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CAREER-DISHA AI BASED CAREER COUNSELING

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Abstract: In today's competitive and rapidly evolving world, choosing the right career path is a frustrating task for many students, often leading to confusion and regret. As the students are going through their academics, they need to realize their capabilities and check their areas of interest so that they will decide which career is best suited for them. Many students choose their careers simply because their friends are choosing the same path or under their family pressure. The system is an innovative platform aimed to guiding secondary-level students in making well-informed career decisions. The system will help students by providing them right career recommendations based on students' interests, skills, and aptitude test outcomes. The platform not only offers career suggestions but also provides detailed insights into various educational pathways, helping students understand the steps needed to achieve their career goals. Additionally, it features a user friendly interface that allows students to explore suitable college options based on their field of interest and location. This system will also be focusing on the way we are using prediction algorithms to recommend career to students by identifying the attributes. The proposed system serves as a one-stop career counseling platform, equipping students with the necessary tools to explore their career opportunities and make informed decisions about their future.

Index Terms - Career Counseling, Web Application, Career Guidance, Artificial Intelligence (AI), Machine Learning (ML), Natural Language Processing (NLP).

I. INTRODUCTION

In today's rapidly changing world, career selection has become one of the most crucial and challenging tasks for students, particularly at the secondary level. With the increasing competition and diverse career options available, many students find themselves struggling to make well-informed decisions, often leading to confusion, stress, and even regret later in life. Studies show that a significant percentage of students are unsure about their career choices, with many expressing a desire to switch paths if given another chance. Every parent wants to see their children engineer or doctor but nobody asks what the child interested for, also the parents are worried about the future of their children. The traditional method, a student is required to schedule a session with their mentor, where the mentor is supposed to have prior knowledge about the generic behaviour, their track record along with the student's educational response and experiences. Sometimes, due to the hectic schedule of both the parties and critical judgment along with the lack of information regarding certain concepts may lead to unexpected outcomes, and a suitable solution may not be found [1]. The system aims to address these challenges through an AI-based career counselling platform specifically designed for secondary-level students. By integrating artificial intelligence with aptitude tests, the platform provides personalized career recommendations that align with individual profiles, including interests, skills, and academic performance. In addition to suggesting career

options, the system offers detailed information on educational pathways, college search tools, and insights into the steps required to pursue various career paths. This highlights the pressing need for effective career guidance that not only helps students explore their interests and skills but also provides a clear roadmap toward suitable career paths. This holistic approach ensures students receive comprehensive guidance, enabling them to make informed choices that align with their aspirations and capabilities.

II. LITERATURE REVIEW

According to the research done by Muskan Sharma and et al. [1] the system focuses on developing a chatbot-based virtual mentor that uses AI algorithms to provide 24/7 career guidance to students. The system allows students to interact anonymously, ensuring they can freely express their doubts and concerns. It aims to offer personalized mentoring and improve career decision-making while also addressing mental well-being.

A study by Madhuri Ghuge and et al. [2] shows that most of the students worldwide struggle to find a career path after HSC. This causes them to have many doubts and second thoughts. The system develops and manages student profiles, including 10th-grade details, extracurricular activities, and career-related achievements. It will allow secure access for students to update their data and for admins to view and manage records efficiently.

The system in [3] provides viable job possibilities, the ML-based career prediction model examines numerous aspects such as talents, educational background, and hobbies. In this method, natural language understanding and generation techniques are used to deliver personalized advice, answer questions, and lead students toward proper educational and career options.

According to Aditya M. Pujari, et al. [4], the paper provides information regarding all fields of education, helping students to understand and know about their field of interest better. There are 3 major problems that they deal with: I. Segregating the college's location II. Generates list of colleges according to stream and range of percentage III. Predicting current year cutoff by using previous years data. The RASA-based chatbot effectively provides personalized advice and guidance using NLU techniques.

The system described in [5] improves the current status of career guidance services in the educational sector to provide effective guidance for students at different levels and stages of their lives. The system provides a new role of career guidance considering the latest data analytics technologies, Machine Learning and Artificial Intelligence used for career guidance predictions and recommendations.

The method in [6] evaluates the effectiveness of neural network and hybrid recommendation models in accurately matching students with professionals. The system implements a Siamese network architecture for processing questions and professionals, along with a Light FM hybrid model to enhance recommendations.

The paper by Benilda Eleonor V, et al. [7] the system aimed to identify the challenges encountered by respondents in choosing their college programs. It determines the appropriate features of the software that can be developed to address these challenges, and evaluates the level of acceptance of the respondents with the developed system in terms of functionality, usability, and reliability.

System described in [8] provides an overview of the Artificial Intelligence techniques that we used to predict the performance of the student. This system also focuses on the way we are using prediction algorithms to identify attributes in student data. Using this system proved to be beneficial for the students, Educational Institutions and educators also.

The research paper in [9] is an AI-based career counselling program that provides comprehensive and accessible career counselling to students at the secondary level. Based on aptitude test results, counsellors can recommend specific educational paths, courses, or training programs that align with the individual's aptitudes and career goals.

[10] involves utilizing technology and AI, this system offers personalized career guidance by analysing students' skills and interests. However, limited human interaction and potential lack of context are considerations. It helps students to make informed decisions about their subject or stream choices by analysing their interests, aptitudes, family background, and prior education.

The paper by Deepali Kadam et al. [11] proposed a system using the Naive Bayes algorithm to predict suitable careers for students based on their academic performance, interests, and psychological traits. The model was implemented as both a website and an Android application to assist students of 10th and 12th grade in identifying career options aligned with their strengths and preferences.

The method in [12] proposed a web-based career guidance system that leverages multiple intelligence theory and a multiclass classification algorithm to recommend suitable career options. Their system incorporates personality traits, user interests, and academic background to enhance prediction accuracy and address unemployment challenges among students.

III. PROPOSED METHODOLOGY

3.1 Dataset

Data is the crucial part of the system proposed, and without it, the system won't be able function and produce outputs based on the user's input. The dataset consists of three key components:

- **Careers Dataset** – This dataset includes various career options along with the required skills, enabling our system to match students with suitable career paths based on their skills and interests.
- **Students Dataset** – This dataset contains student details such as name, HSC percentage, stream, skills, interests, and aptitude test scores, allowing for a more personalized career recommendation.
- **College Dataset** – This dataset includes information on top colleges, categorized by fields of study and preferred locations, ensuring students receive the best possible college recommendations based on their chosen career path.

The Table1 shows the key attributes of each dataset, providing an overview of the information used for career and college recommendations.

TABLE 1. Dataset Description

DATASET	PARAMETERS
Students Dataset	HSC/SSC, Percentage, Skills, Interest, Hobbies
Career Dataset	Career, Required Skills
Colleges Dataset	Field of study, City/State

3.2 Implementation Methodology

The Fig 1 shows the Basic Working methodology of the proposed system:

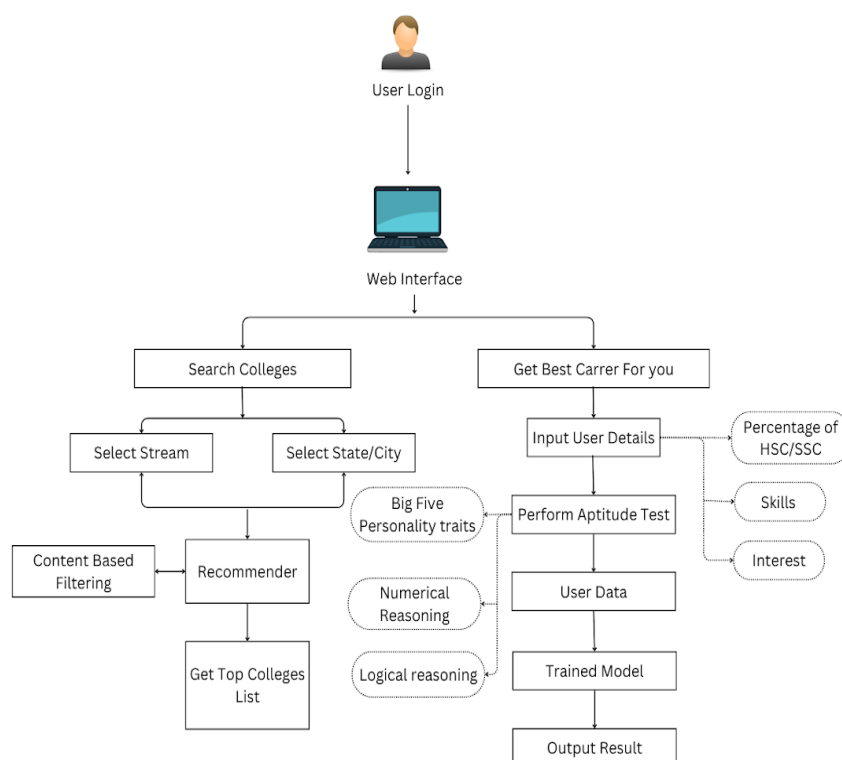


Fig 1. Working Methodology of System

Below is the brief illustration of the operations carried out by the system:

User Input & Data Processing

- Students enter their details through an interactive **React-based web interface**.
- The system processes these inputs and prepares them for comparison with available career and college options.

Career Recommendation using KNN Algorithm

- The system utilizes the **K-Nearest Neighbours (KNN) machine learning algorithm** to recommend careers based on student inputs.
- The algorithm compares a student's **skills, interests, and academic performance** with similar students in the dataset to find the most suitable career path.
- **Fuzzy matching techniques** are used to handle variations in student responses, ensuring more flexible and accurate recommendations.

Aptitude Test and Personality Assessment

- Students take an **aptitude test**, which helps refine career recommendations based on their problem-solving, analytical, and reasoning skills.
- The test also includes questions based on the **Big Five Personality Traits (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism)**.
- Each personality trait is assessed through multiple statements, where students rate their responses on a **scale from 1 to 5** (1 = Strongly Disagree, 5 = Strongly Agree).
- The scores help the system determine the student's personality type and suggest careers that align with their traits.

Career Roadmap Generation

- After recommending a top career, the system provides a **detailed career roadmap** when the student clicks on a specific career.

College Recommendation

- Based on the selected career path and student preferences (such as **location and field of study**), the system recommends top colleges.

Result Display & User Interaction

- The final **career and college recommendations** are displayed on the web interface.

3.3 Tools and Technologies Used

There are several tools and modules that have been used to create the AI-based Education Career Counseling System, which are listed as follows:

- **React & TypeScript:** Modern frontend framework enabling declarative, component-based UI development with TypeScript's static type-checking to prevent runtime errors and improve code maintainability.
- **Tailwind CSS & shadcn/ui:** Utility-first CSS framework that promotes consistency through predefined classes, paired with shadcn/ui's accessible component library built on Radix UI primitives for responsive design.
- **Machine Learning Algorithm:** K-Nearest Neighbours (KNN) algorithm identifies careers by finding the closest matches in a multi-dimensional feature space, while cosine similarity measures the angle between user skill vectors and career requirement vectors.
- **TanStack React Query:** Advanced data synchronization library that handles caching, background updates, and optimistic UI updates, reducing network requests while maintaining data freshness.
- **Scikit-learn:** Comprehensive machine learning library providing implementations of various algorithms, preprocessing tools, and evaluation metrics essential for our recommendation engine.
- **Flask-CORS:** Extension that enables secure cross-origin resource sharing between domains, allowing the frontend to communicate with the Python backend while maintaining security protocols.

3.4 Training and Testing

- The dataset is processed in **CSV format** for easy handling. It is divided into **80% training data and 20% testing data** to help the system learn from existing student profiles while ensuring it works well on new inputs.
- The **K-Nearest Neighbours (KNN) algorithm** is used to analyze student details like **skills, interests, academic scores, and aptitude test results** to find the most suitable career matches.

IV. RESULT AND DISCUSSION

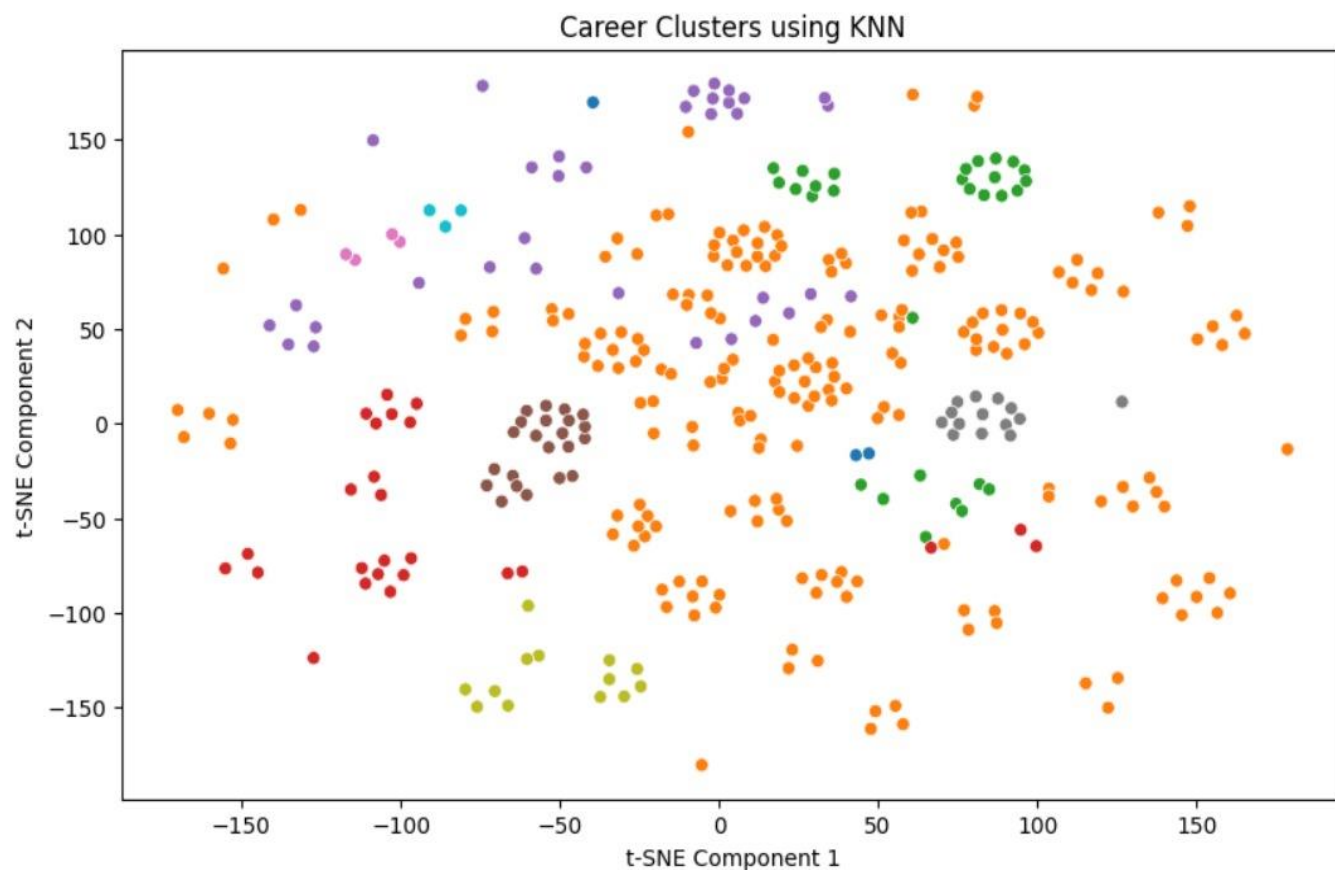
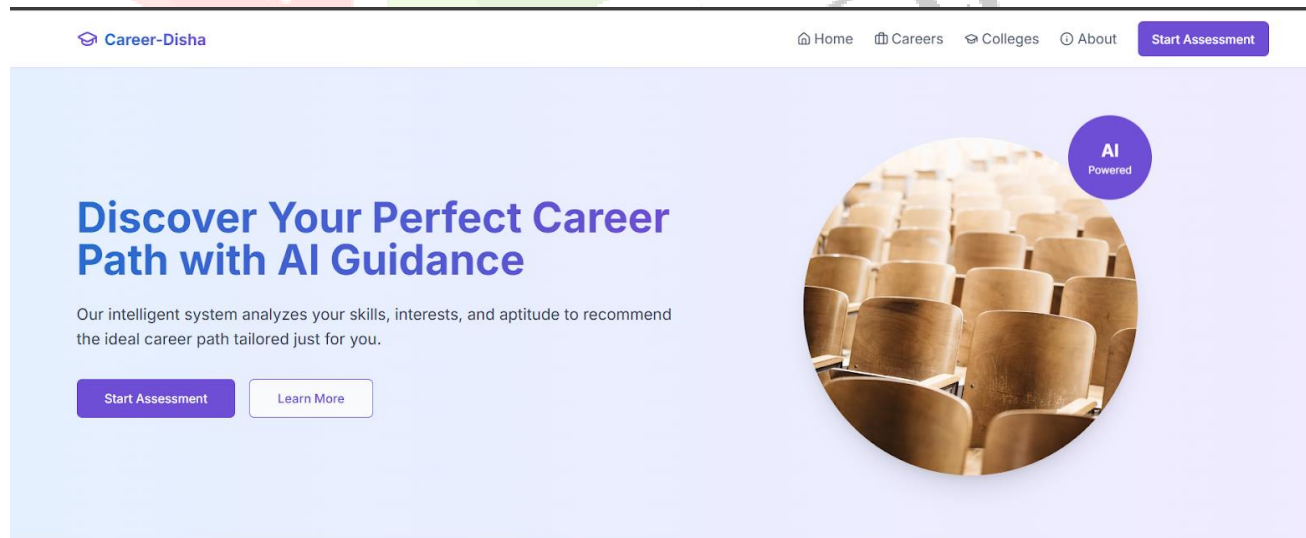


Fig 1. Career Cluster

Fig 1. visualizes career clusters generated using the K-Nearest Neighbors (KNN) algorithm. Each dot represents a student, and similar career profiles are grouped together based on skill and interest similarity, projected onto two dimensions using t-SNE. This helps in identifying natural groupings of career paths for personalized guidance.



How It Works

Our AI-powered career guidance system uses a simple yet effective approach to help

Fig 2. Home Page

Fig 2. Shows the landing page introduces the AI-based Career Guidance System, allowing students to explore career options based on their skills, interests, and academic performance.

The screenshot shows the 'Student Profile' form. At the top, there's a navigation bar with 'Career-Disha' logo and links for Home, Careers, Colleges, About, and a user profile for 'Durgesh Thorat' with a Logout button. The form itself has a title 'Student Profile' and a subtitle 'Please provide your information to start the career assessment process.' Below this, it says 'Logged in as: Durgesh Thorat'. The form contains several input fields: 'Full Name' with the value 'Durgesh Thorat', 'SSC Percentage (%)' with the value '81', and 'HSC Percentage (%)' with the value '85'. There is a 'Skills' section with a grid of checkboxes. The checked skills are: Writing, Public Speaking, Computer Programming, Empathy, Mathematics, AI Development, Software Engineering, and Web Development. Other skills listed but not checked include: Critical Thinking, Creativity, Leadership, Programming, Artistic Skills, Investigative Skills, Observation, Machine Learning, Algorithms, Research, Problem Solving, Attention to Detail, Teamwork, Communication, Analytical Skills, Time Management, Data Analysis, Storytelling, Patience, Design, and Data Structures.

Fig 3. Input Details

Fig 3. Shows student input details. This page collects student information, including SSC/HSC percentages, skills, and interests, to generate personalized career recommendations.

The screenshot shows the 'Aptitude Assessment' form. At the top, there's a navigation bar with 'Career-Disha' logo and links for Home, Careers, Colleges, About, and a user profile for 'Durgesh Thorat' with a Logout button. The form has a title 'Aptitude Assessment' and a subtitle 'Personality assessment: Rate how much you agree with each statement.' Below this, it says 'Question 1 of 15' and '7% Complete'. The question is 'I have difficulty understanding abstract ideas.' Below the question is a rating scale from 1 to 5, with labels: 'Strongly Disagree', 'Disagree', 'Neutral', 'Agree', and 'Strongly Agree'. The scale is currently empty. There are 'Previous' and 'Next' buttons at the bottom of the form.

Fig 4. Aptitude Assessment

Fig 4. Shows aptitude test, a mandatory test assessing students cognitive abilities and personality traits to refine career recommendations further.

Your Career Recommendations

Based on your skills, interests, and academic background, we've identified these career paths as your best matches.

Personalized for: Durgesh Thorat

Career Matches

Insights & Analysis

Historian

Research, analyze, interpret, and present the past through records, artifacts, and documents.

★ 95% Match



Key Skills

Research, Writing, Analytical Skills, Attention to Detail, Critical Thinking



Education Path

Master's or PhD in History or related field



Growth Outlook

Stable



Salary Range

\$55,000 - \$95,000



Industries

Education, Research, Government, Museums

View Career Roadmap →

Fig 5. Career Recommendation

Fig 5. Shows recommendation page, that displays the top three career suggestions based on the student's inputs and aptitude test results, ranked by relevance.

Based on your skills, interests, and academic background, we've identified these career paths as your best matches.

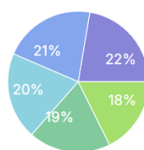
Personalized for: Durgesh Thorat

Career Matches

Insights & Analysis

Match Analysis

Visual breakdown of your top career matches



Historian

AI Engineer

Psychologist

Financial Analyst

Writer/Author

Fig 6. Career Chart Analysis

Fig 6. Shows visual representation of career recommendations, showing the match percentage for each suggested career, helping students compare options effectively.

Career-Disha

Home Careers Colleges About Durgesh Thorat Logout

Data Scientist Roadmap

Your personalized path to becoming a successful Data Scientist. Follow this roadmap to develop the necessary skills and qualifications.

Education Skills Career Path

Education

- 1 High School**
Complete high school with focus on relevant subjects
Duration 3-4 years
Prerequisites Basic education
- 2 Bachelor's Degree**
Undergraduate degree in fields related to Data Scientist
Duration 3-4 years
Prerequisites High school diploma
Institution Types University, College
- 3 Master's Degree (Optional)**

Fig 7. Selected Career Roadmap

Fig 7. Shows a roadmap page that Provides a structured career roadmap detailing required skills, education paths, and potential career growth for the selected career option.

Career-Disha

Home Careers Colleges About Durgesh Thorat Logout

College Recommendations

Find the best colleges and universities across India to pursue your desired degree based on your preferences.

Filter Colleges

Select degree type and location to find the most suitable colleges for your education.

Degree Type All Degrees **State** All Locations **Search** Search by college name

College Name	Degree	State	Fees	Action
Andhra University College of Arts and Commerce	BA	Andhra Pradesh	₹25,000 / year	View Details
Sri Venkateswara University	BA	Andhra Pradesh	₹24,000 / year	View Details
Acharya Nagarjuna University	BA	Andhra Pradesh	₹18,000 / year	View Details

Fig 8. Filter Colleges

Fig 8. Shows college filter page. Allows students to filter and view top colleges based on their chosen career path, preferred location, and fee preferences.

The screenshot displays the 'Filter Colleges' section of the Career-Disha website. At the top, there are navigation links: Home, Careers, Colleges, About, and a user profile for Durgesh Thorat with a Logout button. The 'Filter Colleges' section includes a sub-header 'Select degree type and location to find the most suitable colleges for your education.' Below this are three input fields: 'Degree Type' (set to 'All Degrees'), 'State' (set to 'All Locations'), and a 'Search' box with the placeholder 'Search by college name'. The main content area shows the profile for 'Andhra University College of Arts and Commerce' with a 'Back to list' link. The profile details include: Location (Andhra Pradesh), Rating (4.5/5 stars), Degree Program (Bachelor of Arts), Admission Rate (22%), Tuition Fees (₹25,000 / year), and a Website link ('Visit College Website'). A 'Why This College?' section follows, describing the college as an excellent choice for students interested in Bachelor of Arts, located in Andhra Pradesh, providing a supportive environment for academic and professional growth.

Fig 9. Filtered College

Fig 9. Display detailed information about the chosen college, including fees, location, and available courses, helping students finalize their decision.

V. Conclusion

In conclusion, the System project represents a significant advancement in addressing the complex challenges of career selection faced by secondary-level students in today's competitive and dynamic environment. By leveraging cutting edge artificial intelligence technology, the platform provides personalized career recommendations tailored to individual student profiles, encompassing their interests, skills, and academic performance. The promising results from initial testing underscore the platform's effectiveness in enhancing students' decision making processes and boosting their confidence in pursuing suitable career paths. With high accuracy rates and positive feedback, it is evident that System not only demystifies the often-overwhelming landscape of career options but also fosters a sense of clarity and purpose among users. Looking ahead, the project's future scope is broad, with potential enhancements including real-time labour market insights, virtual mentorship programs, and community support features, all designed to empower students further in their career journeys. By continually evolving and adapting to the changing educational landscape, System has the potential to become an indispensable resource for students, equipping them with the tools and knowledge needed to navigate their futures successfully. Ultimately, this initiative not only aims to improve individual outcomes but also aspires to contribute to a more informed, skilled, and capable workforce, thereby positively impacting society as a whole.

VI. Future Scope

The future scope of the System project is expansive, presenting numerous opportunities for enhancing the capabilities and effectiveness of the AI-based career counseling platform. One significant avenue for development is the integration of real-time labor market data, which would provide students with upto-date insights into current job trends, in-demand skills, and potential salary ranges for various career paths. This feature could empower students to make more informed decisions by aligning their aspirations with market realities. Additionally, expanding the platform's database to encompass a broader array of professions, educational pathways, and skill requirements will ensure that it offers comprehensive guidance suitable for students from diverse backgrounds and interests. Another promising enhancement involves the incorporation of virtual mentorship programs, allowing students to connect with industry professionals in their fields of interest. This could foster valuable networking opportunities and provide insights into real-world experiences and challenges. Additionally, an interactive community forum could be established, where students can share experiences, seek advice, and offer support to one another, thereby creating a sense of belonging and collaboration among users.

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