncertainties and risks. Many people struggle to identify their interests, skills, and aptitudes, and as a result, they end up choosing the wrong career paths that do not align with their talents and aspirations. This often leads to dissatisfaction, low productivity, and high turnover rates, which can negatively impact both the individual and the organization. Moreover, the job market is continuously evolving, and new career opportunities are emerging every day, making it even more challenging for individuals to stay updated and make informed career decisions. Therefore, there is a pressing need to develop an intelligent career guidance system.

3. OBJECTIVE

The main goals of the system are: To offer accurate and customized career recommendations that are based on the individual's skills, aptitudes, and interests, while also taking into account the latest job market trends and opportunities, To enhance the effectiveness of career guidance services by utilizing machine learning algorithms that analyze large amounts of data and provide real-time feedback, To improve user engagement and experience by utilizing chatbot technology and natural language processing, which allows users to ask questions and receive immediate feedback on their career choices, To contribute to reducing unemployment rates by providing users with the necessary guidance and resources to pursue a fulfilling and rewarding career.

4. LITERATURE SURVEY

[1] Career path recommendation system for UiTM Perlis students using fuzzy logic. Noorfaizalfarid Mohd Noor, Muhamad Arif Hashim. Recommendation systems are commonly used over the Internet to guide customers to find the products or services that best fit their personal preferences. In Malaysia, choosing career students is significant due to the existence of multiple human abilities. Many students have chosen their career paths without receiving proper advice from suitable professionals or university services. This may potentially cause a mismatch between the academic achievements, personality, interests, and abilities of the students.

[2] An Intelligent Career Guidance System using Machine Learning Vignesh S, Shivani Priyanka C, Shree Manju H, Mythili K. Most students across the world are always in confusion after they complete higher secondary and the stage where they must choose an appropriate career path. At the age of 18, students don't have adequate maturity to accurately know what an individual must follow to choose a congenial career path. As we pass through the stages, we realize that every student undergoes a series of doubts or thought processes on what to pursue after 12th which is the single tallest question. Then comes the next agony of whether they have the essential skills for their chosen stream. Our computerized career counseling system is used to predict the suitable department for an individual based on their skills assessed by an objective test. If one completes the online assessment we have created in our system, one will automatically choose an appropriate course, which will also reduce the failure rate of choosing a wrong career path.

[3], Chatbot for Efficient Utilization of College Laboratories Manasi Ghadge, Anuja Dhumal, Dr. Uttam. D. Kolekar, Prof. Nahid Shaikh Chat agents commonly known as chatbots have gained immense attention from multiple fields. It is the participants' queries and the responses received. Here in this paper, we have discussed having a chatbot in educational institutions. When considering an institution regardless of whether it is a school or university it is consequential that the students are edified in a congruous environment.

[4] PCRS: Personalized Career-Path Recommender System for Engineering Students. MANAR QAMHIEH, (Member, IEEE), HAYA SAMMANEH, AND MONA NABIL DEMAIDI, (Senior Member, IEEE). Choosing a university specialization is a challenging decision for high-school students. Due to the lack of guidance and limited online resources, students base their decisions on subjective perceptions of family and friends. This increases the risk of high university dropout rates, and students changing their university disciplines. To address the drawbacks, this research paper presents a Personalized Career-path Recommender System (PCRS) to provide guidance and help

high school students choose engineering discipline. The design of PCRS is based on the fuzzy intelligence of N-layered architecture and uses students' academic performance, personality type, and extra-curricular skills. The association between personality type and engineering discipline was built using a sample of 1250 engineering students enrolled in seven engineering disciplines at An-Najah National University. PCRS is implemented as a mobile application, and it is tested against an evaluation sample of 177 engineers. The sample consists of graduate or undergraduate engineers who are satisfied with their engineering disciplines. The evaluation examined the agreement between the recommendations generated by PCRS and the 177 actual engineering disciplines of the sample.

[5] Game-Based Career Guidance Systems Design Concept. Yen-Ru Shi, Ju-Ling Shih.Although schools and government agencies actively provide career guidance services in Tinaiwan, most college graduates are still troubled about their career choices. This study attempts to design a digital game for career planning. The advantage of digital games is to improve people's motivation and interest in career direction seeking and guide them to explore a career that suits them. This paper aims to assess the feasibility of a career game and propose possible approaches for making a game-based career guidance system.

[6] Career Guidance System using Machine Learning for Engineering Students (CS/IT). Ankush Daharwal1, Prof. Sandeep Gore2, Aishwarya Bhagwat3, Shraddha Dethe4, Sunny Chavan5. In today's world choosing the right career is the toughest decision. Today many students are confused about their future. They do possess some skills, but they are not able to identify their abilities and a proper domain. Different people suggest different career options but at last, the student must select their career. In this project, we have focused on the problem of students using machine learning. With the help of machine learning, we will help the students decide which is the best career option and domain for them using different machine learning techniques. The career is decided based on some personal and academic information filled in by the student. This project will help the student to get directed towards a specific domain as per their skills.

[7] An Intelligent Career Guidance System using Machine Learning. Vignesh S, Shivani Priyanka C, Shree Manju H, Mithila K. Most students across the world are always in confusion after they complete higher secondary and the stage where they must choose an appropriate career path. At the age of 18, students don't have adequate maturity to accurately know what an individual must follow to choose a congenial career path. As we pass through the stages, we realize that every student undergoes a series of doubts or thought processes on what to pursue after 12th which is the single tallest question. Then comes the next agony of whether they have the essential skills for their chosen stream.

5. MOTIVATION

The process of choosing the right career path can be overwhelming, and many individuals struggle with making informed decisions about their professional lives. This can lead to frustration, dissatisfaction, and even career changes later in life. Therefore, there is a pressing need to develop innovative solutions to address this issue and help individuals make informed decisions about their careers. With the advancements in machine learning technology, there is a tremendous opportunity to create intelligent career guidance systems that can use algorithms and data to provide personalized recommendations based on the individual's interests, skills, and aptitudes. Such systems can help individuals overcome the uncertainty associated with career decision-making and provide them with the necessary guidance to pursue a rewarding and fulfilling career. Furthermore, the COVID-19 pandemic has significantly impacted the job market, leading to a surge in unemployment rates worldwide. Therefore, an intelligent career guidance system that can offer users updated information on industry trends and job opportunities can help bridge the gap between the job market's demand and supply.

6. PROPOSED SYSTEM ARCHITECTURE

Artificial intelligence chatbots enable natural language interactions between humans and machines. In the literature, we learned that chatbots typically function like search engines and use spoken language systems that incorporate both speech and natural language processing.
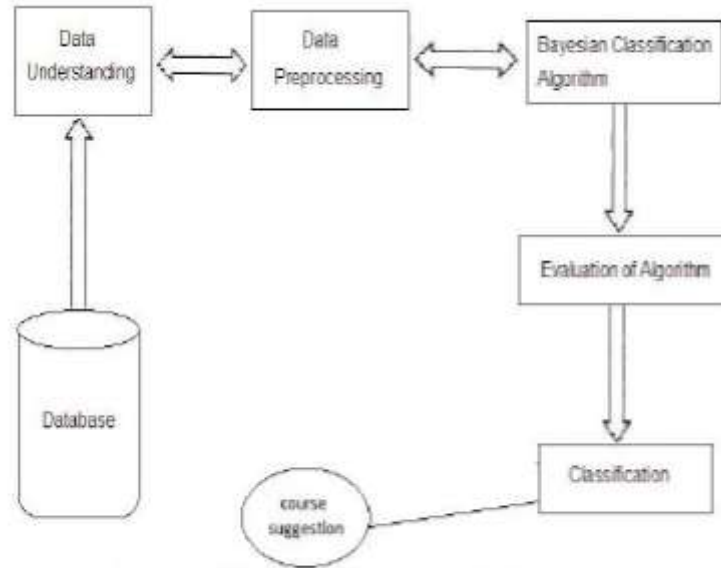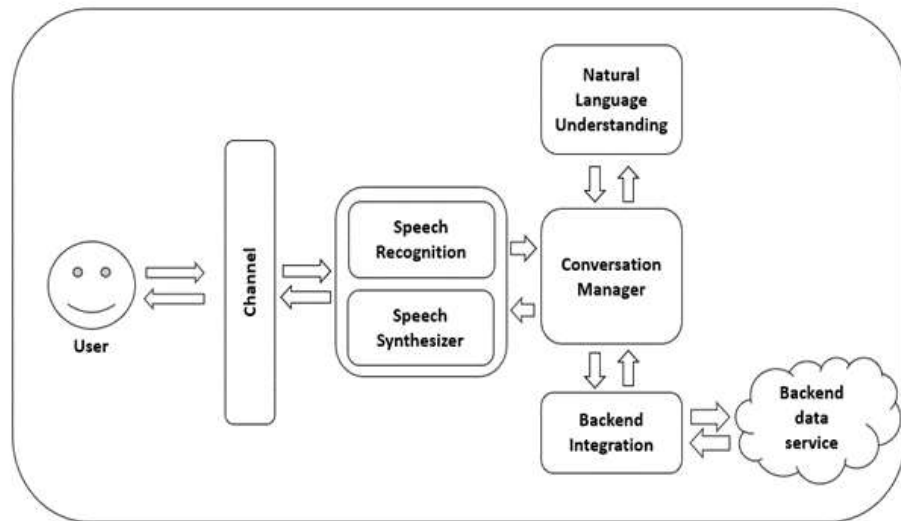
Chart -1: System Architecture

Chart -2: Detailed System Architecture

7. PREDICATION MODULE

The K-Nearest Neighbors (KNN) algorithm is a type of supervised machine learning algorithm that is often used for classification purposes. It involves determining the distance between each neighbor, using a formula such as Euclidean distance, Minkowski, cosine similarity measure, chi square, or correlation, to classify target values. KNN is particularly suitable for classification problems and, although there are other classification algorithms available such as Support Vector Machines, Random Forest, and Naive Bayes, KNN is the only algorithm that has shown an accuracy of over 90% with the dataset created through various methodologies.

On the other hand, K-Means Clustering is an unsupervised machine learning algorithm that is typically used for clustering purposes. It involves partitioning n observations into K clusters in which each value combines with the

cluster with the nearest mean. K-Means Clustering is particularly useful in grouping departments that are most appropriately mapped with a candidate's performance and providing secondary recommendations.

An intelligent career guidance system can leverage machine learning and natural language processing to offer personalized career advice to users based on their skills, interests, and experience. To achieve this, the system can be developed using Chatbot technology, and the following steps can be followed: Natural language processing: The system can utilize NLP techniques to interpret user queries and generate appropriate responses. For instance, the Chatbot can be designed to understand user questions like "What are my career options with a degree in Computer Science?" and provide relevant responses based on the data model.

8. RESULT ANALYSIS

To evaluate the performance of a machine learning model, a confusion matrix is often used. A confusion matrix is presented in the form of a table that contains four different values: true positive, true negative, false positive, and false negative. This matrix is applied to the test dataset, for which the true values are already known.

The different values present in a confusion matrix are defined as follows:

True positives (TP) are the instances that are correctly classified as positive.

False positives (FP) are the instances that are classified as positive but are actually negative.

True negatives (TN) are the instances that are correctly classified as negative.

False negatives (FN) are the instances that are classified as negative but are actually positive.

Precision, recall, accuracy, F-measure, and error-rate are calculated using the confusion matrix to determine the performance of the classification model. The following formulas can be used to calculate each of these performance measures:

$TP = TP / (TP+FN)$ $FP = FP / (FP+TN)$

Precision $= TP / (TP+FP)$ Recall $= TP / (TP+FN)$

Accuracy $= (TP+TN) / (TP+TN+FP+FN)$

F-measure $= 2*(precision* recall) / (precision + recall)$

Error-rate $= 1 – accuracy$

9. PERFORMANCE AND MEASURES FOR CLASSIFICATION TECHNIQUES.

A performance measure is a numerical evaluation of an organization's activities and their outcomes. It is typically based on data and provides insights into whether an organization is achieving its objectives and making progress towards its policy or organizational goals. Productivity, profit margin, scope, and cost are some examples of performance metrics that a business can use to determine if it is meeting its target objectives and goals. Different areas of a business will have their own key performance indicators (KPIs).

Classification refers to a predictive modeling problem where a class label is predicted for a given input data. The performance of classification techniques can be evaluated using machine learning algorithms like KNN (K-Nearest Neighbor), which is a simple algorithm based on supervised learning techniques.

PERFORMANCE MEASURES FOR CLASSIFICATION TECHNIQUES

Classification Technique	Accuracy	F - measure	Error - rate
KNN	0.9410	0.9213	0.01964
SVM	0.8632	0.9018	0.03154
Naive Bayes	0.8714	0.8835	0.06127

Chart -3: Performance Measures For Classification Techniques

10. REFERENCES

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