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PrepVision: AI Career Path Advisor

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***Abstract*: PrepVision: AI Career Path Advisor is an intelligent, all-in-one career and placement preparation platform that leverages Artificial Intelligence (AI) to guide students and professionals toward their ideal career paths. It utilizes Natural Language Processing (NLP) and recommender systems to personalize learning journeys, suggest relevant courses from free platforms such as YouTube and Coursera, and help users bridge existing skill gaps.**

PrepVision incorporates an advanced Resume Analyzer that assesses resumes for Applicant Tracking System (ATS) compatibility, identifying strengths and pinpointing missing skills required for specific job roles. It provides detailed feedback to help users enhance the relevance and visibility of their resumes in automated screening systems. Furthermore, the integrated Mock Interview Generator creates realistic, domain-specific interview simulations for roles such as Software Engineer, Data Analyst, and Product Manager. It generates AI-driven questions and delivers instant, insightful feedback on user responses, enabling effective self-evaluation and continuous improvement.

By combining advanced AI capabilities with real-world placement requirements, PrepVision offers a comprehensive, smart, and scalable solution for career guidance, skill enhancement, and professional growth.

***Keywords*: AI Career Guidance, Resume Analysis, Mock Interview, Recommender System, NLP**

I. INTRODUCTION

In today's rapidly evolving job market, students and professionals often struggle to navigate their career paths due to the overwhelming number of opportunities and constantly shifting industry demands. Traditional career counseling methods frequently fall short as they lack personalization and adaptability to individual profiles or emerging trends. This creates a pressing need for intelligent, data-driven systems that deliver tailored guidance, identify skill gaps, and help users prepare effectively for placements and long-term career growth. PrepVision.ai – AI-Driven Career Path Advisor addresses these challenges by leveraging advanced Artificial Intelligence and Natural Language Processing (NLP) to provide personalized, adaptive, and data-driven career recommendations. The system analyzes user profiles, interests, and resumes to identify strengths and weaknesses, suggest high-quality learning resources, and generate structured preparation strategies. It integrates ATS-based resume evaluation and AI-powered mock interview simulations to ensure holistic readiness, continuously updating its insights based on real-time job market trends. This dynamic approach allows users to visualize their current skill level, explore potential career paths, and receive actionable steps to achieve their goals. PrepVision.ai bridges the gap between learning and employability by offering curated learning pathways, certification courses, and project-based opportunities aligned with industry requirements. Through continuous progress tracking and analytics, users can monitor their growth, refine their learning plans, and stay aligned with evolving market demands. With its accessible interface and focus on inclusivity, the platform empowers individuals from diverse educational backgrounds to make informed career decisions, enhance their employability, and transform uncertainty into structured, confident career progression.

II. LITERATURE REVIEW

The integration of Artificial Intelligence (AI) and Natural Language Processing (NLP) has transformed conventional career counseling into intelligent, data-driven systems that offer personalized recommendations and automated guidance. Recent research emphasizes how AI-powered platforms can analyze user profiles, predict career trajectories, and deliver skill-based learning recommendations to improve employability outcomes.

Manap et al. [1] proposed an AI-driven career counseling model that leveraged predictive analytics and NLP to analyze user interests and recommend suitable occupations. Their system demonstrated that artificial intelligence can provide scalable, data-centric guidance while reducing dependency on manual counseling. Faruque et al. [2] developed a Natural Language-Driven Career Prediction System that used user-entered text to identify suitable professions. Their model demonstrated the potential of NLP for understanding unstructured data in career mapping. Gunwant et al. [3] presented a systematic review of Career Guidance Expert Systems for Students, highlighting that most systems still lack personalization, real-time analytics, and integration with modern AI frameworks.

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Siswipraptini et al. [4] introduced the Personalized Career-Path Recommendation Model (CPRM), integrating AI algorithms with psychometric analysis to tailor career recommendations. The model improved accuracy in matching individual profiles with job roles but required further automation in skill gap analysis. Khader et al. [5] explored AI Chatbots for Smart Academic Advising, showing that conversational agents can assist students in course selection and skill development, though they lacked adaptive intelligence. Bankins et al. [6] examined the psychological and behavioral dimensions of career navigation in the age of AI, stressing the need for systems that combine technical intelligence with human-centered design.

Similarly, Meenakshi et al. [7] developed HIREBRIDGE, an AI-driven career hub integrating job recommendations and resume analysis; however, their system did not include multilingual support or learning resource integration. Shenoy et al. [8] proposed Career Link, an AI tool that analyzed resumes and provided interview guidance, yet it lacked adaptability to changing job-market trends. Trujillo et al. [9] applied machine learning approaches for career prediction, confirming that AI models can effectively map academic and behavioral data to suitable professions but emphasizing that scalability and interpretability remain challenges.

Collectively, these studies confirm that AI-driven career guidance systems enhance employability and automate career decision-making. However, existing solutions often operate as isolated tools — focusing only on career recommendation, resume parsing, or interview advice — without unifying these features into an adaptive and explainable system. Moreover, they rarely incorporate real-time labor market analytics, multilingual interfaces, or continuous skill-gap tracking, limiting their accessibility and long-term impact.

A. Research Gap and Contribution of the Present Work

The proposed system, PrepVision.ai – AI-Driven Career Path Advisor, directly addresses these research gaps by integrating resume analysis, career path prediction, skill gap identification, and AI-powered mock interview simulation into a unified framework. The system employs Natural Language Processing (NLP) to interpret resumes and user profiles, machine learning for career prediction, and ATS-based evaluation for employability analysis. It further provides real-time learning resource recommendations, free course links, and a multilingual interactive interface, ensuring inclusivity and accessibility for users from diverse educational backgrounds. Unlike traditional systems, PrepVision.ai incorporates industry trend tracking and AI-based mentoring to continuously adapt to the evolving job market, bridging the gap between education and employability through an intelligent, personalized, and explainable platform.

Feature	Existing Systems	Proposed System
AI-Based Career Recommendation	✓	✓
Resume Analysis and Parsing	Partial	✓
Skill Gap Identification	✗	✓
ATS-Based Resume Evaluation	✗	✓
Learning Resource Recommendation	Partial	✓
Mock Interview Simulation	✗	✓
Real-Time Industry Trend Adaptation	✗	✓
Personalized Learning Pathways	Partial	✓
Employability Feedback & Analytics	✗	✓

Table I. Comparative Analysis between Existing Systems and Proposed System

III. OBJECTIVES

The primary objective of this research is to develop an AI-based system that assists users in making informed career decisions. By analyzing their interests, education, and current job market trends, the system aims to suggest suitable career paths.

In addition, the system focuses on skill development by recommending free and high-quality learning resources, such as videos, articles, and courses, to help users acquire relevant skills for their chosen careers.

The platform intends to enhance employability by analyzing users resumes, providing insights like ATS compatibility scores, job-role-specific skill gap analysis, and actionable recommendations to improve visibility. AI-powered mock interview sessions will also be offered to prepare users for real-world interviews in their target domains.

A. Key Objectives

1) Develop an AI-based system that suggests career paths based on user interests, education, and trending job roles.
2) Recommend free and high-quality learning resources (videos, articles, courses) for skill acquisition.
3) Analyse users' resumes and provide:
4) ATS compatibility score
5) Job-role-based skill gap analysis
6) Recommendations to improve resume visibility
7) Provide AI-powered mock interview practice sessions tailored to specific domains and job roles.

IV. METHODOLOGY

A. System Architecture Design

The system is designed to analyze user data, identify suitable career paths, and provide AI-driven recommendations. It functions as an intelligent, data-driven platform integrating user interaction, AI processing, and secure storage. The AI Career Path Advisor acts as the central processing unit, coordinating all modules for seamless operation.

1) User Interface (Dashboard): Allows students to create profiles, upload resumes, and view personalized recommendations through a multilingual and user-friendly interface.
2) Resume Analyzer: Extracts and organizes key details such as skills, education, and experience from uploaded resumes using NLP.
3) Skill Gap Analyzer: Compares current user skills with target job roles to identify missing competencies.
4) Recommendation Engine: Generates career path suggestions, job recommendations, and learning resources based on AI and real-time market data.
5) Mock Interview Module: Conducts AI-based interview simulations and provides instant feedback.
6) Database: Stores user profiles, analytical results, and reports securely for continuous tracking and updates.

B. System Software Framework

The software framework forms the intelligent backbone of the system, combining AI-driven decision-making, NLP-based analysis, and cloud data management.

1) Natural Language Processing (NLP) Engine:
- Extracts essential data from resumes such as education, experience, and technical skills.
- Employs transformer-based models (e.g., BERT) for understanding contextual relationships in text.

2) Career Prediction Model:
- Uses supervised learning algorithms to match users with relevant job roles and career paths.
- Continuously updates based on current job market datasets and skill demand analytics.

3) Skill Gap Analysis Module:
- Compares user skills with industry requirements for targeted job roles.
- Generates personalized learning pathways to bridge those gaps effectively.

4) ATS-Based Resume Evaluation:
- Scores resumes using ATS-like algorithms for keyword relevance, structure, and readability.
- Provides improvement tips to enhance selection chances in automated recruitment systems.

5) AI-Driven Mock Interview Module:
- Simulates domain-specific interviews using question generation and NLP-based evaluation.
- Analyzes candidate responses, tone, and accuracy to provide structured feedback.

6) Frontend Dashboard:
- Displays user analytics, career paths, and learning recommendations in real time.

C. System Logic Flow

1) The user signs up, creates a profile, and uploads a resume via the web dashboard.
2) The Resume Parser extracts data and stores it securely in the cloud database.
3) The Career Prediction Model processes user data to recommend potential career paths.

4) The Skill Gap Analyzer identifies missing competencies and suggests relevant learning materials.
5) The ATS Evaluator reviews the resume and generates a detailed report with optimization suggestions.
6) The Mock Interview Module conducts AI-based interview simulations and provides performance analytics.
7) The dashboard compiles results, tracks progress, and updates recommendations based on job market trends and user activity.

V. SYSTEM ARCHITECTURE

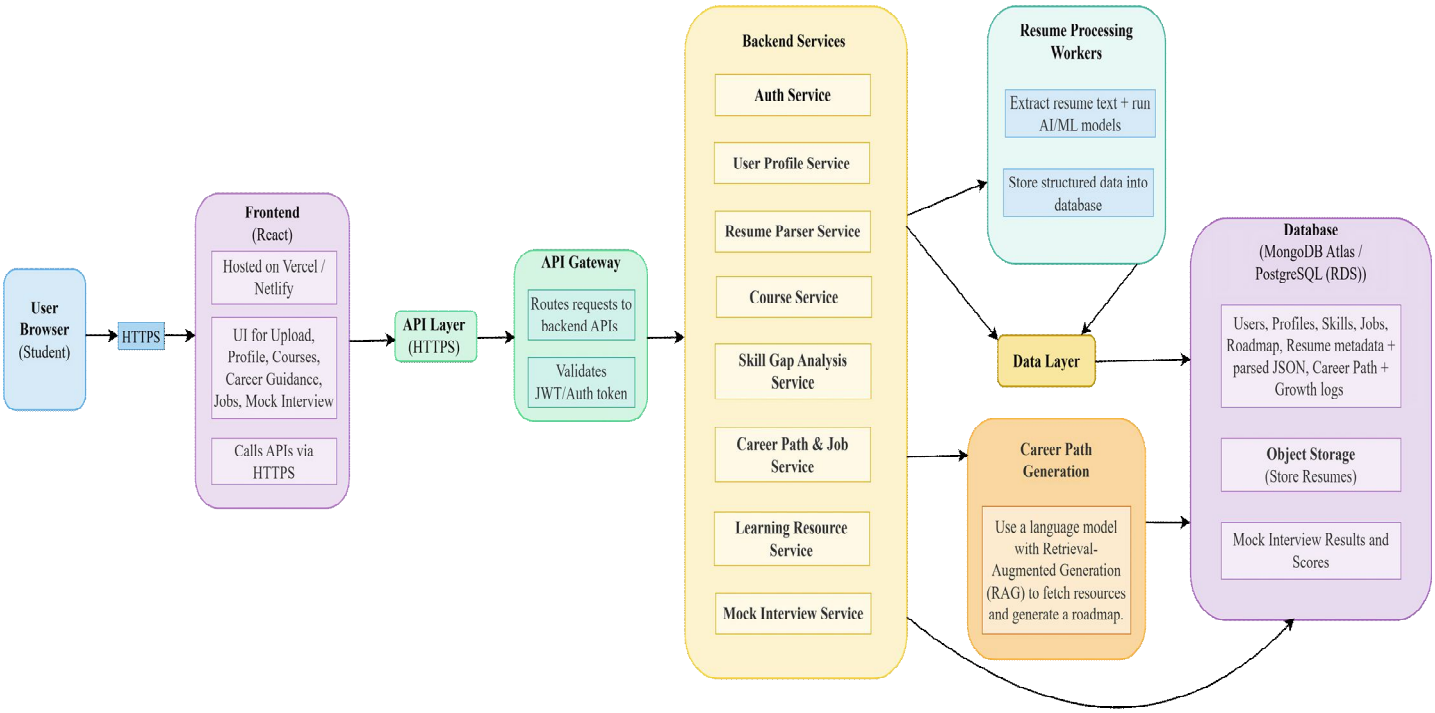


Fig. 1. System Architecture

The system architecture of PrepVision.ai – AI Career Path Advisor is designed to deliver personalized and data-driven career guidance using artificial intelligence. It comprises interconnected components that handle user input, data processing, analysis, and recommendation generation in a structured manner.

A. Student Module

The student acts as the primary user of the system. Students provide their profile details, academic background, skills, and career preferences through an interactive interface. This data forms the basis for all further analysis performed by the system.

B. AI Career Path Advisor (Central Processing Unit)

At the core of the architecture lies the AI Career Path Advisor, which coordinates all internal modules and manages the overall workflow. It processes user data, communicates with other functional components, and ensures intelligent decision-making.
The AI Career Path Advisor consists of the following submodules:

- Resume Analyzer: Extracts key information from uploaded resumes such as educational qualifications, skills, and experience. This helps in understanding the user's current competency level.
- Skill Gap Analyzer: Compares the user's existing skills with the requirements of various career paths. It identifies missing or weak skill areas that need improvement and generates personalized learning suggestions.
- Recommendation Engine: Uses AI and machine learning models to analyze user data, match it with current industry trends, and generate suitable career path recommendations.
- Report Generator: Compiles the processed data and analytical outcomes into structured reports. These reports summarize the user's strengths, potential career matches, and learning roadmap.

C. Database

The Database stores and manages all user-related information, such as personal details, resume metadata, skill analysis results, and generated reports. It ensures secure storage, quick retrieval, and efficient data management for the AI modules. The database also supports continuous updates as the user progresses.

D. Data Flow

The process begins when a student inputs their profile details and uploads a resume. The data is sent to the AI Career Path Advisor, where the Resume Analyzer and Skill Gap Analyzer process it. The Recommendation Engine then generates suitable career paths, and the Report Generator presents the results to the student. All relevant information is stored and retrieved from the Database as needed.

VI. CONCLUSION

The *AI Career Path Advisor* provides a personalized and intelligent solution for career planning and placement preparation. By integrating machine learning, natural language processing, and data analytics, it analyzes student profiles, identifies skill gaps, recommends learning resources, and conducts AI-driven mock interviews. The system overcomes the limitations of traditional counseling through real-time, data-driven insights that enhance employability and support informed career decisions.

VII. EXTENDED RESEARCH AND FUTURE INNOVATIONS

A. Integration of Real-Time Job Market Analytics

Future versions of PrepVision.ai will integrate APIs from platforms such as LinkedIn and Indeed to provide live, data-driven job-role recommendations. This will allow the system to dynamically align career suggestions with current industry trends and emerging job opportunities.

B. AI-Powered Virtual Career Mentors

Advanced Large Language Models (LLMs) will be utilized to develop intelligent virtual mentors capable of providing real-time, conversational career guidance. These mentors will respond to user queries, offer interview preparation tips, and suggest personalized upskilling plans.

C. Emotion and Voice-Based Interview Evaluation

The mock interview module will be enhanced with emotion and speech analysis to assess user tone, confidence, and communication style. This multimodal feedback system will enable a more realistic and comprehensive interview simulation experience.

D. Adaptive Learning Pathways

The system will incorporate adaptive learning algorithms that modify recommended courses and resources based on user performance and progress. This ensures a continuous, personalized learning journey tailored to individual growth.

E. Mobile Application Development

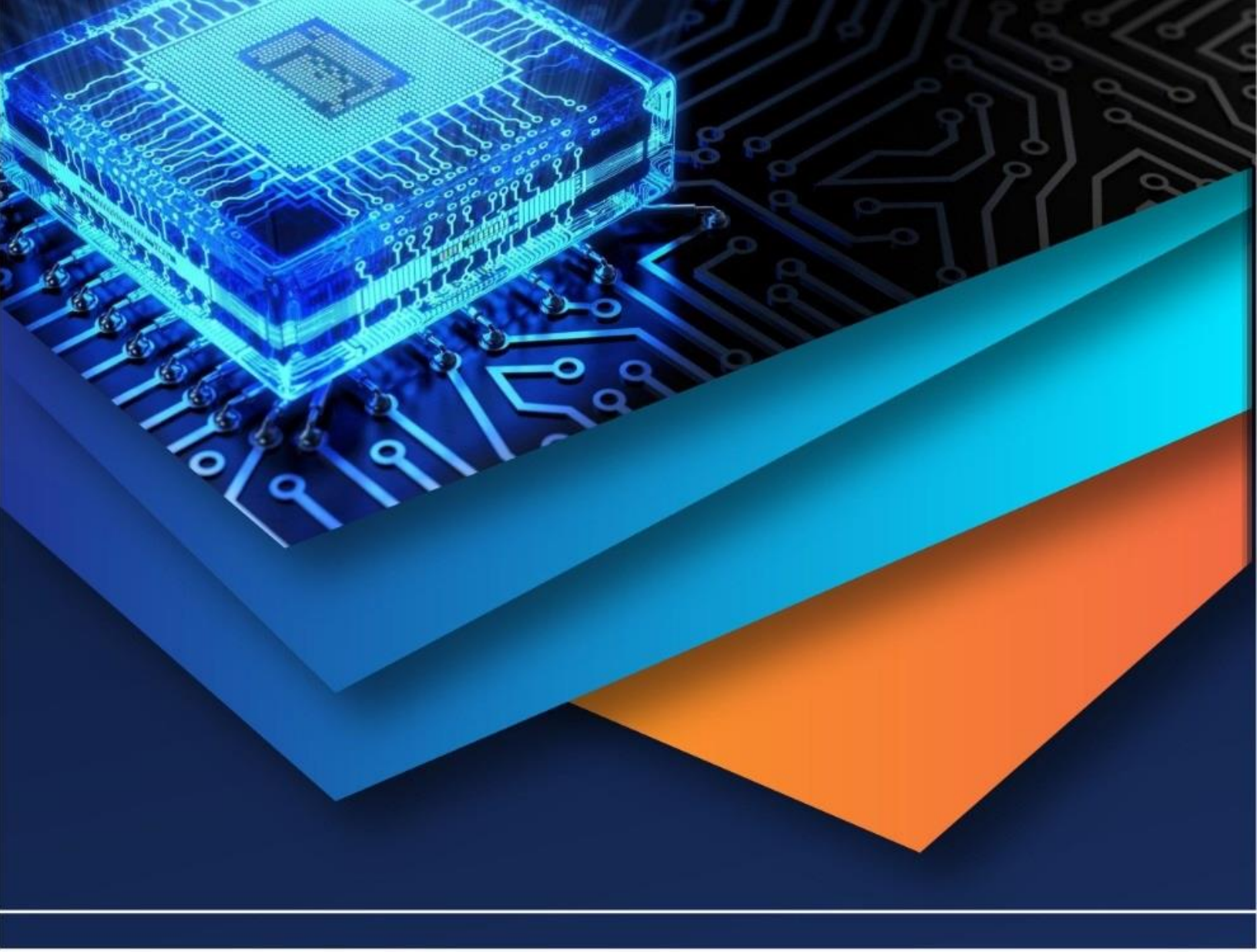
A dedicated mobile version of PrepVision.ai will be developed to provide greater accessibility and support offline functionality. This will particularly benefit students in regions with limited internet connectivity.

VIII. ACKNOWLEDGMENT

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