

AI-Recruitment And Talent Analytics System

**Mrs. Hemalatha M¹, Ms. Sakshi Mahesh Mirji², Ms. Sanjana³, Mr. Braham Abhijat Singh⁴,
Mr. Priyanshu Kumar⁵**

Dept. of CSE, Don Bosco Institute of Technology, Bengaluru, India¹⁻⁵

Abstract: Recruitment is an important function of Human Resource Management, but traditional recruitment processes become difficult to manage when organizations receive a large number of job applications. Manual resume screening, subjective interview evaluation and limited use of recruitment data can increase the time required for hiring and may introduce inconsistency and bias into candidate selection. This paper presents an AI Recruitment and Talent Analytics System that combines Artificial Intelligence (AI),

Machine learning(ML), Natural Language Processing(NLP), and data analytics to support an intelligent recruitment workflow. The proposed system automates major stages of recruitment, beginning with candidate registration and resume submission. NLP-based resume processing is used to extract skills, education, certifications, and work experience. Candidate profiles are compared with job requirements to support candidate-job matching and ranking. The system also proposes an AI-based interview module for evaluating technical knowledge, communication abilities, behavioral responses, and overall performance. A recruitment analytics dashboard provides candidate rankings, hiring insights, reports, and decision-support information. The current prototype focuses on the landing page, authentication interface, candidate dashboard, HR dashboard, and AI interview interface, providing a foundation for subsequent backend, database, AI/ML, and predictive analytics integration.

Keywords: Artificial Intelligence, Recruitment ,Talent Analytics, Machine Learning, Natural Language Processing, Resume Screening, Candidate Matching, HR Analytics, AI Interview, Hiring Automation.

I. INTRODUCTION

Recruitment is one of the most important activities in an organization because selecting suitable employees directly influences organizational performance. Conventional recruitment generally involves manual resume review, comparison of candidate qualifications with job requirements, interviews, and selection decisions based on available information. Although widely used, this approach becomes inefficient when hundreds or thousands of applications are received for a single position.

The growth of online job portals and digital applications has increased the volume of candidate information available to recruiters. Resumes contain unstructured information in different formats and layouts, making the extraction of skills, education, certifications, and experience time-consuming. Subjective interview evaluation can also result in differences between recruiters. These challenges motivate the use of AI, ML, NLP and predictive analytics for recruitment automation and decision support. The proposed AI Recruitment and Talent Analytics System integrates resume screening, candidate-job matching, candidate ranking, AI-assisted interview evaluation, and recruitment analytics into a single platform. The objective is to support candidates and HR recruiters through a structured workflow while reducing manual effort and improving the availability of data-driven hiring information.

II. RELATED WORKS

Several studies have investigated AI in recruitment and Human Resource Management.

Yadav et al. discussed AI-powered recruitment using ML, NLP, and predictive analytics for resume screening, job matching, and recruitment automation [1].

Khedkar et al. presented an intelligent hiring approach for talent identification using AI [2].

Ha-Thuc et al. investigated personalized expertise search at LinkedIn, demonstrating the value of large-scale matching and recommendation methods [3].

Singh et al. compared NLP and generative AI approaches for recommendation and resume screening [4].

SL NO	Author/ Paper	Method ology	Key Findings	Advantage s	Disadvantages
1	Yadav et al., 2023 –AIPowered Recruitment	Uses ML and NLP to screen resumes and match candidates	Automates screening, and improves candidate matching.	Faster hiring and saves time	AI bias and less human interaction
2	Khedkar et al., 2024 – Intelligent Hiring using AI	Uses resume parsers, chatbots ,and AI matching tools	Improves candidate-job matching and hiring automation	Handles large amount of data efficiently.	AI decision s may be difficult to understand or trust.
3	HaThuc et al., 2024 – LinkedIn Expertise Search	Uses ML to analyze skills and rank candidates	Identifies expertise and predicts hidden skills	Quick and skill-based candidate search.	High development and maintenance cost.
4	Singh et al., 2025 – NLP vs Generative AI Screening	Compares keyword-based NLP with Generative AI for resume screening.	Generative AI gives better contextual understanding and accuracy	Better personalized job recommendations	Privacy concerns with candidate data
5	Albassam, W. A. (2023).	Analytical review of AI-based recruitment strategi es.	AI improves screening, matching and hiring efficiency.	Saves time and reduces recruitment effort.	Risk of bias, discrimination and privacy issues
6	Paramita,D. (2020)	Qualitative case study with interviews of 11 HR professionals.	AI improves recruitment efficiency and process collaboration.	Saves time and improves recruitment processes.	May reduce human interaction and requires careful AI adoption.

Table1: A Comparison of algorithms utilized in several related works

Existing approaches frequently focus on a single recruitment activity, such as resume parsing, recommendation, interview analysis, or HR analytics. The proposed system combines these activities into one continuous workflow from candidate registration to HR decision support.

III. PROPOSED SYSTEM

The proposed system consists of interconnected modules that support an intelligent recruitment workflow. The major modules are the Candidate Module, Resume Processing Module, Candidate Matching and Ranking Module, Interview Intelligence Module, Recruitment Analytics Module, and Database.

- A. Candidate Module: Candidates can register, create profiles, upload resumes, apply for jobs, participate in interviews, and track applications.
- B. Resume Processing Module: Resume documents are processed using NLP techniques to extract skills, educational qualifications, certifications, and work experience.
- C. Candidate Matching and Ranking Module: Extracted candidate information is compared with job requirements. Similarity-based methods and machine learning can be used to generate candidate relevance scores and rankings.
- D. Interview Intelligence Module: The system provides an AI-assisted interview environment. Candidate responses can be evaluated for technical knowledge, communication, response clarity, confidence, and behavioral characteristics.
- E. Recruitment Analytics Module: HR personnel can view candidate rankings, recruitment statistics, hiring trends, interview reports, and other decision-support information.
- F. Database: Candidate profiles, job descriptions, interview results, and analytics records are intended to be stored securely for recruitment operations.

IV. SYSTEM ARCHITECTURE AND WORKFLOW

The proposed workflow is: Candidate Registration → Resume Upload → Resume Processing → Skill Extraction → Candidate-Job Matching → Candidate Ranking → AI Interview → Candidate Evaluation → HR Analytics Dashboard → Final Hiring Decision, as illustrated in Fig. 2.

The candidate first creates an account and uploads a resume. The resume-processing component extracts candidate information using NLP techniques. The extracted profile is then compared with available job descriptions. Suitable candidates can be shortlisted for AI-assisted interviews. Interview information is combined with candidate profile information and presented to recruiters through the analytics dashboard.

The architecture separates candidate interaction, AI processing, analytics, and data storage, allowing individual components to be extended without redesigning the complete platform, as shown in Fig. 1.

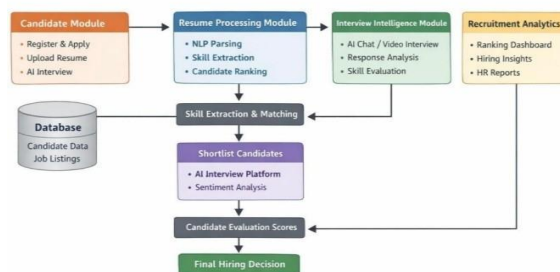


Fig. 1. .System architecture of the proposed AI Recruitment and Talent Analytics System.

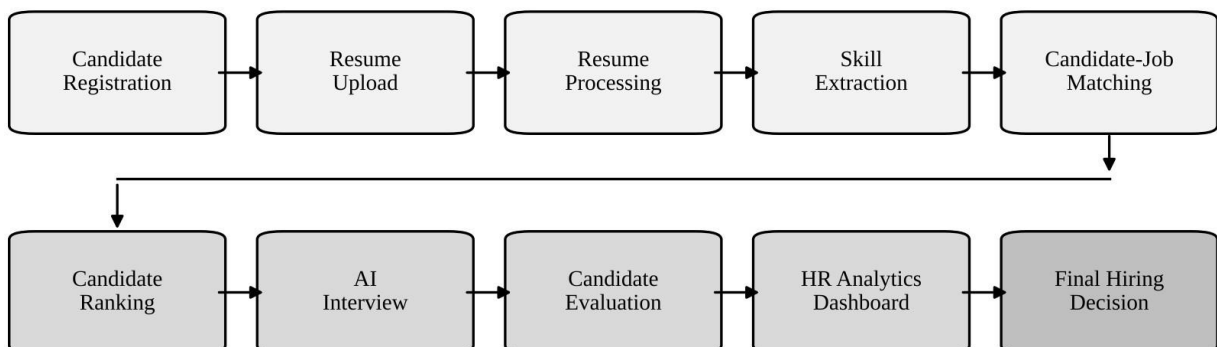


Fig. 2. End-to-end recruitment workflow of the proposed system, from candidate registration to the final hiring decision.

V. METHODOLOGY

- A. Resume Preprocessing: Resumes may be available in different formats and layouts. Text is extracted and cleaned before feature extraction. Preprocessing can include normalization, removal of unnecessary symbols, tokenization, and identification of relevant terms.
- B. Natural Language Processing: NLP identifies important resume entities and converts unstructured information into structured candidate attributes. The complete resume processing and matching pipeline is shown in Fig. 3.
- C. Feature Extraction: TF-IDF can represent important terms in resumes and job descriptions. For a term t in document d :

$$TF\text{-}IDF(t,d) = TF(t,d) \times IDF(t) \quad (1)$$

- D. Candidate-Job Similarity: Cosine similarity can measure the relationship between a candidate resume vector and a jobdescription vector:

$$Similarity(A,B) = (A \cdot B) / (\|A\| \|B\|) \quad (2)$$

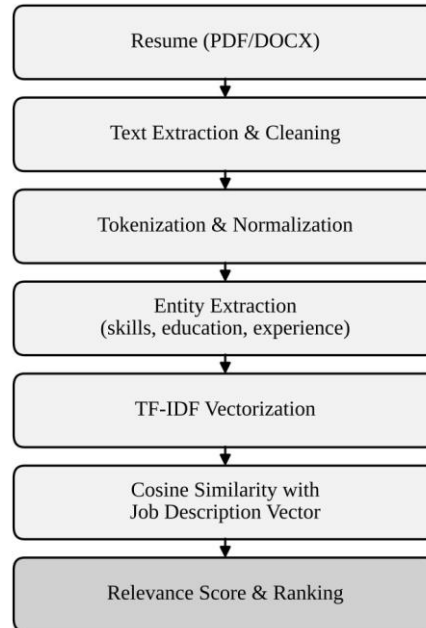


Fig. 3. Resume processing and matching pipeline: TF-IDF vectorization, cosine similarity, and ranking.

- E. Candidate Ranking: Candidate ranking can consider skill match, education, experience, resume relevance, and interview performance. Suitable machine learning approaches can be selected according to available training data.
- F. Interview Analysis: Candidate responses can be analyzed using NLP and sentiment analysis. Future versions can incorporate speech recognition and video-based analysis.
- G. Talent Analytics: Recruitment records can be summarized to identify applicant volume, shortlisting, candidate performance, interview outcomes, and hiring trends.

VI. IMPLEMENTATION

The current implementation focuses on the frontend prototype and user interaction, with separate interfaces for candidates and HR recruiters. The landing page introduces AI-powered candidate matching, automated interviews, and recruitment analytics (Fig. 4(a)). The sign-in interface provides authentication access (Fig. 4(b)). The candidate dashboard supports profile management, resume upload, application tracking, job matches, and interview participation. The HR dashboard presents recruitment statistics, candidate rankings, hiring trends, analytics charts, and interview reports. The AI interview interface provides the environment for AI-assisted interviews and displays candidate evaluation information (Fig. 6).

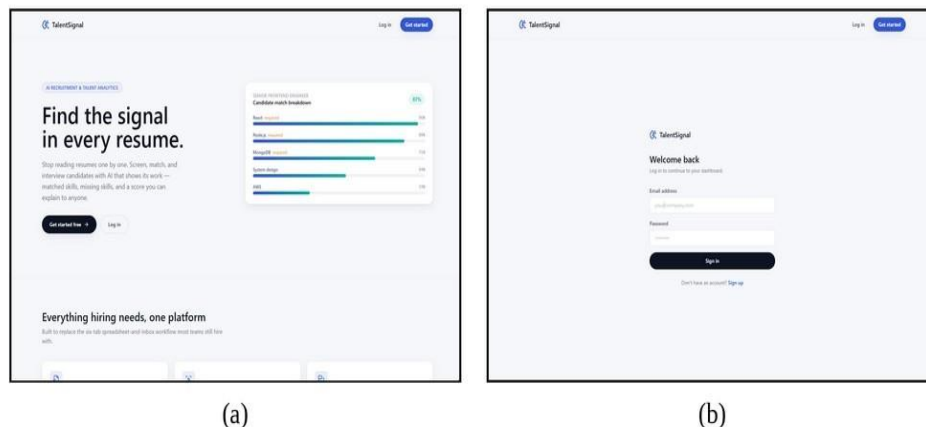


Fig. 4. Prototype screenshots: (a) landing page and (b) sign-in page.

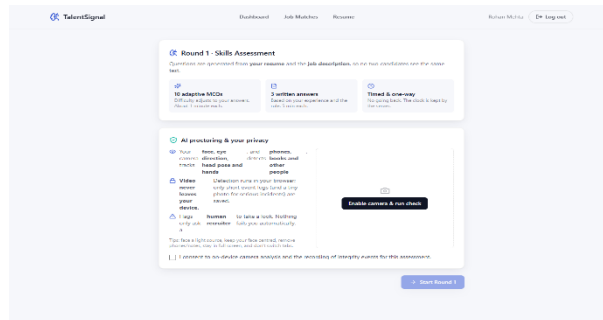


Fig. 5. AI interview interface of the prototype.

The project report states that the frontend implementation has been completed, while backend development, database integration, and complete AI/ML model implementation are planned for the subsequent development phase.

VII. RESULTS AND DISCUSSION

The developed prototype demonstrates the user-interface and architectural foundation of the proposed recruitment platform. The implemented interfaces include the landing page, sign-in page, HR dashboard, candidate dashboard, and AI-based interview analysis interface. The HR dashboard provides a centralized environment for recruitment information, while the candidate dashboard provides facilities for profile management, resume submission, application tracking, and interview participation.

The current results should be considered prototype and interface-level results rather than final machine-learning performance results. No measured ML accuracy is reported because backend, database, and complete AI/ML implementation are planned for the next development phase. For context, Fig. 7 summarizes the improvements reported in [1] for AI-driven recruitment; these figures are taken from the cited study and are not measurements of the present prototype.

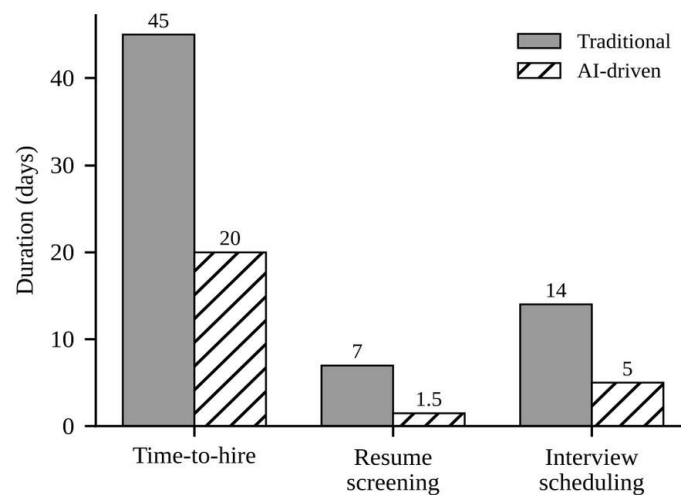


Fig. 6. Recruitment durations (days) for traditional versus AI-driven processes, as reported in [1].

VIII. ADVANTAGES

- Reduced manual effort during initial screening.
- Faster candidate shortlisting through matching and ranking.
- Structured candidate evaluation.
- Data-driven recruitment support through analytics.
- Improved candidate interaction through dedicated interfaces.
- Modular and scalable architecture.
- Support for more structured and transparent hiring decisions.

IX. CONCLUSION

The AI Recruitment and Talent Analytics System presents an intelligent approach to improving traditional recruitment through Artificial Intelligence, Machine Learning, Natural Language Processing, and data analytics. The system is designed to automate resume screening, candidate-job matching, candidate ranking, interview evaluation, and recruitment analytics. The current prototype establishes the frontend foundation through the landing page, authentication interface, candidate dashboard, HR dashboard, and AI interview interface. The architecture supports future integration of backend services, databases, machine learning models, and advanced analytics.

The main contribution of the proposed system is the integration of multiple recruitment activities into a single workflow. With future implementation of advanced NLP, predictive analytics, explainable AI, and real-time interview analysis, the platform can be developed into a comprehensive intelligent talent acquisition system

X. FUTURE SCOPE

- Backend and Database Integration: Secure storage and management of candidate profiles, resumes, job descriptions, interview results, and analytics.
- Advanced NLP Models: Transformer-based and deep learning models for more accurate resume parsing and contextual skill extraction.
- Improved Candidate Recommendation: Advanced recommendation models for better job-candidate matching.
- Real-Time Video Interview Analysis: Speech recognition, facial-expression analysis, and related techniques.
- Explainable AI: Explanations for candidate rankings and recommendations.
- Bias Detection and Fair Hiring: Fairness monitoring and bias-detection mechanisms.
- Predictive Talent Analytics: Prediction of job fit, candidate success, retention probability, and workforce trends.

REFERENCES

- [1] K. Yadav, S. Yuvaraj, S. Jugran, R. AlFatlawy, G. Sharma, and T. Koilraj, "AI-Powered Recruitment: Enhancing Hiring Efficiency and Candidate Experience in Modern HR," *International Conference on Technology Enabled Economic Changes (InTech)*, IEEE, 2025.
- [2] R. Khedkar, P. Shinde, A. R. K. Patel, S. Verma, and S. Renakale, "Intelligent Hiring: Leveraging AI for Talent Identification," *IEEE Pune Section International Conference (PuneCon)*, 2025.
- [3] V. Ha-Thuc, G. Venkataraman, M. Rodriguez, S. Sinha, S. Sundaram, and L. Guo, "Personalized Expertise Search at LinkedIn," *IEEE International Conference on Big Data*, 2024.
- [4] R. P. Singh, S. Pawar, A. G. Goswami, and S. Chourawar, "Comparison of NLP and Generative AI Models for Recommendation and Resume Screening," *IEEE International Conference on Automation, Computing and Renewable Systems (ICACRS)*, 2025.
- [5] Albassam, W. A. (2023). The power of artificial intelligence in recruitment: An analytical review of current AI-based recruitment strategies. *International Journal of Professional Business Review*, 8(6), e02089-e02089.
- [6] Paramita, D. (2020). Digitalization in talent acquisition: A case study of AI in recruitment
- [7] Sahu, R., Yadav, M., & Verma, P. (2021). AI in video interviews: Enhancing recruitment efficiency. *IEEE Transactions on AI in Business*, 9(4), 289-300.
- [8] Dixit, S., Sharma, N., Maurya, M., & Dharwal, M. (2022). AI power: making recruitment smarter. In *Evolution of Digitized Societies Through Advanced Technologies* (pp. 165-180). Singapore: Springer Nature Singapore.
- [9] Ghedabna, L., Ghedabna, R., Imtiaz, Q., Faheem, M. A., Alkhayyat, A., & Hosen, M. S. (2024). Artificial Intelligence in Human Resource Management: Revolutionizing Recruitment, Performance, and Employee Development. *Nanotechnology Perceptions*, 52-68.