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GENERATIVE AI-BASED RESUME SCREENING AND JOB RECOMMENDATION ASSISTANT

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Abstract

The recruitment process has become increasingly challenging because organizations receive a large number of resumes for every job opening. Traditional resume screening methods depend heavily on manual review, keyword matching, and predefined filtering criteria, which can be time-consuming and inconsistent. Recruiters may spend considerable effort identifying suitable candidates from large applicant pools, while qualified candidates can sometimes be overlooked because their resumes use different terminology from the job description. The Generative AI-Based Resume Screening and Job Recommendation Assistant is proposed to address these challenges by using artificial intelligence and natural language processing to automate resume analysis and job recommendation.

The proposed system uses Generative AI and Natural Language Processing techniques to understand the semantic meaning of resumes and job descriptions rather than relying only on exact keyword matches. Resumes can be uploaded in formats such as PDF or DOCX, after which the system extracts relevant information including educational qualifications, technical skills, soft skills, certifications, work experience, projects, and professional interests. The extracted information is structured into a candidate profile that can be compared with available job requirements.

The system calculates the relevance between candidate profiles and job descriptions using semantic similarity, skill matching, experience analysis, and qualification comparison. A Generative AI component can provide an explanation of why a particular job is recommended and identify missing or desirable skills for a candidate. This makes the system more informative than conventional ranking mechanisms because users can understand the reasoning behind recommendations and improve their resumes or skills accordingly.

The system can also provide personalized job recommendations based on a candidate's skills, qualifications, experience, preferred role, and other available profile information. Recruiters can use the screening functionality to prioritize potentially suitable candidates, while job seekers can use the recommendation functionality to discover positions aligned with their profiles. The system can therefore serve both candidate-oriented and recruiter-oriented recruitment workflows.

I. Introduction

Recruitment is an important process for organizations because selecting suitable employees directly affects productivity, innovation, and business performance. In

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conventional recruitment, recruiters manually examine resumes and compare candidate qualifications with job requirements. When hundreds or thousands of applications are received, manually reviewing every resume becomes difficult and time-consuming. The increasing availability of online job portals and digital recruitment platforms has further increased the volume of candidate applications, creating a strong need for automated and intelligent screening solutions.

Traditional automated resume screening systems generally use keyword matching and predefined rules to identify candidates. Although these methods can quickly filter large numbers of resumes, they may fail to understand the context and semantic relationships between words. For example, a resume mentioning "machine learning development" may be relevant to a job requiring "AI model development" even when the exact keywords are different. Similarly, candidates may possess transferable skills that cannot be identified effectively through simple keyword-based filtering.

Generative AI and Large Language Models provide new opportunities for improving recruitment systems. These models can process unstructured text, understand contextual relationships, summarize information, and generate human-readable explanations. When applied to resume screening, Generative AI can identify relevant candidate attributes from unstructured resumes and compare them with job requirements. Natural Language Processing can additionally support entity extraction, skill identification, education analysis, and experience interpretation.

The proposed Generative AI-Based Resume Screening and Job Recommendation Assistant combines these capabilities into a unified system. The assistant analyzes a candidate's resume, extracts important information, creates a structured candidate profile, and compares it with available job descriptions. It can then rank jobs according to their relevance and recommend suitable positions. For recruiters, the same technology can assist in screening and prioritizing candidates according to job-specific requirements.

The system is designed not only to produce a match score but also to provide meaningful insights. It can identify matching skills, missing skills, relevant experience, and areas where a candidate may improve. By providing personalized recommendations and explanations, the proposed system can support more informed recruitment decisions. The overall objective is to improve efficiency while keeping human recruiters involved in important hiring decisions.

II. Literature Survey

Early automated recruitment systems primarily relied on keyword-based information retrieval and rule-based filtering. These systems extracted words from resumes and compared them with keywords contained in job descriptions. Such approaches provided a relatively simple way to process large candidate pools, but their effectiveness was strongly dependent on the quality of keywords and manually designed rules. They often struggled with synonyms, contextual meanings, transferable skills, and differences in resume writing styles.

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Natural Language Processing introduced more sophisticated approaches for recruitment-related text analysis. NLP techniques can be used to identify entities such as skills, organizations, educational qualifications, job titles, certifications, and work experience. Named Entity Recognition, text classification, information extraction, and semantic analysis have therefore become useful components of intelligent recruitment systems. These approaches allow resumes to be transformed from unstructured documents into structured candidate profiles.

Machine-learning-based recruitment systems have also been developed to rank candidates according to their similarity to job requirements. Classification and ranking algorithms can learn relationships between candidate attributes and job categories. However, traditional machine-learning models generally require carefully prepared training datasets and may have difficulty adapting to rapidly changing job roles and skill requirements. This has motivated research into more flexible semantic and language-model-based approaches.

Transformer-based language models and Large Language Models have significantly improved the ability of AI systems to understand long and complex textual information. Modern language models can interpret resumes and job descriptions semantically, summarize candidate profiles, and identify relationships between skills and job responsibilities. Research into LLM-based recruitment systems has explored resume parsing, candidate-job matching, personalized career guidance, and automated recruitment assistance. These systems demonstrate the potential of generative models to move recruitment beyond simple keyword matching.

Another important research direction is personalized job recommendation. Recommendation systems can use candidate profiles, skills, previous experience, preferences, and job characteristics to rank available opportunities. Semantic embeddings can represent both candidates and job descriptions in a common vector space, allowing jobs to be recommended according to contextual similarity. Hybrid approaches can combine semantic similarity with explicit skill matching and other constraints to improve recommendation quality.

Recent research also emphasizes fairness, explainability, privacy, and human oversight in AI-assisted recruitment. Automated systems can potentially reproduce biases present in historical recruitment data or introduce new forms of unfair filtering. Therefore, responsible recruitment systems should provide transparent reasoning, protect candidate information, allow human review, and avoid treating an automated score as the sole basis for employment decisions. The proposed system incorporates these principles by positioning Generative AI as a decision-support component rather than a replacement for human recruitment judgment.

III. System Analysis

The proposed system analyzes resumes and job descriptions using an integrated Generative AI and Natural Language Processing pipeline. The system first receives a candidate resume through a web-based interface. The uploaded document is processed using a document extraction component that identifies readable text and relevant

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sections. NLP techniques are then applied to extract skills, education, experience, certifications, projects, and other important candidate attributes. A structured candidate profile is created from the extracted information. Job descriptions are processed using a similar approach to identify required skills, qualifications, responsibilities, and experience levels. The system converts candidate and job information into semantic representations using language-model-based embeddings. A matching engine compares the candidate profile with available job profiles using semantic similarity and explicit skill matching. The recommendation component ranks suitable jobs according to their calculated relevance. Generative AI produces explanations describing matching skills, missing requirements, and recommendation reasons. The final results are displayed through a user-friendly dashboard. The system can continuously improve its recommendation quality through feedback and evaluation of matching results.

Existing System

Existing resume screening systems generally use manual recruitment, keyword-based filtering, Applicant Tracking Systems, and basic job recommendation mechanisms. In manual recruitment, recruiters read resumes individually and determine whether candidates satisfy job requirements. Applicant Tracking Systems automate some parts of the process by extracting keywords and applying predefined filtering rules. Keyword-based systems search for specific technologies, qualifications, job titles, and experience terms in candidate resumes. Although these systems are faster than completely manual screening, they may not understand the semantic meaning of resume content. A candidate may be rejected when a required skill is expressed using a synonym or a different technical term. Existing systems may also provide limited explanations about why a candidate was selected or rejected. Many traditional recommendation systems depend primarily on explicit profile fields and historical interactions. They may not fully understand the relationship between candidate experience and job responsibilities. Furthermore, conventional systems generally provide limited personalized skill-gap analysis. Recruiters may still need to manually investigate shortlisted candidates. These limitations create opportunities for a more intelligent, semantic, and Generative-AI-powered recruitment assistant.

Disadvantages of Existing System

- Heavy dependence on manual resume screening.
- Time-consuming when application volume is high.
- Keyword matching can miss semantically relevant candidates.
- Difficulty understanding synonyms and related skills.
- Limited understanding of candidate context.
- Predefined rules may become outdated.
- Limited personalized job recommendations.
- Recruiters may need to manually verify shortlisted candidates.
- Traditional systems may provide rigid filtering rather than intelligent assistance.

Proposed System

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The proposed system introduces a Generative AI-based assistant capable of understanding resumes and job descriptions semantically. The system begins by accepting resumes through a secure user interface and extracting their textual content. An NLP processing module identifies important information such as technical skills, soft skills, education, certifications, projects, job roles, and professional experience. The extracted information is transformed into a structured candidate profile. Job descriptions are processed using the same pipeline to identify required qualifications, skills, responsibilities, and experience. A semantic matching engine compares candidate profiles with job requirements using embeddings and similarity techniques. The system combines semantic similarity with explicit skill and qualification matching to calculate job relevance. Generative AI is then used to explain why specific jobs are suitable for the candidate. The system can identify skills that match the position as well as important skills that are missing. A recommendation engine ranks available jobs according to their suitability for the candidate. Recruiters can also use the system to rank candidates against a particular job description. The system presents results through an interactive dashboard containing match scores, recommended jobs, candidate summaries, and skill-gap information. Human users remain responsible for final recruitment decisions, while the AI system provides intelligent assistance and evidence-based recommendations.

Advantages of Proposed System

- Automates major parts of resume screening.
- Saves recruiter time and effort.
- Uses semantic understanding instead of only keyword matching.
- Identifies related and transferable skills.
- Provides personalized job recommendations.
- Generates explanations for recommendations.
- Supports automated skill-gap analysis.
- Processes large numbers of resumes efficiently.
- Provides structured candidate profiles.
- Supports recruiter-oriented candidate ranking.
- Can adapt to different job categories and domains.
- Improves candidate-job matching.
- Provides a user-friendly recruitment dashboard.
- Supports human-in-the-loop decision making.

IV. Methodology

The methodology of the proposed system consists of several sequential stages for intelligent resume analysis and job recommendation. The first stage is **resume collection**, where candidates upload their resumes through the application interface. In the second stage, the system performs document preprocessing and extracts text from supported file formats. The extracted text is cleaned and divided into meaningful sections such as education, skills, experience, projects, and certifications. NLP techniques and Generative AI are then used to identify important entities and construct a structured candidate profile. In parallel, job descriptions are collected and processed to extract required skills, qualifications, responsibilities, and experience.

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Both candidate profiles and job descriptions are transformed into semantic embeddings using a suitable language model. The matching engine calculates similarity between candidate and job representations while also checking explicit skills and qualifications. A recommendation algorithm ranks jobs based on their overall relevance to the candidate. Generative AI generates an understandable explanation for each recommendation and identifies potential skill gaps. The results are displayed through a dashboard containing recommended jobs, matching skills, missing skills, and relevance scores. Feedback from users can be used to evaluate and improve the recommendation process. Human recruiters can review AI-generated results before making final employment decisions.

System Architecture

The system architecture consists of multiple interconnected layers including the User Interface, Document Processing Layer, NLP and Generative AI Layer, Candidate Profile Database, Job Database, Semantic Embedding Module, Matching Engine, Recommendation Engine, Explanation Module, and Results Dashboard. The candidate first uploads a resume through the web-based user interface. The document processing layer extracts and preprocesses the resume content before sending it to the NLP module. The NLP and Generative AI layer identifies skills, education, experience, certifications, projects, job roles, and other relevant information. These attributes are stored as a structured candidate profile in the candidate database. At the same time, job descriptions are collected and processed to create structured job profiles containing requirements, responsibilities, skills, and qualifications. The embedding module converts both candidate and job profiles into semantic vector representations. The matching engine calculates the relevance between candidates and available jobs using semantic similarity, skill matching, qualification matching, and experience compatibility. The recommendation engine ranks jobs according to their calculated suitability. The Generative AI explanation module produces human-readable reasons for each recommendation and identifies matching and missing skills. The final results are presented through the dashboard to candidates or recruiters. A feedback and evaluation component can collect user responses and matching outcomes for continuous improvement. The architecture therefore creates an end-to-end pipeline from **resume upload → information extraction → semantic analysis → candidate-job matching → recommendation → explanation → final results**.

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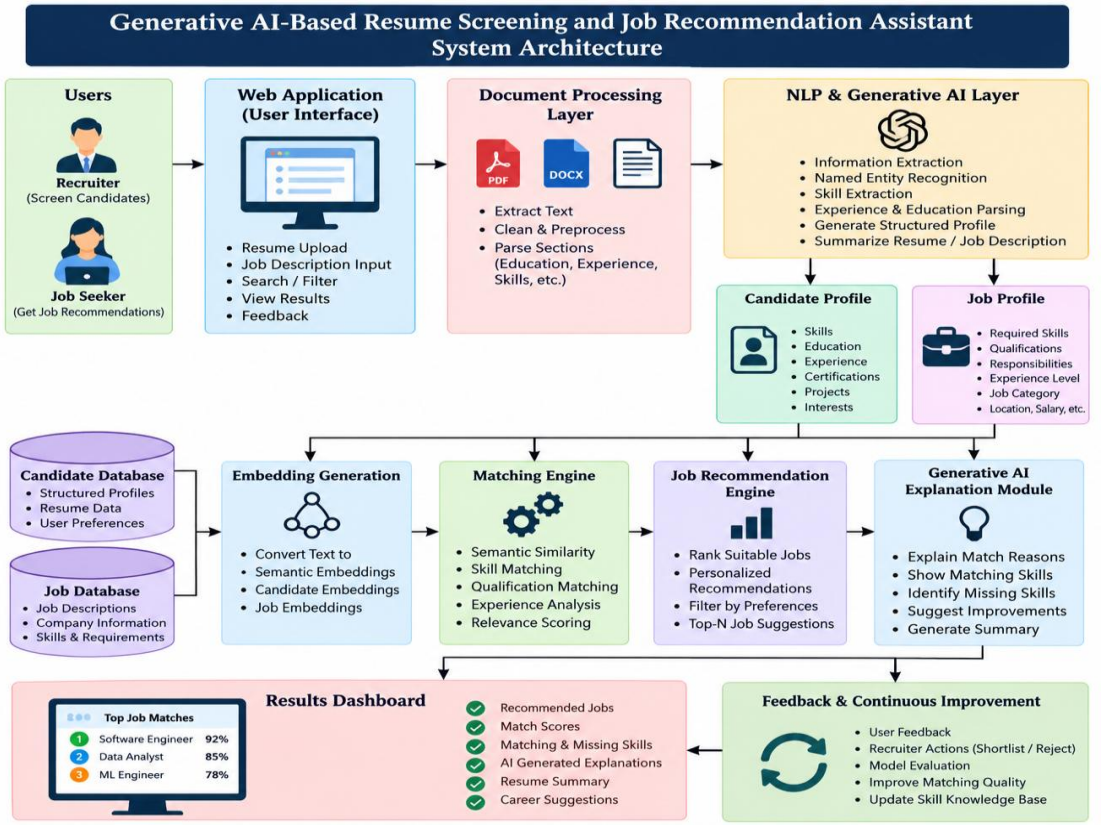
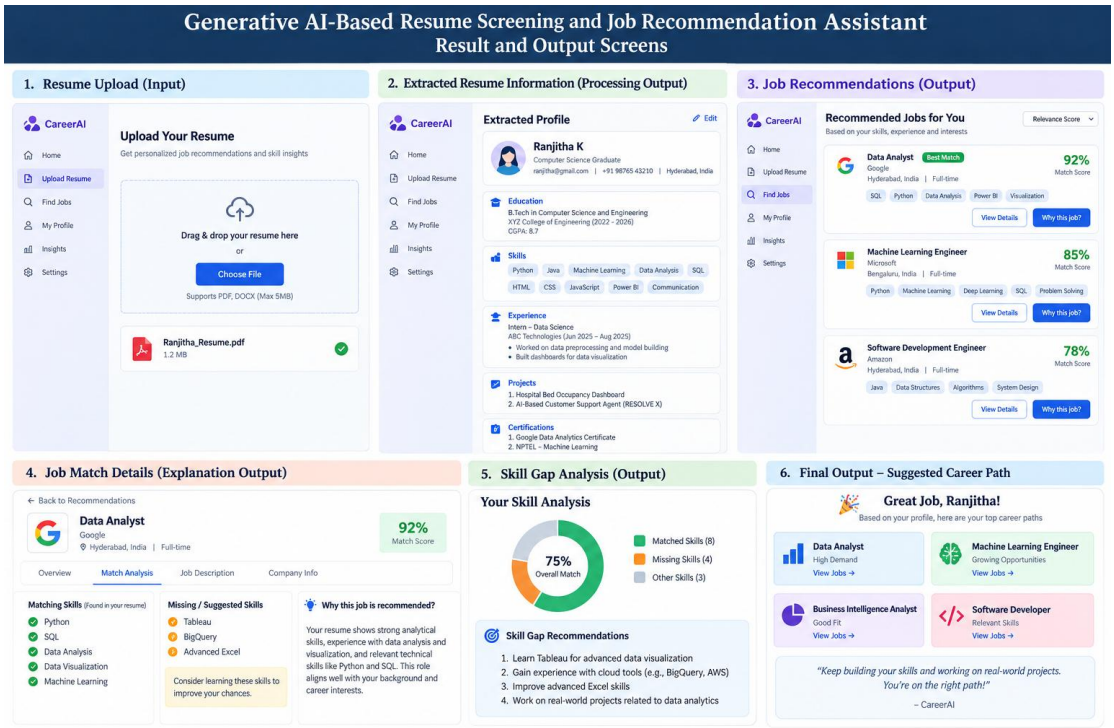


V. Result and Output



VI. Conclusion

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The Generative AI-Based Resume Screening and Job Recommendation Assistant provides an intelligent and efficient solution for modern recruitment challenges. The proposed system uses Generative AI, Natural Language Processing, semantic analysis, and recommendation techniques to analyze resumes and understand job requirements beyond simple keyword matching. By automatically extracting skills, qualifications, education, projects, certifications, and experience, the system creates structured candidate profiles that can be effectively compared with available job opportunities.

The system improves the recruitment process by automating repetitive resume-screening activities and ranking candidates or jobs according to their relevance. Its semantic matching capability enables it to identify related skills and meaningful relationships between candidate profiles and job descriptions. The recommendation module provides personalized job suggestions, while the Generative AI explanation component helps users understand matching skills, missing skills, and the reasons behind particular recommendations.

The proposed assistant also supports skill-gap analysis, allowing candidates to identify areas that require improvement and make better career-development decisions. Recruiters can use the system to reduce screening time and prioritize potentially suitable candidates.

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