ALIGARH MUSLIM UNIVERSITY

DEPARTMENT OF COMPUTER SCIENCE

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Synopsis on

Intelligent Career Mapping and Progression System Utilizing AI

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Title: Intelligent Career Mapping and Progression System Utilizing Al

I. INTRODUCTION

The idea of developing a system to assist students in discovering the career paths most suited to their strengths and interests has been driven by the increasing complexity of career choices in today's world. In recent years, the availability of vast educational resources and diverse career opportunities has made it challenging for students to make informed decisions about their futures. This challenge is further compounded by the lack of personalized guidance tailored to individual needs.

According to a recent study by the National Centre for Education Statistics (NCES) [1], many students feel overwhelmed by the number of career options available, often resulting in indecision or choosing a path that may not align with their true interests or abilities. To address this growing concern, the development of an interactive web application has been proposed. This application is designed to provide personalized career recommendations by analysing academic performance and personal interests.

This project leverages cutting-edge AI technology, specifically utilizing tools like Vertex AI, to process and analyse user data. By doing so, the application aims to offer insights that are not only meaningful but also actionable, providing students with a clearer understanding of the career paths available to them. The use of AI in educational and career guidance is a rapidly expanding field, with numerous studies highlighting its potential to revolutionize how students approach their career planning. For instance, research published in the *Journal of Educational Data Mining* demonstrates how AI-driven systems can accurately predict student success in various fields based on their academic history and personal preferences. [2]

The application will serve as a tool to bridge the gap between students' aspirations and the realities of the job market. By providing tailored recommendations, it is hoped that students will be better equipped to pursue careers that not only align with their interests but also offer long-term satisfaction and success. The project is built on the understanding that each student is unique, and thus, their career guidance should be equally personalized and specific to their individual profiles.

II. PROBLEM STATEMENT

In today's fast-paced world, students are confronted with an overwhelming number of career options, each requiring different skill sets, interests, and levels of commitment. Traditional career counselling methods often fail to address the unique characteristics and aspirations of each student. Instead of personalized advice, many students receive generalized guidance that doesn't fully consider their academic performance, personal interests, or evolving ambitions.

This disconnects between available career options and the personalized guidance that students need can lead to uncertainty, confusion, and sometimes even poor career choices. The challenge lies in creating a system that can bridge this gap by providing tailored advice that resonates with each student's individual profile. This project aims to address this challenge by developing an intelligent system that offers personalized career recommendations, helping students make more informed and confident decisions about their futures.

III. STUDY OF THE EXISTING SYSTEM

Existing career guidance systems tend to follow a one-size-fits-all approach, providing recommendations based on broad assessments and generalized career categories. While these systems can be useful, they often fall short in understanding each student's unique situation. Many rely on static questionnaires, offering only a limited view of a student's potential and interests. These systems frequently lack modern tools like machine learning and data analytics, which could enhance their guidance to be more nuanced and personalized.

IBM Watson Career Coach is a prominent example of advanced career guidance technology. It utilizes natural language processing and machine learning to provide tailored career advice and job recommendations based on employee profiles. Key features include:

- ➤ Myca: A conversational agent that delivers personalized career advice and responds to employee queries.
- Employee Profile: Allows users to enhance their profiles with resumes and skills, aiding in role mapping and job matching.
- ➤ **Job Recommendations**: Identifies job opportunities and potential career moves within the organization.
- ➤ Career Navigator: Assists employees in exploring potential career paths using historical progression data. [3]

The project described focuses on students, aiming to offer personalized career guidance based on academic performance and interests. Key distinctions include:

- ➤ Target Audience: The system is tailored to students seeking career advice based on their academic achievements, rather than professionals within a company.
- ➤ Input Data: Utilizes academic marks, interests, and interactive quizzes instead of resumes and job roles.
- ➤ Functionality: Provides dynamic career recommendations that evolve with the user, integrating interactive features and advanced technologies to analyse and adapt to changing needs.

By addressing these gaps, the project seeks to deliver a more engaging and personalized career guidance experience. It is designed to evolve with each student, offering insights that are more relevant and tailored to their ongoing academic and personal development.

IV. PROPOSED SOLUTION

To address the shortcomings of existing career guidance systems, an advanced solution is proposed: the "Intelligent Career Mapping and Progression System Utilizing AI." This system will be designed to combine user input, such as academic marks and interests, with AI model to deliver highly personalized career recommendations along with career path.

The system will function through a series of steps. First, users will input their academic data and interests into a user-friendly interface. The AI will then process this data to generate tailored career recommendations, presenting them in a visually engaging format that highlights the best career matches. Additionally, the system will feature interactive quizzes that adapt to the user's

The system will also include a progression roadmap, guiding students on how to achieve their career goals step by step. A supportive chatbot will be integrated to offer further advice and answer any questions the user may have. This solution is designed to be flexible, interactive, and deeply personalized, addressing the unique needs of each student.

V. SCOPE OF THE PROJECT

The scope of this project is both ambitious and practical. The project will serve as a comprehensive platform that provides tailored career guidance to students. It will be designed to be accessible to a broad audience, with a user-friendly interface that simplifies the process of career exploration.

This system will not only offer personalized career recommendations but will also generate detailed roadmaps that outline the steps necessary to achieve these career goals. The inclusion of interactive tools, such as quizzes and visualizations, will make the exploration process engaging and informative. Furthermore, a section dedicated to user-generated success stories will enhance community engagement, allowing students to learn from the experiences of their peers.

Overall, the project aims to create a platform that is more than just a recommendation engine. It seeks to be a companion in the career planning journey, supporting students from the initial stages of exploration to the final decision-making process.

VI. PRELIMINARY SYSTEM DESIGN

The design of the "Intelligent Career Mapping and Progression System Utilizing AI" will be structured to ensure seamless interaction between the backend and frontend components. The backend will be powered by a flexible web framework such as Django, Flask, or a similar framework capable of handling data processing, including the storage and analysis of user inputs. Depending on the complexity of the project and time constraints, containerization options like Docker may be considered to facilitate smooth deployment and management.

On the frontend, CSS, or ReactJS or a similar technology will be used to create a responsive and intuitive user interface. This interface will allow users to input their data, engage with interactive quizzes, and view their personalized career recommendations in a visually appealing format. The frontend and backend will communicate through API requests, ensuring efficient data exchange.

For hosting and deployment, Google Cloud Platform (GCP) or a similar cloud service will be considered, offering scalability and reliability. The system will be designed with a focus on security and data privacy, ensuring that user data is protected throughout the process.

VII. FEASIBILITY ANALYSIS

Using AI models like Vertex AI, or similar platforms, to generate career recommendations, combined with the flexibility of GCP or other cloud-based

solutions, makes this project not only achievable but also capable of growing with its users. These pre-trained machine learning models will dive deep into analysing students' academic records and personal interests, offering career advice that's specifically tailored to each individual.

Technically, the tools and technologies being considered—whether it's Django, Flask, ReactJS, or alternatives—are well-established and come with plenty of resources and community support. This means that learning to use them will be straightforward, and the chances of running into major technical roadblocks are reduced. Plus, with cloud platforms, the system can easily scale up to accommodate more users as it gains traction.

On the financial side, these technologies are cost-effective, especially when you think about the long-term impact this project could have on helping students make well-informed career choices. By leveraging affordable cloud services, the project will be able to keep operational costs in check while delivering valuable guidance to its users.

VIII. TOOLS AND TECHNOLOGIES

The development of the "Intelligent Career Mapping and Progression System Utilizing AI" will rely on a suite of modern tools and technologies, selected for their flexibility and scalability. These will include:

- **Frontend:** CSS, or ReactJS, or a similar technology to build a dynamic and user-friendly interface.
- **Backend:** Django, Flask, or a similar web framework to handle data processing and server-side logic.
- AI Models: Vertex AI or similar AI platforms for generating career recommendations based on user data.
- Cloud Services: Google Cloud Platform (GCP) or a similar cloud service for deploying and hosting the application, ensuring scalability and secure data management.

*The final selection of tools will depend on the complexity of the project, time constraints, and the specific requirements that arise during development.

IX. EXPECTED OUTCOMES

When the "Intelligent Career Mapping and Progression System Utilizing AI" is completed, it is expected to be a powerful tool that offers students personalized career recommendations along with clear, step-by-step roadmaps to help them reach their goals. The system will be more than just a static tool—it will actively

engage students through interactive quizzes, visualizations, and a supportive chatbot that can answer their questions and provide additional guidance.

By using this system, students will gain a much clearer understanding of the career paths that suit them best. This insight will empower them to make informed decisions about their futures, leading to more satisfying and successful career choices [4]. Additionally, the platform is designed to create a sense of community among its users. By sharing success stories and experiences, students can learn from each other, drawing inspiration and guidance from their peers' journeys.

X. RISKS AND CHALLENGES

1. Ensuring Accuracy and Relevance of Recommendations:

One of the primary challenges is making sure that the AI-generated career recommendations are both accurate and relevant. The system will need to analyse a diverse range of academic data and personal interests, which can vary greatly from one student to another.

2. Maintaining User Engagement:

Keeping users engaged over time is another significant challenge. The interactive elements of the system—such as quizzes, visualizations, and the chatbot—must be designed to be both engaging and useful. If these features fail to capture users' attention or seem too complex or irrelevant, there's a risk that students might not fully benefit from the system. To address this, user feedback will be critical in iterating on the design to ensure it remains user-friendly and engaging.

3. Data Privacy and Security:

Protecting user data is a critical concern. The system will be dealing with sensitive information, such as academic records and personal interests, which must be safeguarded against unauthorized access. Ensuring compliance with data protection regulations (like Digital Personal and Data Protection Act, 2023) adds another layer of complexity. To manage these risks, robust encryption, secure authentication methods, and regular security audits will be essential components of the system's design.

4. Resource and Time Management:

Finally, balancing the complexity of the project with available resources and time is a major challenge. Decisions about which features to prioritize, whether to use certain technologies (like Docker), and how to allocate time efficiently will significantly impact the project's success. Regular project reviews, setting clear milestones, and staying adaptable to changes will help in managing these risks effectively.

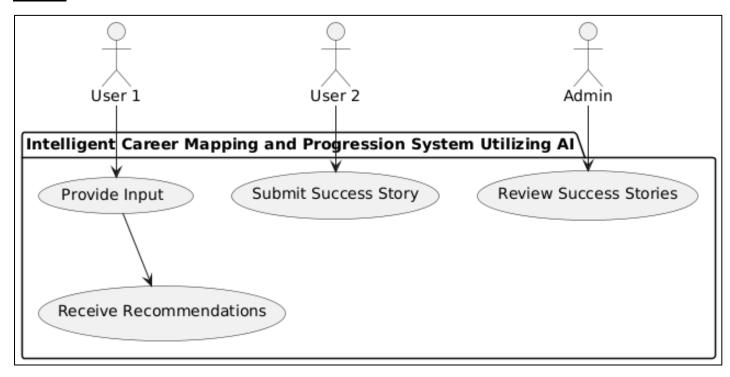
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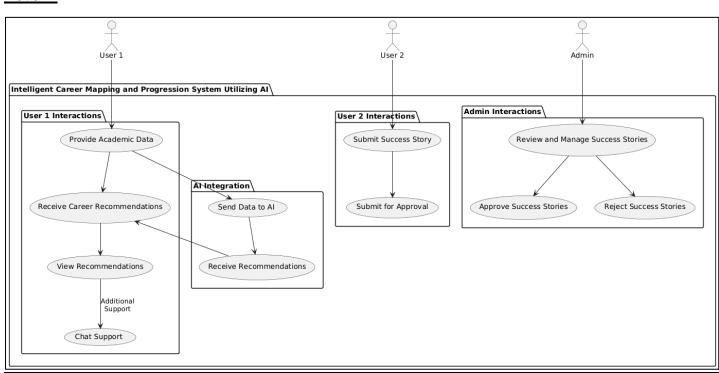
XII. APPENDICES

A: Use Case Diagram

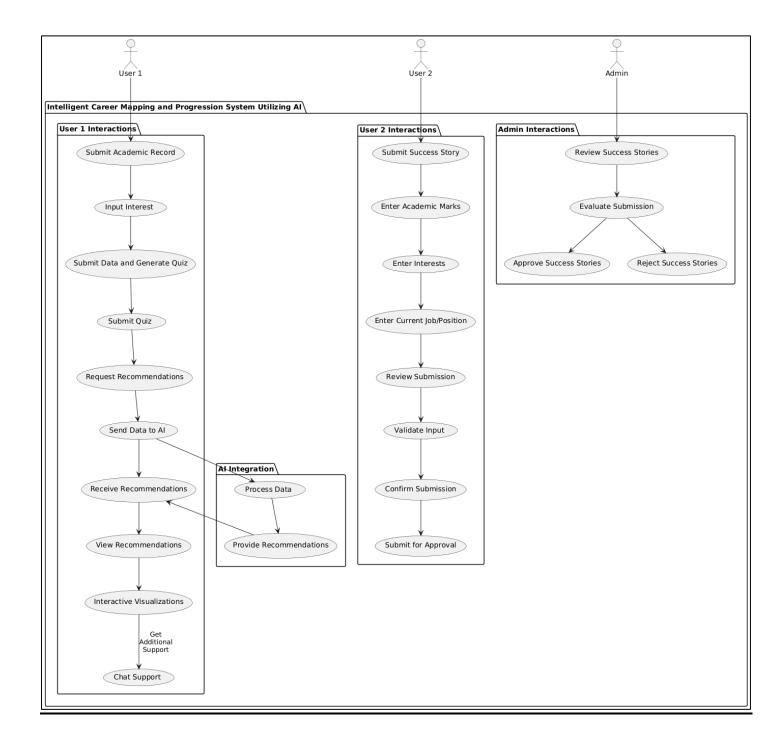
Level 0



Level 1



Level 2



B. Activity Diagram

