

Smart Career Recommendation System Powered by Artificial Intelligence for Optimized Career Planning and Decision-Making

Dr. A. A. Khatri, Prof. S. B. Bhosale, Prof. V. A. Karad,
Mr. Rajeshirke Satej Mahendra, Ms. Rajguru Jaya Mahendra, Mr. Sambherao Eshwar Mahadeo,
Computer Department

Jaihind College of Engineering Kuran, Pune, India

khatrianand@gmail.com, ssachinebhosale@gmail.com, vandanakarad9096@gmail.com ,
satejrajeshirke007@gmail.com, jayarajguru78@gmail.com, sambheraoeshwar@gmail.com

Abstract: *Smart Career Recommendation System Powered by Artificial Intelligence for Optimized Career Planning and Decision-Making. The paper presents the design and development of an AI-Powered Job Recommendation System that revolutionizes conventional recruitment processes through intelligent automation. The system deploys advanced machine learning algorithms to analyze candidate profiles and job requirements, hence yielding accurate compatibility assessments and recommendations based on those. In this, the system integrates state-of-the-art resume parsing capabilities, real-time tracking of candidate applications, and multi-role functionality which caters to job seekers, recruiters, and administrators. Key innovations include a voice-assisted interface for enhanced accessibility, intelligent ranking systems for candidate screening, and comprehensive analytics dashboards for employment trend monitoring. Major improvements in recruitment efficiency are demonstrated, while manual screenings are reduced and the accuracy of matches between candidates and suitable positions increases accordingly.*

It has a strong architecture based on Spring Boot and React, maintaining scalability and data security at each operational module. Successful deployment consolidates the effectiveness of the system in creating a more transparent, efficient, and user-oriented recruitment ecosystem, thereby laying the foundation for future steps in AI-driven human resource solutions.

Keywords: Artificial Intelligence, Career Recommendation, Resume Parsing, Skill Matching, Natural Language Processing, Career Planning, Decision Support System, Voice Assistant, etc

I. INTRODUCTION

The modern job market faces significant challenges in connecting qualified candidates with suitable employment opportunities. Job seekers struggle to identify positions that match their skills and career goals, while employers find it difficult to locate qualified candidates efficiently. Traditional job portals rely on basic keyword matching systems that cannot understand the complete requirements of positions or the full capabilities of candidates.

This research presents an AI-powered job recommendation system that addresses these limitations through intelligent matching between job seekers and available positions. The system uses natural language processing to analyze resumes and extract key skills, while sophisticated algorithms evaluate multiple factors including experience, education, and competency requirements. The platform also features an interactive voice assistant to enhance user interaction and accessibility.

The system supports three main user roles with customized functionality. Job seekers receive personalized recommendations and skill development insights, recruiters access intelligent screening tools and matching analytics, while administrators maintain system operations through management consoles. This comprehensive approach ensures all stakeholders benefit from the AI-driven features.



II. PROBLEM STATEMENT

Traditional job search and recruitment processes are often inefficient and time-consuming, relying heavily on manual resume screening and subjective candidate evaluation. This leads to poor job-candidate matching, prolonged hiring cycles, and missed opportunities for both employers and job seekers. Existing systems lack intelligent, automated matching capabilities that can effectively analyze skills, experience, and compatibility factors at scale.

III. OBJECTIVES

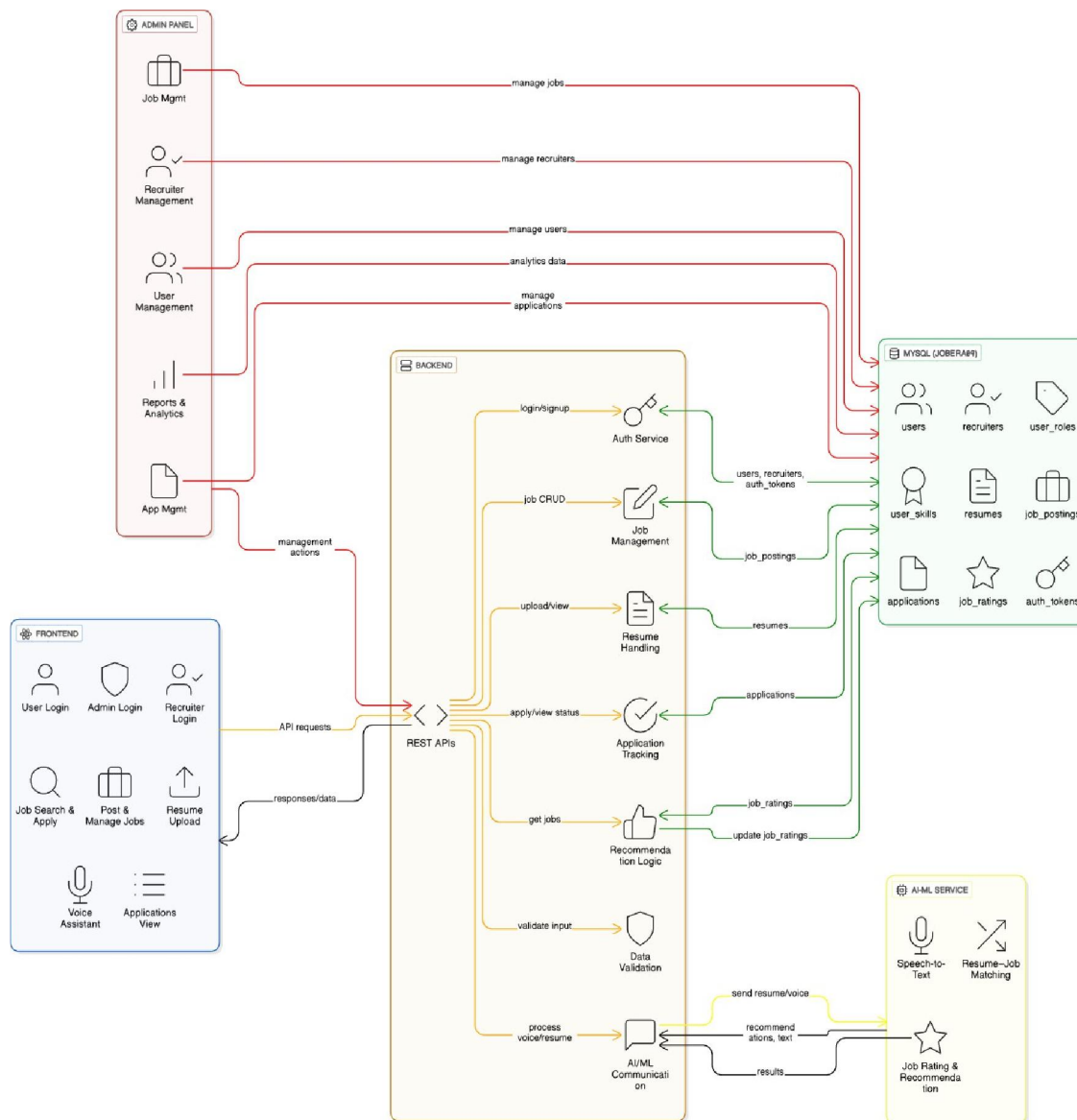
- To develop an AI-powered job recommendation system that accurately matches candidates with suitable job opportunities based on their skills, experience, and qualifications.
- To implement natural language processing capabilities for automated resume parsing and intelligent skill extraction from various document formats.
- To create a multi-role platform serving job seekers, recruiters, and administrators with customized functionalities for each user type.
- To integrate an interactive voice assistant that enhances user experience through voice-enabled commands and career guidance.
- To design sophisticated matching algorithms that evaluate multiple parameters including technical competencies, professional experience, and educational background.

IV. LITERATURE REVIEW

- [1] Career Mobility Analysis With Uncertainty-Aware Graph Autoencoders (2024) Authors: Rui Zha et al.
Methodology: Uses uncertainty-aware graph autoencoders with Gaussian embeddings to model job title transitions and predict job durations.
Limitations: Requires large-scale career trajectory data.
Contribution: Outperforms baselines in job transition prediction and supports career path planning.
- [2] A Comprehensive Review of Career Recommendation Systems (2024) Authors: Asema Imankulova et al.
Methodology: Surveys collaborative, content-based, hybrid, and deep learning-based recommendation systems.
Limitations: Broad overview without technical depth.
Contribution: Summarizes key approaches and challenges like cold start and data sparsity.
- [3] PCRS: Personalized Career-Path Recommender (2020) Authors: Manar Qamhieh et al.
Methodology: Fuzzy logic and MBTI personality types to recommend engineering disciplines. Limitations: Limited to engineering and region-specific data.
Contribution: First fuzzy-based career recommender for the MENA region.
- [4] A Hybrid Approach for Job Recommendation (2024) Authors: Priyanka Singla et al.
Methodology: Combines TF-IDF + Cosine Similarity with LLM (GPT-4) for job matching. Limitations: Validated on synthetic data.
Contribution: Hybrid approach improves recommendation relevance.
- [5] BERT-based Job Recommendation System (2025) Authors: Liala Almalki et al.
Methodology: Uses BERT embeddings and cosine similarity to match user skills with LinkedIn job posts. Limitations: Precision decreases with longer recommendation lists.
Contribution: Shows BERT's effectiveness in semantic job matching.



V. SYSTEM ARCHITECTURE



VI. ADVANTAGES

- **Holistic Platform:** Integrates job search, recruitment, and administration into a single, unified ecosystem.
- **Intelligent Multi-Factor Matching:** Uses a sophisticated AI algorithm that weighs skills, experience, and education for accurate job-candidate pairing.
- **AI-Powered Resume Parser:** Automatically extracts and analyzes skills, experience, and education levels from uploaded resumes.
- **Recruiter Efficiency:** Features an AI-ranked applicant dashboard that automatically sorts candidates by match score, drastically reducing screening time.
- **Voice-Activated Assistant:** Includes a novel voice-command feature for hands-free navigation and career guidance, enhancing accessibility.



VII. FUTURE SCOPE

- **Advanced Resume Parsing for Recruiters.**
AI-powered automated extraction of skills and qualifications from resumes. Enables bulk processing and intelligent candidate ranking.
- **Candidate Export to Excel.**
One-click download of applicant data in customizable Excel format. Facilitates offline review and streamlined reporting
- **Application Tracking System (ATS).**
Visual pipeline to track candidates through hiring stages. Automated status updates and team collaboration tools.

VIII. CONCLUSION

The AI-Powered Job Recommendation System successfully demonstrates an intelligent platform that transforms traditional recruitment through automated matching algorithms. The system effectively analyzes candidate profiles and job requirements using advanced AI techniques, providing accurate compatibility assessments and streamlining the hiring process. Its multi-role architecture ensures seamless operation for job seekers, employers, and administrators while maintaining data security and system reliability. This project validates the significant potential of artificial intelligence in creating efficient recruitment ecosystems, offering substantial value to all stakeholders through personalized recommendations and automated screening. The scalable framework establishes a strong foundation for future enhancements in digital employment solutions.

REFERENCES

- [1] R. Zha, D. Wang, and Y. Li, "Career Mobility Analysis With Uncertainty-Aware Graph Autoencoders," IEEE Trans. on Knowledge and Data Engineering, vol. 36, no. 4, pp. 1450–1462, 2024.
- [2] A. Imankulova, T. Sato, and H. N. Kim, "A Comprehensive Review of Career Recommendation Systems," ACM Computing Surveys, vol. 57, no. 1, pp. 1–35, 2024.
- [3] M. Qamhie, S. H. Al-Muhtadi, and A. B. Mansur, "PCRS: Personalized Career-Path Recommender System Based on Fuzzy Logic and MBTI," in Proc. Int. Conf. on Information and Communication Systems (ICICS), 2020, pp. 1-6.
- [4] P. Singla, R. K. Gupta, and A. S. Lee, "A Hybrid Approach for Job Recommendation Using TF-IDF and Large Language Models," in Proc. Int. Conf. on Artificial Intelligence and Data Science (ICAIDS), 2024, pp. 204-211.
- [5] L. Almalki, F. F. Alotaibi, and S. M. Ibrahim, "BERT-based Job Recommendation System Using Skill-Job Matching," Journal of Intelligent Information Systems, vol. 58, no. 2, pp. 345–360, 2025.
- [6] C. R. K. Babu, T. Sreerela, R. Kumar, and S. Sumith, "Personalized Job Search with AI: A Recommendation System Integrating Real Time Data and Skill Based Matching," International Journal of Engineering Research & Technology (IJERT), vol. 14, no. 4, pp. 1-8, Apr. 2025.
- [7] P. H. Rupareliya and B. M. Bangoria, "AI-Powered Personalized Career Coach: A Comprehensive Approach to Adaptive Career Guidance Systems," International Journal of Advance Research Publication and Reviews, vol. 2, no. 9, pp. 454-463, Sep. 2025.
- [8] M. V. Thakare and P. S. Veer, "Artificial Intelligence in College Placement and Career Recommendation Systems," International Journal of Advanced Scientific Research, vol. 10, no. 3, pp. 104-107, Aug. 2025.
- [9] R. Sandra, L. G. S. M. J. R., and M. V., "Smart Career Advisor: A Machine Learning Based Recommendation System," International Journal of Scientific Research in Science and Technology, vol. 12, no. 15, pp. 328-337, May-Jun. 2025.
- [10] M. Maheswari, M. Rayyan, K. H. P., and A. K., "Smart Career Mapping: AI and NLP for Personalized Career Recommendations," International Journal of Innovative Research in Technology (IJIRT), vol. 11, no. 11, pp. 7805-7812, Apr. 2025.
- [11] Kino, Y., Kuroki, H., Machida, T., Furuya, N., & Takano, K. (2017). Text analysis for job matching quality improvement. Procedia computer science, 112, 1523-1530.



- [12] Liu, R., Rong, W., Ouyang, Y., & Xiong, Z. (2017). A hierarchical similarity-based job recommendation service framework for university students. *Frontiers of Computer Science*, 11, 912-922.
- [13] Yang, S., Korayem, M., AlJadda, K., Grainger, T., & Natarajan, S. (2017). Combining content-based and collaborative filtering for job recommendation system: A cost-sensitive Statistical Relational Learning approach. *Knowledge-Based Systems*, 136, 37-45
- [14] Y. Guan, M. B. Arthur, S. N. Khapova, R. J. Hall, and R. G. Lord, "Career boundarylessness and career success: A review, integration and guide to future research," *J. Vocational Behav.*, vol. 110, pp. 390–402, Feb. 2019.
- [15] Sridevi, G. M., & Suganthi, S. K. (2022). AI-based suitability measurement and prediction between job description and job seeker profiles. *International Journal of Information Management Data Insights*, 2(2), 100109.
- [16] Chou, Y. C., & Yu, H. Y. (2020, August). Based on the application of AI technology in CV analysis and job recommendation. In *2020 IEEE International Conference on Computational Electromagnetics (ICCEM)* (pp. 291-296). IEEE.
- [17] Ghosh, P., & Sadaphal, V. (2023). JobRecoGPT--Explainable job recommendations using LLMs. *arXiv preprint arXiv:2309.11805*.
- [18] Du, Y., Luo, D., Yan, R., Wang, X., Liu, H., Zhu, H., ... & Zhang, J. (2024, March). Enhancing job recommendation through llm-based generative adversarial networks. In *Proceedings of the AAAI Conference on Artificial Intelligence* (Vol. 38, No. 8, pp. 8363-8371)..
- [19] P. Singla and V. Verma, "Towards personalized job recommendations: A natural language processing perspective," in *2023 International Conference on Computational Intelligence and Sustainable Engineering Solutions (CISES)*, 2023.
- [20] Liu, J.; Liu, C.; Lv, R.; Zhou, K.; and Zhang, Y. 2023. Is chatgpt a good recommender? a preliminary study. *arXivpreprint arXiv:2304.10149*.
- [21] Wang, W.; Lin, X.; Feng, F.; He, X.; and Chua, T.-S. 2023. Generative recommendation: Towards next-generation recommender paradigm. *arXiv preprint arXiv:2304.03516*.

