

Scientiarum: A Multidisciplinary Journal
Vol. 2 No. S1 (2026): Supplement Issue
DOI: 10.54646/SAPARS.2026.78

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RESUMEXTRACT: AI-POWERED CANDIDATE INTELLIGENCE AND ASSESSMENT SYSTEM

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Abstract

Recruitment processes involve several time-consuming activities, including resume screening, candidate profiling, job matching, technical assessment, identity verification, and candidate comparison. Traditional recruitment workflows often depend on manual screening and separate tools, which can increase processing time and make systematic comparison of candidates difficult. Recent research has demonstrated the potential of Natural Language Processing (NLP), machine learning, semantic similarity, and Large Language Models (LLMs) for improving individual recruitment activities. However, many existing approaches concentrate on a particular stage, such as resume classification or job recommendation.

This paper presents ResumeXtract, an AI-powered candidate for intelligence and assessment system designed to integrate multiple recruitment activities within a single web-based platform. The system extracts information from resumes, generates structured candidate profiles using AI, analyzes skills and experience, performs job matching, identifies skill gaps, conducts technical assessments, and supports identity

verification during online assessments. The platform also provides separate workflows for candidates, recruiters, and administrators. A modular architecture is used to separate authentication, resume processing, AI analysis, job matching, assessment management, identity verification, and recruitment administration. The system was implemented and tested as an academic prototype, and the major workflows demonstrated the intended functionality. The study identifies the limitations of current approaches and shows how an integrated system can address the gap between resume analysis, candidate evaluation, and recruitment management while retaining human involvement in final recruitment decisions.

Keywords: *Artificial Intelligence; Resume Analysis; Candidate Profiling; Job Matching; Skill Gap Analysis; Candidate Assessment.*

Introduction

Recruitment organizations receive large numbers of applications for different job roles. Reviewing resumes, identifying relevant qualifications, comparing applicants, conducting assessments, and maintaining candidate information can therefore become time-consuming when performed manually. Traditional recruitment systems may also use keyword-based filtering, which can fail to capture the contextual relationship between a candidate's experience and the requirements of a job.

Recent developments in artificial intelligence have created opportunities for automating several recruitment activities. NLP-based systems can extract and classify information from resumes, while semantic matching techniques can compare candidate profiles with job descriptions beyond exact keyword matching. More recent research has also explored LLMs for resume screening, candidate ranking, and recruitment support. For example, Resume Atlas investigated large-scale resume classification using BERT and Gemma-based models, while other recent studies have

examined semantic job matching and LLM-based recruitment frameworks. However, recruitment is not limited to resume screening. After screening, organizations may need to assess technical knowledge, verify candidate identity, compare assessment performance, and manage candidate information. These activities are frequently handled through separate applications or manual processes. To address this issue, ResumeXtract was developed as an integrated candidate intelligence and assessment system. The proposed system combines resume processing, AI-based candidate profiling, job matching, skill-gap identification, technical assessment, identity verification, and recruitment management in one platform.

The objective is not to replace recruiters but to provide structured information and automated assistance so that recruiters can review candidates more systematically while retaining human involvement in final decisions.

Problem Statement

Traditional recruitment workflows face several challenges:

- Manual resume screening: Recruiters may need to examine large numbers of resumes individually.
- Unstructured resume information: Resumes are available in different formats and contain information in different structures.
- Keyword-based limitations: Exact keyword matching may not fully represent the semantic relationship between candidate qualifications and job requirements.
- Candidate comparison: Comparing education, skills, experience, projects, and assessment of performance manually can be difficult.
- Separate recruitment activities: Resume screening, job matching, assessments,

and candidate management may be performed using different tools.

- ➢ Assessment management: Technical assessments require candidate assignment, submission handling, scoring, and result tracking.
- ➢ Online identity verification: Remote assessments require mechanisms for verifying that the registered candidate is participating.
- ➢ Skill-gap identification: Candidates may need information about missing skills and possible areas for improvement.
- ➢ Recruitment administration: Recruiters and administrators require centralized information for managing jobs, candidates, assessments, and recruitment activities.

Therefore, there is a need for an integrated system that can process candidate information, support AI-assisted evaluation, perform job matching, conduct assessments, and provide recruitment management features through a common platform.

Literature Review

Recent studies have explored the use of Artificial Intelligence (AI), Natural Language Processing (NLP), Large Language Models (LLMs), and semantic techniques in recruitment and candidate assessment.

Heakl et al. (2024) proposed ResuméAtlas, a large-scale resume classification system using transformer-based and LLM techniques. The study demonstrated the potential of AI for automated resume processing and classification. This work highlighted the importance of using advanced language models to handle large volumes of resumes.

Lo et al. (2025) developed an LLM-based multi-agent framework for resume screening that performs resume extraction, candidate evaluation, summarization, and score generation. This study showed how LLMs can support context-aware and

structured candidate evaluation.

Ajjam and Al-Raweshidy (2026) proposed a semantic similarity-based job matching framework to overcome the limitations of traditional keyword matching. The study highlighted the importance of semantic analysis for improving candidate-job compatibility.

Mohamed et al. (2025) investigated the use of LLMs for automated programming-assignment evaluation. The study demonstrated the potential of AI for technical assessment while highlighting the need for appropriate evaluation and human verification.

From the above studies, it was observed that existing research mainly focuses on individual areas such as resume classification, resume screening, job matching, and technical assessment. There is limited integration of these functions into a single recruitment workflow. Therefore, ResumeXtract integrates resume processing, AI-based candidate profiling, job matching, skill-gap analysis, technical assessment, identity verification, and recruitment management within a single web-based platform.

Proposed System Architecture

The ResumeXtract system follows a layered architecture that integrates user interaction, application services, AI-based processing, data storage, and external services. The architecture is designed to support the complete recruitment and candidate assessment workflow.

The Users Layer consists of three main users: Candidate, Recruiter, and Administrator. Candidates can register, upload resumes, apply for jobs, take assessments, and view results. Recruiters can post jobs, review candidates, manage assessments, and compare candidate information. Administrators manage users, monitor the system, and generate reports.

The Presentation Layer provides separate web interfaces for candidates, recruiters, and administrators. The candidate interface includes profile management, resume upload, dashboard, assessments, and results. The recruiter interface provides job management, candidate search, comparison, and reports, while the administrator interface provides user management, analytics, and system settings.

The Application/Service Layer contains the main modules and business logic of the system. It includes authentication, resume processing, AI analysis, job matching, assessment, identity verification, and recruitment management modules. These modules handle tasks such as resume processing, candidate profiling, compatibility analysis, technical assessment, facial verification, and candidate management.

The AI and Processing Layer provides intelligent capabilities to the system. The NLP engine supports resume text extraction and understanding, while machine learning techniques support matching and prediction. LLM integration is used for candidate analysis and summarization, and computer vision is used for face detection and identity verification.

The Data Layer stores important system information such as users, candidates, resumes, jobs, applications, assessments, evaluation records, and verification information. This layer provides centralized data storage for the different modules of ResumeXtract.

The External Integration Layer connects the system with cloud services, external APIs, third-party platforms, and security services. These integrations can support scalable deployment, additional AI services, recruitment platforms, and data protection.

This layered architecture allows ResumeXtract to combine resume analysis, job matching, technical assessment, identity verification, and recruitment management

within a single web-based platform.

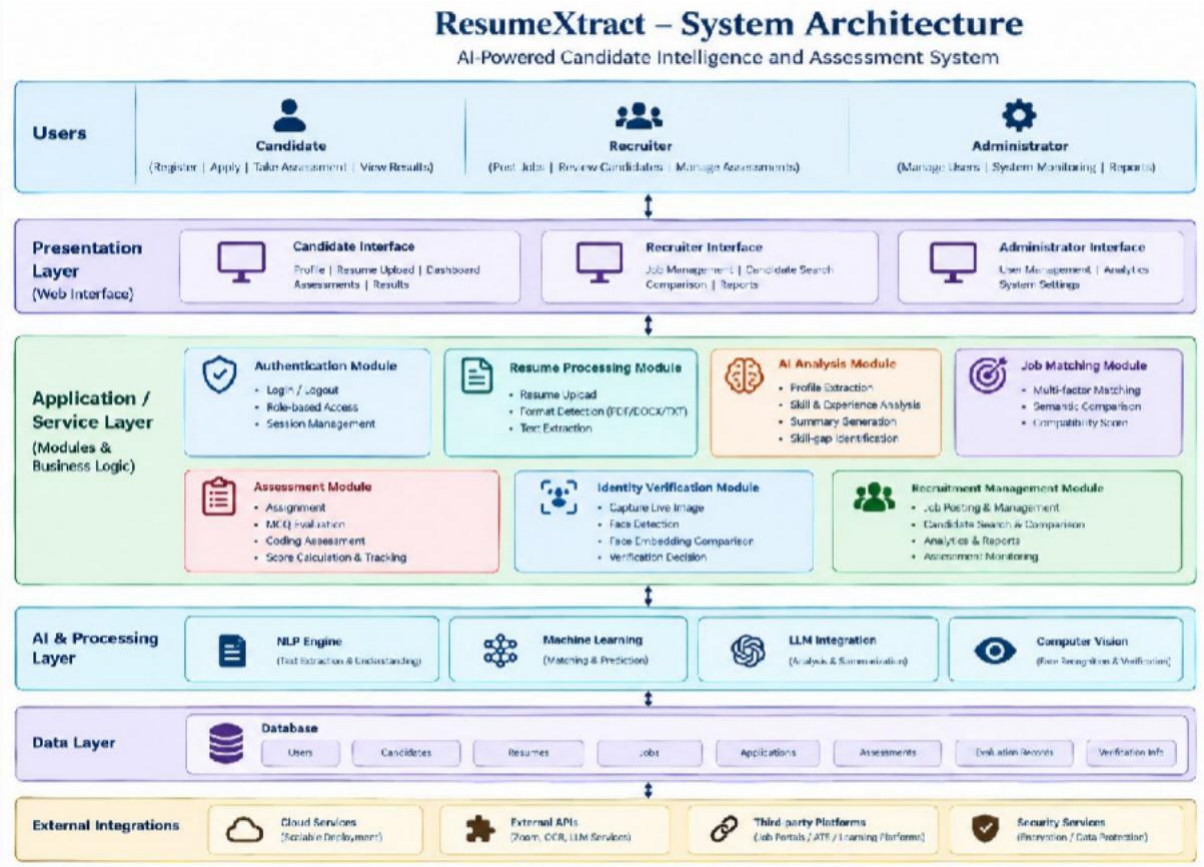


Figure 1: System Architecture

System Components

- User Authentication: Manages secure login and role-based access for candidates, recruiters, and administrators. It ensures that each user can access only the features and functions relevant to their assigned role.
- Resume Upload and Processing: Allows candidates to upload resumes in supported document formats. The uploaded files are processed, and their information is stored for further analysis.
- Resume Text Extraction: Extracts text from supported PDF and DOCX resumes. The extracted content is cleaned and prepared for AI-based processing.
- AI Resume Analysis: Analyzes the extracted resume information using an AI

model and generates a structured candidate profile. The profile includes skills, education, experience, projects, professional summary, and evaluation-related information.

- Job Matching: Compares candidate profiles with job requirements using skills, experience, education, projects, keywords, and semantic relevance. A compatibility score is generated to help recruiters evaluate and compare candidates.
- Skill-Gap Analysis: Identifies skills required for a job that are missing or insufficient in the candidate profile. The system can provide improvement or learning recommendations based on the identified skill gaps.
- Technical Assessment: Allows recruiters to assign assessments to candidates and manage their submissions. The system calculates scores, tracks assessment status, and stores evaluation results.
- Identity Verification: Uses a live webcam image and face-embedding techniques to verify candidate identity before an online assessment. The captured image is compared with the candidate's registered image to support identity verification.
- Recruitment Management: Allows recruiters to create and manage job postings, review candidate profiles, monitor assessments, and compare candidates. Administrators can manage users and monitor recruitment and assessment-related activities.

Methodology

The development of ResumeXtract followed a modular software-development methodology consisting of requirement analysis, system design, resume processing, AI-based profile extraction, candidate-job matching, assessment, identity verification,

result management, and testing.

Step 1: Requirement Analysis - The recruitment process was analyzed to identify problems related to resume screening, candidate evaluation, job matching, assessment management, candidate comparison, and identity verification. Functional and non-functional requirements were also identified.

Step 2: System Design - The system was designed using a modular architecture in which authentication, resume processing, AI analysis, job matching, assessment, identity verification, and recruitment management were developed as separate components.

Step 3: Resume Processing - Uploaded resumes are identified based on their file type, and text is extracted from supported formats such as PDF and DOCX. The extracted content is cleaned and prepared for further analysis.

Step 4: AI-Based Profile Extraction - The extracted resume text is analyzed using an AI model to generate a structured candidate profile containing information such as skills, experience, education, projects, and professional summary.

Step 5: Candidate-Job Matching - The candidate profile is compared with the job description using multiple factors, including skills, experience, education, projects, keywords, and semantic relevance. A compatibility score is generated to support candidate comparison.

Step 6: Assessment - Candidates are assigned technical assessments according to the recruitment workflow. MCQ and coding assessments are processed, scores are calculated, and evaluation results are stored for further review.

Step 7: Identity Verification - Before an online assessment, a live webcam image of the candidate is captured and compared with the registered image. Face detection and face-embedding techniques are used to support candidate identity verification.

Step 8: Result Management - Resume analysis, matching results, assessment scores, and identity verification information are stored in the system. Recruiters and administrators can access the information through dashboards, candidate comparison, and reports.

Step 9: Testing - Individual modules and integrated workflows were tested to verify their functionality and ensure that the implemented system met the defined requirements. The testing covered major processes such as resume processing, AI analysis, matching, assessment, identity verification, and result management.

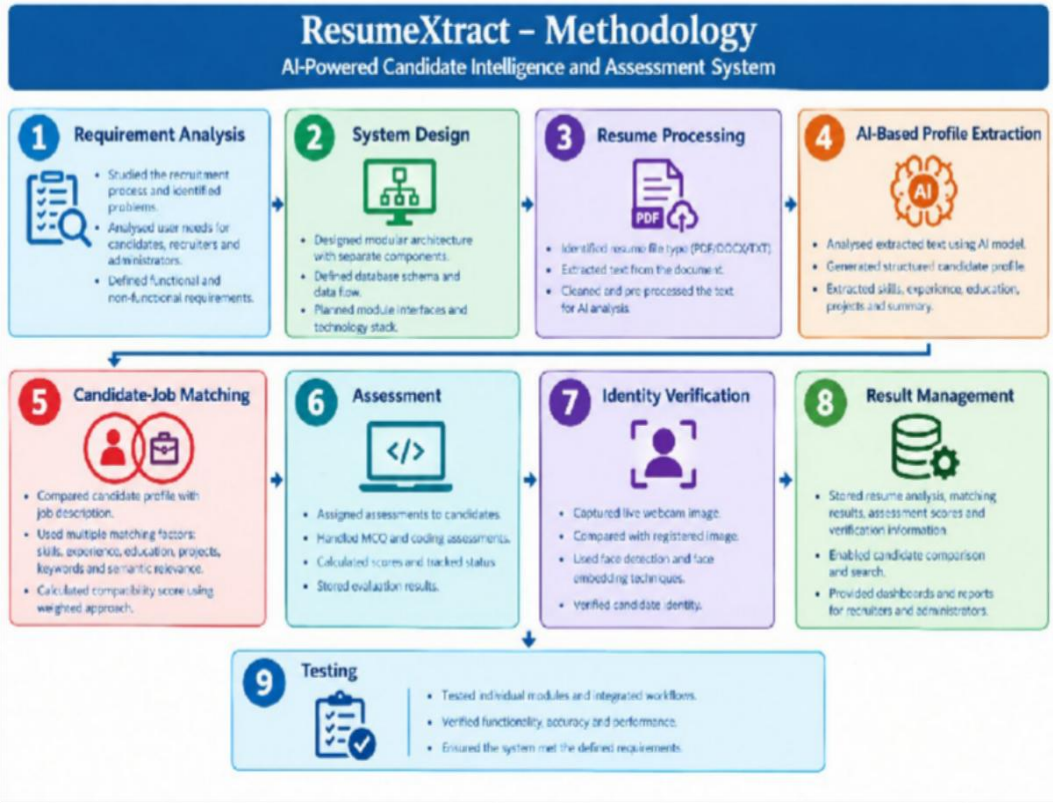


Figure 2: Methodology

Limitations

Although ResumeXtract provides an integrated recruitment workflow, several limitations remain.

- The quality of AI-generated analysis depends on the underlying AI service and

input data.

- Resume formats can vary significantly, making complete extraction difficult for highly complex layouts.
- Scanned or image-based resumes require additional OCR processing.
- AI-generated evaluations may require human verification.
- Face verification performance can be affected by lighting, camera quality, and image conditions.
- Online assessment functionality depends on camera and network availability.
- The current system is designed primarily as an academic prototype and has not been evaluated at large enterprise scales.
- The current database design may require migration to a more scalable database architecture for large-scale deployment.
- The system does not completely eliminate potential bias in AI-based candidate evaluation.
- The current assessment functionality can be expanded with more advanced coding execution and monitoring capabilities.

Challenges

Several technical challenges were encountered during the development of ResumeXtract.

- Resume Format Variation: Resumes differ in layout, formatting, tables, headings, and information order. Designing a common extraction process for different formats was therefore a significant challenge.
- Unstructured Candidate Information: Candidate information is generally presented as free text rather than structured database fields. AI-based extraction was therefore required to convert the information into structured

candidate profiles.

- Contextual Job Matching: Simple keyword matching cannot always capture the relation- ship between a candidate's experience and a job requirement. Therefore, the system combines multiple matching factors and semantic analysis.
- AI Reliability: AI-generated information can vary depending on input content and model behavior. Structured output requirements and fallback mechanisms were therefore considered during implementation.
- Assessment of Security: Online assessment requires candidate identity verification and appropriate monitoring mechanisms. Webcam availability and environmental conditions can affect verification.
- Role-Based Access: Candidates, recruiters, and administrators have different responsibilities. Managing role-specific permissions while maintaining a common platform was another important development challenge.
- System Integration: The major challenge was not only implementing individual modules but integrating resume analysis, matching, assessment, verification, and recruitment management into a consistent workflow.

Outcomes

The development of ResumeXtract resulted in an integrated web-based prototype for AI-assisted recruitment and candidate assessment. The major outcomes of the proposed system are as follows:

- Centralized Recruitment Platform: A centralized platform was developed to bring major recruitment activities into a single system. It supports candidates, recruiters, and administrators through role-based interfaces.
- Resume Processing: Candidates can upload resumes in supported formats,

and the system extracts and processes the resume content. This reduces the need for manual handling of resume information.

- AI-Based Candidate Profiling: The system converts extracted resume information into structured candidate profiles containing skills, education, experience, projects, and other relevant information. AI-assisted analysis helps organize candidate information for further evaluation.
- Candidate-Job Matching: Candidate profiles are compared with job requirements using multiple factors such as skills, experience, education, projects, keywords, and semantic relevance. A compatibility score is generated to support candidate comparison.
- Skill-Gap Identification: The system identifies skills that may be missing or insufficient for a particular job requirement. It can also provide recommendations to indicate areas where candidates may improve.
- Technical Assessment: Recruiters can assign technical assessments to candidates, includ- ing MCQ and coding-based assessments. The system calculates scores and stores the assessment results for evaluation.
- Identity Verification: The system supports candidate identity verification before online assessments using a live webcam image. Face detection and face-embedding techniques are used to compare the live image with the registered candidate image.
- Recruitment Management: Recruiters can create and manage job postings, review candidate profiles, monitor assessments, and compare candidates. This provides a centralized workflow for recruitment-related activities.
- Administrator Management: Administrators can manage users and monitor recruitment and assessment activities. The system also provides access to

relevant reports and system information.

- ➢ Overall Outcome: Overall, the implementation demonstrates the feasibility of integrating resume processing, AI-based profiling, job matching, skill-gap analysis, technical assessment, identity verification, and recruitment management within a single web-based platform.

Future Scope

Several improvements can be considered for future versions of ResumeXtract.

- ➢ Advanced Resume Processing: OCR can be integrated to support scanned and image-based resumes. Improved layout analysis can also support complex tables, graphics, and multilingual documents.
- ➢ Improved Semantic Matching: Future versions can use more advanced embedding and retrieval techniques for contextual job matching and candidate recommendation.
- ➢ Explainable AI : The system can provide more detailed explanations for candidate scores, showing which skills, experience, education, and job requirements contributed to the evaluation. This direction is particularly relevant because recent research has identified transparency as an important factor in AI-assisted recruitment.
- ➢ Advanced Assessment: The assessment module can be extended to include secure code execution, automated programming evaluation, coding questions, and more detailed performance analysis.
- ➢ Advanced Online Monitoring: Future versions can incorporate additional monitoring techniques such as object detection, head-pose analysis, gaze estimation, and anomaly detection. Recent research demonstrates continuing development in multimodal online proc-toring.

- AI-Assisted Interviews: Video interviews, speech-to-text processing, question generation, and AI-assisted interview analysis can be integrated.
- Scalable Deployment: The system can be migrated to cloud infrastructure with scalable databases, background processing, caching, and distributed services.
- External Integration: Future versions can integrate with Applicant Tracking Systems, job portals, learning platforms, and external recruitment services.
- Human-in-the-Loop Recruitment: AI-generated recommendations can be presented together with explanations so that recruiters can review and validate the information before making final recruitment decisions.

Conclusion

ResumeXtract presents an integrated approach to AI-assisted recruitment and candidate assessment. Unlike systems that focus only on resume classification or job recommendation, the proposed platform combines resume processing, AI-based candidate profiling, job matching, skill-gap analysis, technical assessment, identity verification, and recruitment management.

The literature review of recent research from 2024–2026 indicates that substantial progress has been made in individual areas such as LLM-based resume screening, semantic job matching, automated assessment, and online identity verification. However, these functions are frequently investigated as separate systems. Recent research also highlights the importance of transparency, reliability, and human oversight in AI-assisted recruitment.

ResumeXtract addresses this integration gap by providing a modular platform in which candidate information can move through multiple stages of the recruitment workflow. Resume information is extracted and analyzed, candidates can be

compared with job requirements, assessments can be conducted, and identity verification can support online assessment participation.

The system is intended as a decision-support platform rather than a complete replacement for human recruiters. Its results should therefore be reviewed by responsible recruitment personnel before final decisions are made. Future development can focus on improving semantic matching, explainability, OCR, assessment security, scalability, and integration with external recruitment platforms. Overall, the project demonstrates how AI, NLP, web technologies, and computer vision can be combined to create a unified candidate intelligence and assessment system for modern recruitment workflows.

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