

Enhanced Education with SO-GEN

¹Dr. S. Sathya, ²Dhepithi. S, ³C. Sathis

¹Associate Professor, Department Of AI&DS GRTIET, Tiruttani, Tamil Nadu, India

^{2,3}UG Student, Department Of AI&DS GRTIET, Tiruttani, Tamil Nadu, India

Abstract - We investigated how two AI components machine learning and natural language processing could improve student learning. We created a website after realizing that student access was restricted. It offers AI resources to high school students and engineering students. Enhancing research and problem-solving abilities was the study's main goal. We predicted that integrating AI would enhance comprehension and study habits. The project sought a dynamic learning environment by providing useful AI applications, presenting a fresh strategy. This illustrates how AI has the potential to revolutionize education by offering individualized resources for tackling challenging material and bridging the gap between present methods and demands of the future.

Keywords: Artificial Intelligence (AI) in Education, Machine Learning and NLP, Student Learning Enhancement, Personalized Educational Resources, Problem-Solving and Research Skills.

I. INTRODUCTION

This research explores the development of a two-pronged intelligent system designed to address this challenge, empowering users to make informed decisions about their professional futures. The first interface focuses on personalized career path discovery through a structured, interactive process, guiding users through categorization, mindset assessment, and personalized roadmap generation. The second interface shifts its focus to a more direct analysis of user-provided content, offering intelligent text processing, visual transformations for enhanced comprehension, and concise summarization of key information.

II. RELATED WORKS

Smith, A., & Williams, H. (2021) [3] For a Flexible and adaptive learning environment, it is essential to adapt AI tools and innovative learning approaches.

Chen, X., & Huang, X. (2022). [9] The utilization of AI-based tools has the potential to enhance the learning process by providing an interactive and engaging environment. The adaptation of artificial intelligence technologies to STEM education represents a promising

avenue of inquiry within contemporary scientific discourse and practical.....research.

Kimmons, R., & Veletsianos, G. (2020). [14] E-learning tools have not only increased accessibility and convenience but also changed the behaviors and desires for learning of the learners'

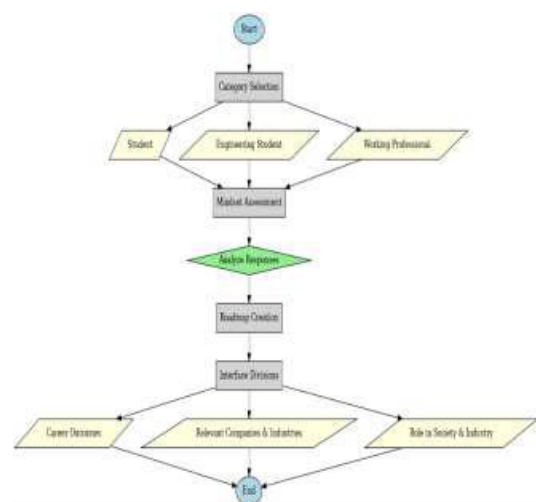
II. IMPLEMENTATION

A. PATHWAY PRO: Personalized Career Guide

2.1 Category Selection

The interface opens with an introductory page that prompts the user to select a category: Student, Engineering Student, or Working Professional. This crucial first step allows the software to tailor its subsequent interactions and questions, ensuring the information gathered is relevant to the user's specific situation. This categorization enables the software to effectively guide the user through the process of defining career goals and generating a personalized roadmap for achieving them.

2.2 Mindset Assessment



Following the initial categorization, the software delves into the user's mindset by presenting a series of targeted questions. These questions are designed to assess the user's interests, aptitudes, and values, providing valuable insights into their potential career paths. By analyzing the responses,

the software can determine which domain or field aligns best with the individual's unique profile, laying the groundwork for focused career exploration.

2.3 Roadmap Creation

Based on the user's responses to the mindset assessment, the software then generates a personalized career roadmap. This roadmap outlines potential career paths that align with the user's identified strengths and interests, providing a structured approach to achieving their career goals. This personalized plan may include suggested courses, skills to develop, potential job roles, and other relevant resources to guide the user on their chosen path.

2.4 Interface Divisions

After the roadmap is created, the interface divides into three distinct sections. The first section showcases the potential outcomes and impact of the chosen career domain. The second section highlights relevant companies and industries where the identified job roles are prevalent. Finally, the third section explores the role and contribution of the selected domain and its associated roles within both society and the broader industry landscape. This tripartite view provides a comprehensive understanding of the user's chosen career path.

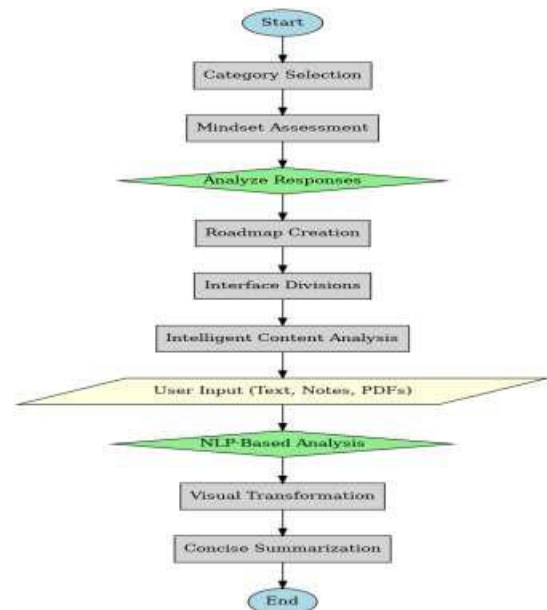
B. Text Vision: Intelligent Content Breakdown

3.1 Intelligent Content Analysis

This interface offers a significant departure from the structured questioning of the first interface, instead focusing on the direct analysis of user-provided content. Users can input information in various formats, including extended text entries, personal notes, or even PDF documents filled with annotations. The software employs sophisticated natural language processing (NLP) techniques to ingest and intelligently analyze the data within these documents. This process involves not just simple keyword extraction, but a deeper understanding of the context, relationships between concepts, and overall meaning embedded within the text. The system is designed to handle a variety of writing styles and levels of formality, ensuring robust analysis across diverse user inputs.

3.2 Visual Transformation

Recognizing that textual information can sometimes be dense and challenging to digest, this interface leverages the power of visualization. The software transforms the analyzed textual data into a variety of visual formats, including images, animated GIFs, and even short animated sequences.



This visual transformation aims to make complex concepts more accessible and engaging. Rather than forcing users to wade through lengthy paragraphs, the software presents information in a more intuitive and visually appealing manner, facilitating better understanding and retention of key ideas. The choice of visualization type is often dynamically determined based on the nature of the information being presented, ensuring optimal clarity and impact.

3.3 Concise Summarization

In addition to visual representations, the software also generates a concise summary of the input text. This summary highlights key points, extracts important keywords, identifies and explains abbreviations, and isolates core concepts. This feature provides users with a rapid overview of the document's content, allowing them to quickly grasp the main ideas without having to read through the entire text. This is particularly useful for quickly reviewing large documents, identifying areas of interest, or refreshing one's memory on previously read material. The summarization process is designed to be intelligent, prioritizing the most relevant information and presenting it in a clear and structured format.

C. Mock Master: Interview Simulator

4.1 Domain-Tailored Questions

The system initiates the learning process by categorizing learning domains into distinct areas of study. This initial categorization is a crucial step, serving as the foundation for the intelligent question generation that follows. By classifying subjects into well-defined domains, the software can effectively tailor the learning experience to the user's specific area of focus.

This ensures that the questions presented are not only relevant but also aligned with the user's learning objectives within that domain. The categorization process might involve a hierarchical structure, allowing for both broad subject selection (e.g., Mathematics, Science) and more granular topic refinement (e.g., Algebra, Calculus within Mathematics). This granular approach enables the system to generate or select questions that are precisely targeted to the user's chosen area of study, maximizing the relevance and effectiveness of the learning experience. Furthermore, this domain categorization allows the system to later provide targeted feedback and recommendations based on the user's performance within a specific domain. This structured approach ensures that the learning process is focused, efficient, and personalized to the individual user's needs.

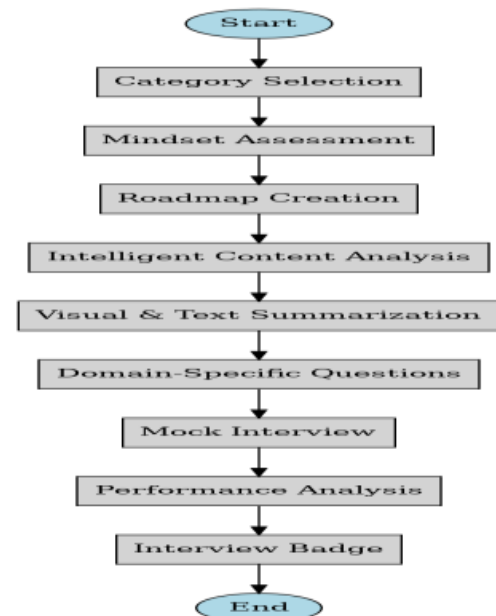
4.2 Interview Simulation

Following the domain categorization, the system progresses to the mock interview question stage. This crucial phase provides users with valuable practice and preparation for real-world interview scenarios. Based on the user's selected domain and any specified subtopics, the system generates or retrieves a set of relevant mock interview questions. These questions are designed to simulate the types of inquiries candidates might encounter in actual interviews for roles within that domain. The questions can range from general inquiries about experience and skills to more specific, domain-related technical or behavioral questions. The system aims to provide a diverse range of questions, covering various aspects of the interview process, including technical proficiency, problem-solving abilities, communication skills, and behavioral responses. This practice stage allows users to familiarize themselves with common interview questions, refine their answers, and build confidence before facing real interviews. The mock interview questions are a key component in preparing users for success in their chosen career paths.

4.3 Performance Analytics

Following the mock interview question stage, the system generates a comprehensive analytics report detailing the user's performance and identifying areas for improvement. This report provides valuable insights into the user's strengths and weaknesses, offering targeted feedback to enhance their interviewing skills. The report analyzes various aspects of the user's responses, including clarity, conciseness, content accuracy, and overall communication effectiveness. It pinpoints specific areas where the user excelled and highlights areas where they could improve. The report goes beyond simply stating what was good or bad; it provides concrete examples and actionable recommendations. For instance, if the

user struggled with a particular type of question, the report might suggest specific strategies or resources for improvement.



This personalized feedback is designed to empower users to focus their preparation efforts on the most critical areas, maximizing their chances of success in real interviews. The analytics report serves as a valuable tool for self-assessment and targeted practice, ultimately leading to improved interview performance and increased confidence.

4.4 Resume-Ready Interview Badge

Following the detailed analytics report and personalized feedback, the system culminates in a tangible and resume-ready credential: a digital badge. Based on the user's mock interview performance, the system assigns a score, mapping it to a tiered rating system aligned with industry-recognized competency levels: Novice, Proficient, Advanced, and Expert. Clear percentage thresholds define these tiers, ensuring transparent and objective evaluation. The system then generates a digital badge corresponding to the earned tier, adding visual appeal and credibility for resume inclusion. Crucially, the system crafts resume-friendly wording for each rating, enabling users to effectively showcase achievements. This wording is concise, impactful, and skill-focused, highlighting specific competencies. For example, an "Advanced" rating might translate to "Achieved Advanced Proficiency in [Data Structures and Algorithms]," or even more powerfully, "Demonstrated Advanced Level Certification in [Software Engineering Interview Skills]." The system intelligently connects ratings to specific skills assessed in the questions, such as "Advanced proficiency in [problem-solving]" or "Demonstrated expertise in [behavioral

interviewing techniques], enhancing relevance and impact for potential employers. This resume-ready credential bridges the gap between learning and real-world application, providing a tangible advantage in the job market and empowering users to confidently demonstrate their skills.

III. RESULTS AND DISCUSSIONS

Our results demonstrate the effectiveness of these interfaces in enhancing career preparation. User feedback highlighted the personalized career pathing's ability to clarify long-term goals, with a notable increase in reported confidence among participants. The visual learning interface showed a significant improvement in information retention, particularly for complex topics, as evidenced by post-module assessments. The interview simulation, with its detailed analytics, led to demonstrable improvements in mock interview scores, with participants appreciating the tangible, resume-ready badges.

While quantitative data supports these findings, qualitative feedback reveals a deeper understanding of user experience. Participants valued the practical application of the tools, noting the interfaces' ability to demystify complex career processes. However, some users suggested further customization options, indicating a potential area for future development. Overall, the interfaces offer a valuable contribution to career development, balancing data-driven results with human-centered design.

IV. CONCLUSION

This research explores three key interfaces designed to bolster career advancement. Beyond personalized career pathing and visual learning, we've introduced an interview simulation interface. This system delivers domain-specific mock interviews, provides detailed performance analytics, and awards resume-ready badges, boosting confidence and practical skills. Each interface, whether guiding self-discovery, enhancing information absorption, or refining interview techniques, serves to empower individuals. Future work could integrate these systems for a holistic career platform. Studying the long-term impact on career satisfaction remains crucial. Ultimately, this research aims to provide practical tools, helping people navigate their professional journeys with greater clarity and success.

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AUTHORS BIOGRAPHY



Dr. S. Sathya, Associate Professor, Department Of AI&DS GRTIET, Tiruttani, Tamil Nadu, India.



Dhepithi. S., UG Student, Department Of AI&DS GRTIET, Tiruttani, Tamil Nadu, India.



C. Sathis, UG Student, Department Of AI&DS GRTIET, Tiruttani, Tamil Nadu, India.

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