

INTELLIGENT RESUME ANALYSIS AND CAREER RECOMMENDATION SYSTEM

Dasari Surya Sai

Department of Cyber Security, School of Engineering and Technology, Dhanalakshmi Srinivasan University, Samayapuram Campus, Tiruchirappalli, Tamil Nadu – 621112, India
Email: suryasaihanuma6801@gmail.com

Konduri Thrinath

Department of Cyber Security, School of Engineering and Technology, Dhanalakshmi Srinivasan University, Samayapuram Campus, Tiruchirappalli, Tamil Nadu – 621112, India
Email: okthrinath@gmail.com

Kottapalli Amara lingeswara chari

Department of Cyber Security, School of Engineering and Technology, Dhanalakshmi Srinivasan University, Samayapuram Campus, Tiruchirappalli, Tamil Nadu – 621112, India
Email: kottapalliamar339@gmail.com

Guided by: Dr.V.Ravindra Krishna

Head of the Department of Cyber Security, School of Engineering and Technology, Dhanalakshmi Srinivasan University, Samayapuram Campus, Tiruchirappalli, Tamil Nadu – 621112, India

Abstract— Career Path AI is an AI-based career guidance and resume analysis system designed to assist engineering students in identifying suitable job roles and career opportunities. The system enables users to upload their resumes, which are analyzed using artificial intelligence and natural language processing techniques to extract key information such as skills, projects, certifications, and experience. Based on this analysis, the platform identifies the user's domain and recommends relevant job roles along with suitable applications aligned with current industry requirements. Additionally, the system considers user interests and preferred roles to provide personalized career recommendations. It also highlights skill gaps and suggests areas for improvement. With a simple and user-friendly interface, Career Path AI allows smooth interaction and efficient navigation. Overall, the system supports informed decision-making and helps students build a structured and confident career path.

Index Terms: Resume Analysis, Career Recommendation, Artificial Intelligence, NLP, Skill Gap Analysis, Job Matching

1. INTRODUCTION

The rapid growth of the technology industry has created a wide range of career opportunities for engineering students. However, many students struggle to choose the right career path due to a lack of personalized guidance and limited understanding of their skills and domain expertise. They often rely on generic job portals or peer suggestions, which may not align with their actual abilities and interests. Traditional career guidance methods, such as manual resume screening and counseling services, have several limitations. Manual processes are time-consuming and inconsistent, while job portals provide generic recommendations without analyzing individual profiles. Additionally, professional counseling can be expensive and not accessible to all students. To address these challenges, Career Path AI introduces an intelligent system that provides personalized career guidance using Artificial Intelligence. The system analyzes student resumes to extract key information such as skills, projects, and experience, and maps them to relevant industry job roles. By combining resume analysis with user preferences, the platform helps students identify suitable career paths, understand their strengths, and recognize skill gaps. It also provides clear recommendations, enabling students to improve their skills and increase their employability in a structured and informed manner.

2. LITERATURE REVIEW

A. Traditional Career Guidance Systems

Traditional career guidance systems have been widely used across educational institutions, job portals, and career counseling platforms. These systems primarily focus on providing users with access to job listings, basic career paths, and general industry information. However, they often lack depth when it comes to understanding individual users. Most of these

systems operate using static databases and predefined categories, which means they are not designed to adapt to the unique background of each student. They typically do not analyze a student's academic performance, project experience, technical skills, or personal interests in a meaningful way. As a result, the recommendations provided are often generic and not tailored to the user's actual profile.

Another major limitation is the absence of intelligent resume analysis. These platforms usually do not extract meaningful insights from resumes such as skill gaps, strengths, or domain alignment. Instead, they treat all users similarly, without considering differences in specialization such as Artificial Intelligence, Data Science, Web Development, or Core Engineering fields.

Additionally, traditional systems tend to ignore important factors like user interests, career goals, and preferred domains. For example, a student interested in Machine Learning might still receive suggestions related to unrelated roles like marketing or general IT support due to the lack of personalization. Because of these limitations, students often receive irrelevant or low-quality job recommendations. This not only wastes time but also creates confusion and frustration, making it harder for them to make informed career decisions.

B. Resume Screening Systems

Resume screening systems were introduced to automate the recruitment process and reduce the workload of human recruiters. These systems are commonly used by companies to filter large volumes of applications quickly. While they improve efficiency, they come with several drawbacks. Most resume screening systems rely heavily on keyword matching techniques. They scan resumes for specific words or phrases that match the job description. If the keywords are present, the candidate is shortlisted; if not, the resume is rejected. This approach is very limited because it does not truly understand the context or depth of a candidate's skills. For instance, a student with strong practical knowledge in Machine Learning but without exact keyword matches in their resume might get rejected, while another candidate with superficial knowledge but better keyword placement may get selected. This highlights the lack of true intelligence in such systems.

Another major limitation is the absence of domain identification. These systems do not effectively recognize the candidate's specialization or expertise area. They fail to distinguish between closely related fields such as Data Science, AI, and Data Analytics, leading to inaccurate filtering. Moreover, resume screening systems are purely focused on selection rather than guidance. They do not provide any feedback to the candidate regarding skill gaps, improvement areas, or career direction. Students are left without insights on how to improve their profiles or align themselves with industry requirements.

C. AI-Based Recommendation Systems

With advancements in Artificial Intelligence, modern career guidance platforms have started incorporating AI-based recommendation systems. These systems aim to provide smarter and more dynamic suggestions by analyzing user data. However, despite these improvements, several challenges still remain. Many existing AI-based systems are not specifically designed for students or fresh graduates. Instead, they are built for general users or experienced professionals, which makes them less effective for beginners who need structured guidance and skill-building recommendations. Another key issue is the lack of integration between resume analysis and user preferences. While some systems analyze resumes and others consider user interests, very few combine both aspects effectively. This results in incomplete recommendations that do not fully reflect the user's profile.

For example, a system might suggest jobs based on resume skills but ignore the user's interest in a specific domain like AI research or startup building. Similarly, it might recommend career paths based on interests without considering whether the user has the required skills or qualifications. A significant limitation of current AI systems is the lack of explainability. Many platforms provide recommendations without clearly explaining why a particular job or career path was suggested. This reduces user trust and makes it difficult for students to understand the reasoning behind the suggestions. Without transparency, students cannot learn from the system or improve their profiles strategically. They are simply given outputs without guidance on how to reach their desired career goals.

3. EXISTING SYSTEM

Current career guidance systems and job portals are primarily designed to provide job listings and basic career information to users. These platforms generally rely on manual resume screening and predefined filtering mechanisms to match candidates with available job opportunities. In most cases, users are required to search and apply for jobs based on their own understanding, without receiving intelligent or personalized recommendations.

Some existing systems incorporate basic automation techniques such as keyword-based resume filtering. These systems scan resumes for specific keywords that match job descriptions and shortlist candidates accordingly. However, this approach lacks the ability to understand the context, relevance, and depth of a candidate's skills and experience. Furthermore, these platforms do not effectively analyze important aspects such as user interests, domain specialization, or career goals. As a result, the recommendations provided are often generic and not aligned with the individual profile of the student. Most systems are designed for general job seekers and do not specifically cater to the needs of engineering students or fresh graduates who require structured guidance.

3.1. Limitations of Existing System

1. Lack of Personalization

Existing platforms provide generic job recommendations without considering individual skills, interests, and career aspirations. This results in irrelevant suggestions that do not match the user's profile.

2. Inefficient Resume Analysis

Most systems rely on basic keyword matching and do not utilize advanced Artificial Intelligence (AI) or Natural Language Processing (NLP) techniques. This limits their ability to extract meaningful insights from resumes.

3. No Domain Identification

The systems fail to accurately identify a candidate's area of specialization, such as Artificial Intelligence, Data Science, or Web Development, leading to improper career recommendations.

4. Absence of Skill Gap Analysis

Users are not provided with feedback on missing skills or guidance on how

to improve their profiles. This prevents students from understanding what is required to achieve their desired career path.

5. Limited Student-Centric Approach

Most platforms are not specifically designed for students or fresh graduates. They do not address challenges such as lack of experience, need for career direction, and structured learning paths.

4. PROPOSED METHODOLOGY

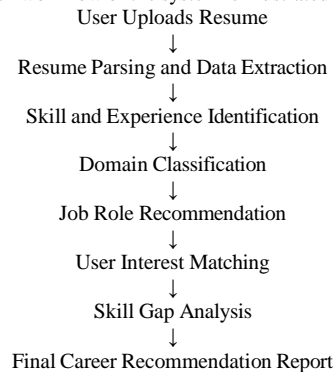
4.1 System Architecture

The proposed Career Path AI system is designed as a modular framework that integrates multiple components to deliver personalized career guidance. The architecture consists of the following core modules:

- **Resume Analysis Module:** This module processes user-uploaded resumes and extracts key information such as technical skills, projects, certifications, and work experience using Natural Language Processing (NLP) techniques.
- **Domain Identification Module:** Based on the extracted information, this module classifies the user into a specific domain such as Artificial Intelligence, Data Science, or Web Development.
- **Recommendation Engine:** This component maps user profiles to relevant job roles and career paths by analyzing industry requirements and skill relevance.
- **User Preference Module:** It incorporates user-defined interests and preferred career roles to refine and personalize the recommendations.
- **Skill Gap Analysis Module:** This module identifies missing or required skills for targeted job roles and provides actionable suggestions for improvement.

System Workflow

The overall workflow of the system is illustrated as follows:



4.2 Dataset and Processing

The system operates on user-uploaded resumes in formats such as PDF and DOCX. The extracted dataset includes:

- Technical skills
- Projects
- Certifications
- Work experience

Natural Language Processing (NLP) techniques are applied to preprocess the data, including text cleaning, tokenization, and information extraction. The processed data is then structured to enable accurate analysis and decision-making.

4.3 Training and Analysis Approach

The proposed system utilizes AI-based models to perform the following tasks:

- Identification of relevant skills and entities from resumes

- Classification of users into appropriate technical domains
- Mapping of user profiles to suitable industry job roles

The recommendation engine is designed to adapt dynamically by incorporating updated industry trends, ensuring that the suggested career paths remain relevant and aligned with current market demands.

4.4 Performance Evaluation

The performance of the system is evaluated using the following metrics:

Metric	Description
Accuracy	Measures correctness of job role recommendations
Relevance	Evaluates alignment between user profile and roles
Efficiency	Assesses time taken for resume analysis
User Satisfaction	Based on feedback from users

The system aims to deliver highly accurate and relevant career recommendations while maintaining low processing time and high user satisfaction.

5. DEPLOYMENT AND BUSINESS INSIGHT MODULE

Deployment and Career Insights Module

The system is deployed as a web-based application, enabling users to access personalized career guidance efficiently.

Features

- Upload resumes (PDF/DOCX)
- Receive instant career recommendations
- View extracted skills and domain identification
- Analyze skill gaps

Outputs

- Recommended Job Roles
- Domain Identification
- Skill Gap Analysis
- Suggested Learning Paths

6. CHALLENGES

- Key challenges faced during development include:
- Accurate extraction of data from different resume formats
- Handling diverse skill representations
- Maintaining recommendation accuracy

- Keeping system updated with changing industry trends
- Ensuring scalability and performance

7. CONCLUSION AND FUTURE WORK

- Integration with real-time job portals
- Advanced AI models for improved accuracy
- Personalized learning path recommendations
- Mobile application support
- Real-time career tracking and analytics

REFERENCES

- [1] T. Mikolov, I. Sutskever, K. Chen, G. Corrado, and J. Dean, "Distributed Representations of Words and Phrases and their Compositionality," in Proc. Advances in Neural Information Processing Systems (NIPS), 2013.
- [2] J. Devlin, M.-W. Chang, K. Lee, and K. Toutanova, "BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding," in Proc. NAACL-HLT, 2019.
- [3] S. Bird, E. Klein, and E. Loper, "Natural Language Processing with Python," O'Reilly Media, 2009.
- [4] D. Jurafsky and J. H. Martin, "Speech and Language Processing," 2nd ed., Pearson, 2008.
- [5] F. Chollet, "Deep Learning with Python," Manning Publications, 2017.
- [6] A. Kulkarni and A. Desai, "Resume Parsing and Job Recommendation System using Machine Learning," in Proc. International Conference on Computing and Communication, 2020.
- [7] P. S. Hiremath and S. S. Manjunath, "Automated Resume Classification System using NLP," International Journal of Computer Applications, vol. 182, no. 10, 2018.
- [8] LinkedIn Corporation, "Global Talent Trends Report," 2023.
- [9] World Economic Forum, "The Future of Jobs Report," 2023.
- [10] K. Goyal, R. Gupta, and N. Kumar, "Career Recommendation System using Machine Learning Techniques," in Proc. IEEE International Conference on Intelligent Systems, 2021.
- [11] A. Raj, S. Jain, and P. Sharma, "Skill Gap Analysis and Career Prediction using AI," International Journal of Engineering Research & Technology (IJERT), 2022.
- [12] IBM, "Artificial Intelligence and Career Matching Systems," IBM Research Report, 2022.