IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

ASPIRA - PERSONALIZED AI CAREER COACH FOR SKILLS AND JOB READINESS

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Abstract: The complexity of career decision-making has increased as job roles evolve and digital recruitment systems become more widely adopted. Job seekers often struggle to match their skills with market expectations and generate resumes that align with Applicant Tracking System (ATS) requirements. ASPIRA is proposed as an intelligent career guidance platform that supports applicants through automated resume parsing, rule-based skill extraction, skill-gap identification, and job-role alignment using real-time job market data. The system is developed using a MERN stack architecture and integrates external job data APIs to recommend suitable career roles and upskilling paths. Preliminary evaluation demonstrates improvements in resume–job relevance and application accuracy when compared to traditional keyword-based job search approaches, indicating the platform's potential to enhance employability and support informed career planning.

Index Terms - Career Guidance, Resume Parsing, Skill Gap Analysis, ATS Optimization, MERN Stack, Job Recommendation System, Employability Enhancement, API Integration, Job Market Analytics.

I. INTRODUCTION

Rapid shifts in technology and competitive hiring environments have created challenges for both applicants and recruiters. Job seekers struggle to align their skills with market expectations, while recruiters receive large volumes of applications that are often unsuitable or ATS – incompatible in recent times. Identifying appropriate career options, creating resumes tailored to roles, and matching skills with industry requirements is often a challenge for job seekers in today's job market. Simultaneously, employers are tasked with screening numerous applications that are not relevant or optimized for Applicant Tracking Systems (ATS). Traditional recruitment and career guidance methods lack the necessary personalization and contextual awareness, leading to inefficiencies, mismatches in careers, and poor employability outcomes [1], [2].

Existing platforms such as resume builders, job portals, and interview preparation tools usually operate in isolation. Resume builders emphasize formatting, job boards focus on listings, and career resources often overlook role-specific skill requirements. This fragmented ecosystem makes it difficult for learners and early-career applicants to obtain coherent, data-driven support throughout the hiring process [3], [4].

Emerging AI technologies enable automatic processing of unstructured documents, allowing systems to extract candidate skills, interpret experience contextually, and evaluate job alignment. NLP models can analyze resume content beyond keyword matching, while ML techniques support dynamic recommendation based on current labor-market patterns [5], [6]. However, most existing solutions still address isolated tasks, such as only resume scoring or only job matching, without providing a unified guidance framework [7].

This article discusses ASPIRA, an AI-powered platform that provides career guidance and skill recommendation through resume parsing, skill extraction, skills gap analysis, and real-time job market

insights. By utilizing the MERN stack and AI-based NLP techniques, ASPIRA strives to offer personalized career guidance that is data-driven, market-friendly, and tailored to enhance job prospects and assist individuals in making informed career choices [8], [9].

A. Problem Statement

Conventional career guidance systems function in silos, with skill development platforms functioning independently of current labor market demand, job portals offering generic advice, and resume builders lacking industry context. Inadequate career planning, poor job-role alignment, and few job opportunities especially for young professionals are the outcomes of this breakdown. Additionally, the lack of advanced resume optimization and skill gap analysis tools reduces candidate visibility in ATS-based hiring procedures.

B. Objectives of the Study

- To develop a comprehensive AI based career guidance platform for early career professionals and students.
- To perform automated resume parsing and skill extraction using Natural Language Processing techniques.
- To identify skill gaps by comparing user profiles with industry required skill sets.
- To provide personalized career and job recommendations using real-time job market data.
- To enhance employability by suggesting role-specific skills, certifications, and learning pathways.
- To assess interview readiness through role based quiz generation and evaluation.

C. Significance of the Study

Despite tremendous advances in technology, the global labor market is always changing, making it more difficult for professionals to meet industry demands. Conventional career counseling tools lack tailored, flexible, and data-driven solutions. ASPIRA overcomes this shortcoming by integrating resume evaluation, skill shortage detection, and job guidance into a unified system. The proposed system makes use of artificial intelligence and real-time labor market data to increase employment, reduce skill gaps, and improve job prospects. The study also shows that AI-led platforms can change career counseling and lessen the gap between education and employment.

II. MATERIALS AND METHODS

The creation and evaluation of ASPIRA involved the use of multiple software tools, APIs, and datasets for resume analysis, skill extraction, or job recommendation. This research primarily relies on user-uploaded resumes in PDF format, job listings obtained through external job market APIs, and pre-trained language models for semantic analysis. The bulk of resumes were in PDF format and user-receives were gathered to be used for skill extraction and resume parsing. Real-time recommendations from the Adzuna Job API were based on current labor market trends, which involved analyzing job titles, skills required, locations, and descriptions. They use a suite of pre-trained Natural Language Processing (NLP) models accessed via the Hugging Face platform to analyze semantic similarity between resumes and job descriptions. All experimental evaluations were conducted on sample user profiles to exhibit the comparative system performance.

A new AI-powered platform, known as ASPIRA, is intended to replace traditional career guidance and job portals with an advanced user-centric design. The system combines resume analysis, skill gap identification, career recommendation, and role-based assessment to enable complete planning of the early careers for students and early-career professionals.

ASPIRA is composed of an intelligent resume parsing module, skill gap analysis engine, career and job recommendation system, and role-specific quiz generation module. These components work together to provide personalized, data-driven, and market-specific career guidance. The platform not only helps users find suitable jobs but also provides information about skills they need to improve and how to prepare for recruitment processes.

A. Resume Analysis and Skill Extraction

An AI-powered resume analysis component is included in ASPIRA, which can be used to submit a resume and create outlines for job seekers. Natural language processing (NLP) techniques are employed to extract relevant information from unstructured resumes, such as technical skills, soft skills like job applications or for-profit employees, education and experience, and certifications. The system uses semantic analysis and keyword extraction to identify relevant competencies and aligns them with standardized skill categories.

Moreover, the system offers insightful suggestions for improving your resume's quality, such as optimizing keywords and improving formatting. Ensure that resumes are optimized for Applicant Tracking Systems (ATS) and match the job specific role.

B. Career Advice and Skill Gap Analysis

The skill gap analysis in ASPIRA is carried out by comparing extracted user skills with industry-required skill sets, which are determined from job descriptions and labor market data. Identifying skills that are absent or underdeveloped, the system suggests specific skill enhancements, certification options, and learning pathways to meet user career objectives.

The user's profile, preferences and analyzed skills are used by the career recommendation engine to identify suitable career paths or positions. External job APIs are used to incorporate live job market data, ensuring that recommendations match current industry demand. Based on user interactions and updated profile information, the logic used to recommend items becomes more personalized as the user experience evolves.

C. Role-Based Quiz Generation and Assessment

ASPIRA also includes an AI-powered quiz generation module for interview preparation and self-evaluation. This module generates quizzes that are role-specific and skill-oriented, taking into account the user's desired job role and identified skill gaps. Users can use the quizzes to assess their interview readiness and identify areas that need to be improved upon. The accuracy of career guidance is improved by analyzing the results of the quiz to improve skill recommendations.

III. SYSTEM WORKFLOW

- User registration and profile creation.
- Resume creation through upload or profile-based generation.
- Automated resume parsing and skill extraction.
- Role-based quiz generation and assessment.
- Personalized career and job recommendations.
- Continuous profile and skill updates.
- Identification and analysis of career and skill gaps.

IV. SYSTEM ARCHITECTURE

The architecture of ASPIRA is both flexible and modular, built on the MERN stack. React.js is utilized in the frontend to create a user interface that is both responsive and interactive. The backend is built around Node.js and Express.js to manage API requests, authentication, and business logic. The storage capacity of MongoDB includes user profiles, resumes, skills extracted from outside sources, quiz results, and job recommendations. ASPIRA employs resume parsing and PDF parsing techniques to extract structured data from user-generated resumes, which are then utilized as AI capabilities. Then, it extracts the data to identify key proficiencies, degrees and years of service. The Hugging Face platform provides access to pre-trained Natural Language Processing models that are used for semantic analysis and relevance matching between user profiles and job requirements. Real-time job data is incorporated into the Adzuna Job API, which provides real-time job listings and skill requirements for various domains to ensure market relevance. This facilitates the development of job matching and career advice that are relevant to current industry demand. Table 1 presents the technology stack used in the development of the ASPIRA platform.These systems, along with their workflow diagrams, provide a visual representation between the frontend, backend, database and external job data sources.

Table 1. Technology Stack Used in ASPIRA

COMPONENT	TECHNOLOGY USED
Frontend	React.js, React Router, Axios, Tailwind CSS
Backend	Node.js, Express.js
AI and Intelligence Layer	Hugging Face API
Job Market Integration	Adzuna API
Resume Processing	pdf-parse
Database	MongoDB
Authentication	JWT (Token-Based Authentication)
Deployment & Hosting	Vercel

Figure 1 illustrates the overall system architecture and workflow of the proposed ASPIRA platform, highlighting the interaction between the frontend, backend, database, and external APIs.

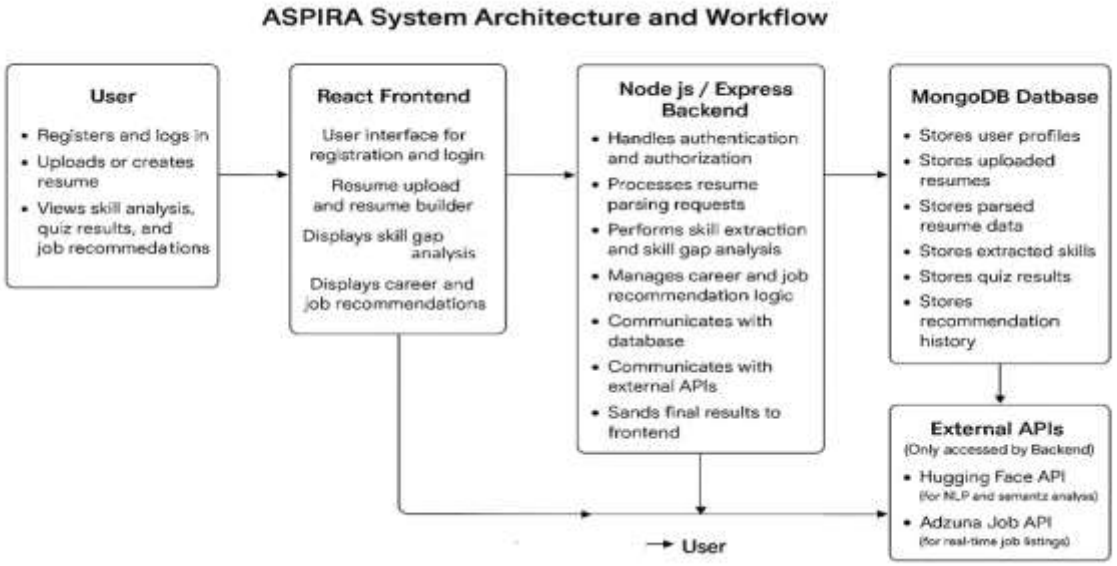

Fig. 1. End-to-End Workflow and Architecture of the Proposed ASPIRA Platform.

V. RESULTS AND DISCUSSION

The purpose of evaluating ASPIRA was to evaluate the effectiveness of AI-based resume-job matching and skill gap identification in contrast to conventional career guidance methods that focus on keywords. This experimental setup is focused on demonstrating whether the application of pre-trained NLP models and real-time integration into the job market via semantic analysis improves the relevance of recommendations and career guidance quality.

A. Experimental Design and Rationale

Initially, the experimental design was to test whether matching using semantic similarity made it more effective than traditional keyword matching methods. The ASPIRA system was utilized to manage user profiles and resumes, while the Adzuna Job API was used to obtain job listings. In addition, semantic similarity scores are calculated from vector embeddings generated by Hugging Face models between resumes and job descriptions. Job positions are ranked and recommended based on these scores.

Controlled sample datasets were used for evaluation purposes, with varying skill levels and controlled samples included. This was used to compare system output with older data in terms of relevance and accuracy.

B. Optimization Strategy

The system was optimized to enhance the relevance of recommendations by adjusting the similarity threshold used for job selection. They assessed different cosine similarity threshold to ensure the balance between recommendation range and precision.' A higher threshold ensured greater relevance but a lower number of recommendations, while lower levels increased coverage at the cost of relevance. Optimal threshold ranges were determined through empirical observation to ensure high precision and adequate diversity of recommendations.

Moreover, resume parsing and skill extraction were made more efficient to minimize noise in extracted features, which improved the accuracy of downstream skill gap analysis.

C. Validation Methodology

The evaluation of semantic relevance score and precision was carried out using quantitative metrics. A score of relevance is given to resume content that demonstrates cosine similarity, with values ranging from 0 to 1. Precision was used measure the proportion of relevant job recommendations and is defined as:

$$\text{Precision} = \text{Number of relevant job recommendations} \div \text{Total job recommendations}$$

System output against baseline keyword-based matching methods for comparative validation. It evaluated sample user profiles to exhibit comparative system behavior.

D. Result Analysis

The precision analysis indicates that ASPIRA recommends a greater number of relevant positions compared to traditional systems. This advancement highlights the value of semantic embedding over keyword-based filtering.

The perceived enhancements in relevance scores and accuracy support the decision to incorporate semantic NLP models into real-time job market data. The outcomes demonstrate that contextual resume-job matching reduces inconsistencies and increases recommendation effectiveness. By utilizing the same semantic framework, skill gaps are identified and suggestions for improvement vary according to the role. Despite the fact that the experiments were conducted on sample datasets, these trends demonstrate the feasibility and efficacy of the proposed method. By being a modular system, it can accommodate larger datasets and changing job market conditions.

A comparison of the accuracy of resume-job matching across three system types Keyword Based Matching, Conventional Job Portals, and the suggested ASPIRA platform is shown in Figure 2 The findings show that keyword-based matching has the lowest accuracy (55%), underscoring its shortcomings in comprehending semantic relevance and context. Due to rule-based heuristics and partial filtering mechanisms, traditional job portals perform somewhat better with 68% accuracy. ASPIRA, on the other hand, attains the highest accuracy of 85%, indicating the efficacy of vector-based relevance scoring and semantic NLP models. The system's ability to more accurately interpret candidate profiles and match them with job roles based on contextual suitability rather than surface-level keyword overlap is validated by this notable improvement.

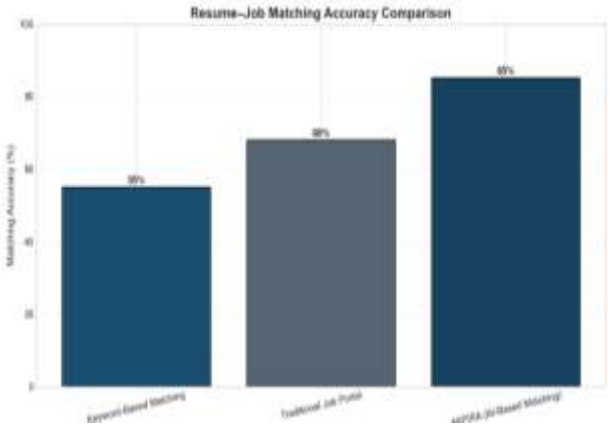

Fig. 2. Resume-Job Matching Accuracy Comparison

Figure 3 presents the skill gap distribution identified from user resumes, compared against current industry role requirements. The results indicate that Advanced Excel (40%) and SQL (35%) are the most frequently missing competencies, followed by core programming and communication skills at 28% each. Foundational areas such as Data Structures (22%) and Machine Learning Basics (18%) also reflect notable gaps. These findings highlight the need for targeted upskilling and support the system's objective of providing personalized guidance to improve employability.

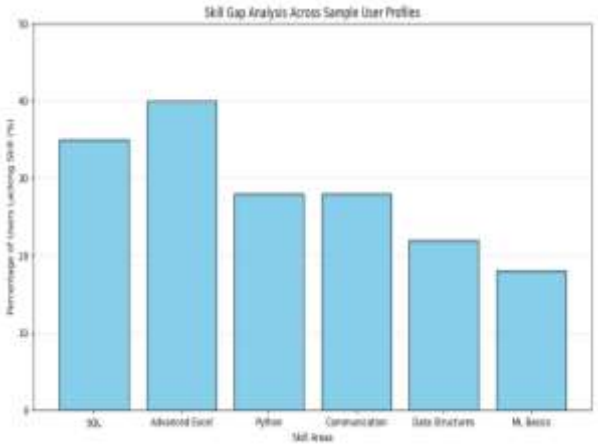

Fig. 3. Skill gap distribution

VI. CONCLUSION

By focusing on keyword-based matching, this research found that systemic barriers to effective career guidance are not addressed in the absence of dynamic job market requirements and individual skill profiles. This is particularly problematic for generic systems. This was primarily an experiment to see if artificial intelligence (AI)-based semantic analysis and real time job market data could be used to improve the relevance and quality of career recommendations.

The study suggests that ASPIRA surpasses traditional career guidance in terms of resume-job matching accuracy and precision. Pre-existing NLP models are used to conduct semantic similarity computation and identify the contextual relationships between resumes and job descriptions. Moreover, it incorporates real-time job listings to identify skill gaps and offer tailored recommendations for each role.

According to the results, AI-based career guidance platforms can significantly improve job placement by reducing disparities between candidate skills and industry demands. ASPIRA illustrates the potential to support informed career decisions and personalized skill development in rapidly changing job markets.

Limits exist for this study, such as the need to assess sample datasets and limited job roles. The performance of the system can fluctuate with the acquisition of larger and diverse datasets and across different domains.

Future work could involve increasing the size of the dataset, introducing new evaluation metrics, and improving personalization through adaptive learning mechanisms. Further integration with more advanced assessment and recommendation modules may also improve the platform's effectiveness.

Finally, ASPIRA is a practical and adaptable AI-driven tool for modern career guidance that emphasizes the importance of semantic intelligence and real-time data integration in enhancing career planning results.

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