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Enhancing Fresher Employability through Intelligent Job Matching and Skill Gap Analysis

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ABSTRACT: In today's job market, mismatches between candidate skills and industry requirements reduce hiring efficiency and limit fresher employability. This work presents a role-based intelligent job recommendation system with integrated skill gap analysis. The platform follows an admin-approved registration process for both users and companies to ensure authenticity and secure access. Verified companies can post vacancies, manage applications, and communicate with applicants, while users can build detailed profiles including skills, education, projects, internships, and certifications. The system computes a profile-job match percentage, identifies missing skills for selected roles, and recommends personalized learning resources with estimated completion timelines. Job recommendations are also generated based on user profile data and activity. Overall, the proposed framework improves recruitment accuracy while supporting continuous skill development.

KEYWORDS: Job Recommendation System, Skill Gap Analysis, Fresher Employability, Profile- Job Matching, Personalized Learning Recommendation, Recruitment Platform, Role- Based Recommendation, Admin Verification System, Career Guidance, Web-Based Application

I. INTRODUCTION

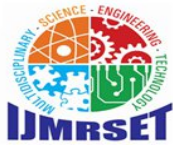
In recent years, recruitment has become more difficult due to rapidly changing job requirements and the continuous emergence of new industry skills. Many traditional job portals mainly focus on posting vacancies and collecting resumes, but they provide limited support for evaluating how well a candidate fits a role or for guiding users in improving missing skills. As a result, hiring becomes less efficient and job seekers often struggle to meet employer expectations. In addition, the absence of strong verification processes and intelligent matching features reduces trust and transparency in recruitment platforms. With the growth of data-driven technologies and intelligent systems, there is a clear demand for solutions that can connect candidate abilities with job requirements while also supporting continuous upskilling. To meet these needs, this project proposes a secure, role-based recruitment platform that combines job recommendation, skill gap identification, and administrative monitoring to improve both hiring efficiency and career development.

1.1 PROBLEM STATEMENT

Fresh graduates and early-career job seekers often face difficulty in identifying suitable job opportunities due to mismatches between their existing skills and current industry requirements. Conventional job portals mainly provide vacancy listings and basic filtering, but they rarely offer accurate profile-job suitability evaluation or structured guidance for improving missing competencies. As a result, candidates spend significant time applying for roles that do not match their qualifications, while recruiters receive large volumes of less relevant applications. Additionally, the lack of verification and controlled access in many platforms reduces trust and increases the possibility of unreliable job postings. Therefore, there is a need for a secure and intelligent recruitment system that can (i) compute job relevance based on user profiles, (ii) identify skill gaps for targeted roles, and (iii) recommend personalized learning paths to enhance employability and improve recruitment efficiency.

1.2 OBJECTIVE OF THE STUDY

The objective of this study is to develop an automated recruitment assistance platform that improves the alignment between candidate profiles and job role requirements. The system is designed with an authorization-based onboarding



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process to validate users and companies before granting access. It aims to support organizations in publishing job vacancies, reviewing applications, and managing shortlisting and interview-related workflows through a structured interface.

The study also focuses on enabling job seekers to maintain complete professional profiles containing academic background, skills, project experience, internships, and certifications. A key objective is to compute a relevance score that represents the suitability of a user for a selected job role. In addition, the system aims to identify missing skills for target roles and provide personalized upskilling recommendations, including learning resources and estimated time required for completion. Another objective is to improve interaction efficiency by enabling direct communication between recruiters and applicants. Finally, the platform includes administrative supervision to maintain transparency, control access approvals, and ensure reliable system operation, ultimately improving placement outcomes while encouraging continuous skill development.

II. LITERATURE REVIEW

Several studies have explored job recommendation, skill gap identification, and career guidance using machine learning and data-driven techniques. The following works are closely related to the proposed system.

In paper [1], Mashayekhi et al. introduced ReCon, a scalable job recommendation approach that reduces recommendation congestion using optimal transport, improving fairness and coverage in job suggestions.

In paper [2], Ashrafi et al. proposed Career-gAIde, an AI-based framework that analyzes resumes to recommend suitable job roles and provides rapid re-education paths using deep learning and NLP.

In paper [3], Qin Shi presented a deep learning and big data-based employment management model focused on improving job matching for college students. The proposed approach learns feature interactions between student profiles and enterprise requirements to enhance recommendation accuracy. The results showed that the model effectively captured candidate–job relationships and improved employment matching performance.

In paper [4], Puji Catur Siswipraptini et al. conducted an analysis of real-world IT job postings to identify hidden patterns in job roles and required skills. The authors applied average-linkage hierarchical clustering to group job profiles and extract frequently occurring skill and technology keywords. The study highlighted the importance of structured job profile analysis to reduce skill mismatch and support curriculum updates aligned with industry needs.

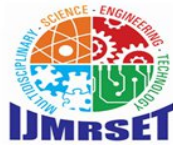
III. SYSTEM ARCHITECTURE

The system is a role-based recruitment platform with Admin, Company, and User modules. The admin verifies registrations to ensure secure access. Companies can post jobs and manage applications, while users maintain professional profiles. A recommendation engine calculates profile–job match scores, detects skill gaps, and suggests learning resources to support career development.

3.1 SYSTEM OVERVIEW

The system follows a three-tier architecture consisting of:

1. Presentation Layer (Frontend) – Developed using JSP and HTML to provide user interfaces for job seekers, companies, and administrators.
2. Application Layer (Backend) – Implemented using Java and Spring Boot to handle authentication, job posting, profile management, recommendation logic, and system workflows.
3. Data Layer (Database & Cloud Storage) – Uses MySQL to store user profiles, company details, job postings, applications, and skill-related data securely.
4. Development Environment (Tools & Platform) – The system is developed and executed on Windows 7/8/10 using an appropriate IDE for implementation and testing.



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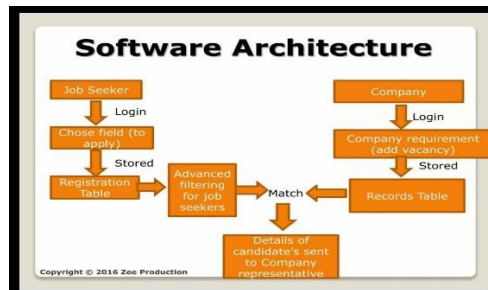


Fig.1 Architecture of the System

3.2 USE CASE ANALYSIS

The Use Case Analysis explains how different users interact with the proposed skill gap-aware Intelligent Job Recommendation System for Freshers. It identifies the actors, their interactions with the system, and key functionalities.

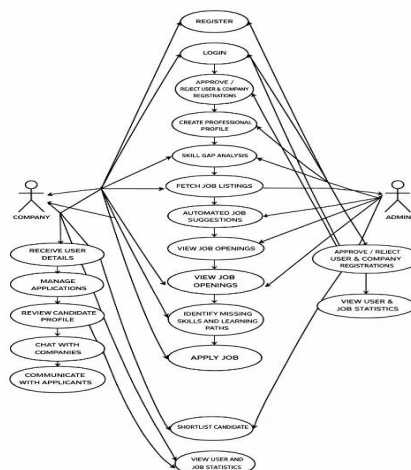


Fig.2 Use Case Diagram

Use Case Flow Example: Job Application with Skill Gap Support

1. The User logs in and creates a professional profile.
2. The user views job listings and selects a suitable job role.
3. The system calculates the profile–job match percentage.
4. The system identifies missing skills and recommends learning resources.
5. The user applies for the job and the company reviews the application.

This Use Case Analysis ensures that the platform supports efficient job matching, skill improvement guidance, and structured recruitment workflows.

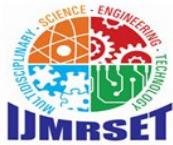
3.3 CLASS DIAGRAM ANALYSIS

The class diagram represents the structural design of the proposed Skill Gap–Aware Intelligent Job Recommendation System. It describes the major classes involved in the platform and explains how they interact to support job posting, profile management, application tracking, and recommendation generation.

Key Components and Their Roles

1. User Class

The User class stores the details of job seekers such as user ID, name, email, password, education, skills, projects, and certifications. It provides operations for viewing available jobs, applying for a selected job, and requesting skill gap information for a specific role. This class acts as the core entity for profile creation and job matching.



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2. Company Class

The Company class represents registered organizations. It contains attributes like company ID, company name, email, and password. It supports functions such as creating job postings, viewing received applications, shortlisting applicants, and communicating with candidates. This class is responsible for managing recruitment-related actions on the employer side.

3. Job Class

The Job class stores job-related information including job ID, title, description, location, and required skills. It provides methods to fetch job requirements and compute suitability by comparing job requirements with user profile details. This class plays an important role in match percentage calculation and job filtering.

4. Application Class

The Application class is used to manage job applications submitted by users. It contains details such as application ID, user ID, job ID, and status. It also includes methods to update application status and retrieve applicant details. This class helps in tracking the hiring process from application submission to shortlisting.

5. Admin Class

The Admin class handles system-level management and verification. It includes admin credentials and verification status. Its main operations include approving or rejecting user and company registrations and monitoring system statistics. This ensures secure access control and maintains system reliability.

The job matching process can be described in the following stages:

Profile Data Collection

The system stores user profile information in a structured format. Each profile includes a set of skills and additional attributes such as education and experience.

Let:

- U represent a user profile
- S_u represent the set of skills available in the user profile

Job Requirement Extraction

Each job posting contains a list of required skills and eligibility criteria.

Let:

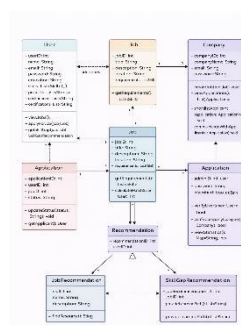
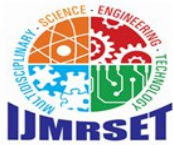


Fig.3 Class Diagram

3.5 DATA FLOW DIAGRAM (DFD)

The Data Flow Diagram represents how information moves between the User, Company, and Admin modules in the proposed system. Users and companies first submit registration details, which

- J represent a job posting
- S_j represent the set of skills required for the job



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Match Percentage Calculation

To compute the job match percentage, the system compares the overlap between user skills and job- required skills.

The match percentage is calculated using:

$$\frac{|S_u \cap S_j|}{|S_j|}$$

are forwarded to the admin for approval. After verification, users create professional profiles and companies post job openings. The system stores profile data, job details, and applications in the database. When a user searches for jobs, the system

Where:

$$\text{Match\%} = \left(\frac{|S_u \cap S_j|}{|S_j|} \right) \times 100$$

fetches job listings and calculates the profile–job match percentage. It also identifies missing skills and provides learning recommendations. Users can apply for jobs, and companies can review applications, shortlist candidates, and communicate with applicants. Admin monitors overall activity and maintains platform integrity.

IV. JOB MATCHING AND RECOMMENDATION ALGORITHM

The core functionality of the system depends on an intelligent matching and recommendation mechanism. Unlike conventional job portals that only display job listings, this platform evaluates user suitability and provides skill improvement guidance.

- $|S_u \cap S_j|$ is the number of matching skills
- $|S_j|$ is the total number of skills required for the job

This ensures that match scoring is based on actual job requirements rather than general keywords.

4.1 Skill Gap Identification

Skill gap analysis identifies the missing skills required for a selected job.

$$\text{SkillGap} = S_j - S_u$$

The output of this process is a list of missing skills that the user should acquire.

4.2 Learning Recommendation Generation

After identifying missing skills, the system maps each missing skill to learning resources such as online courses, tutorials, or training modules. The system also provides an estimated learning duration based on the complexity level of the skill.

For example:

- Beginner skills → 1–2 weeks
- Intermediate skills → 3–6 weeks
- Advanced skills → 2–3 months

This feature improves user employability by giving structured and realistic learning guidance.

4.3 Automated Job Suggestions

The recommendation engine generates job suggestions for users based on:

- Profile skillset
- Previous job interactions (viewed jobs, applied jobs)
- Match percentage scores

The system prioritizes jobs with higher match percentage and displays them on the user dashboard.

V. RESULTS AND DISCUSSION

5.1 RESULTS

The proposed system successfully provides an integrated recruitment platform that supports both job searching and skill development guidance. The implementation demonstrates that users can register, build professional profiles, search job listings, and apply for jobs through a structured workflow. Verified companies can post vacancies, manage applications, and shortlist candidates efficiently.



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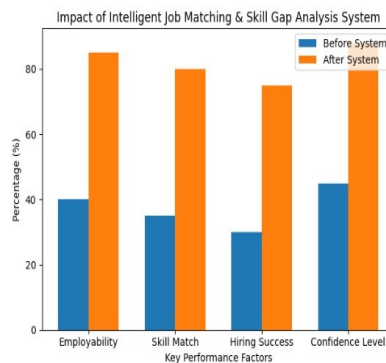
The system generates a profile–job match percentage by comparing job requirements with user profile skills. This helps users quickly understand their suitability for a specific job role. Additionally, the platform performs skill gap analysis to identify missing skills required for selected jobs. Based on the detected gaps, the system provides learning recommendations and estimated learning durations, enabling users to plan their upskilling process effectively.

The admin verification module improves platform reliability by approving or rejecting user and company registrations. This ensures controlled access and reduces the possibility of fake job postings. Overall, the system improves the recruitment process by combining job matching, skill gap detection, and secure interaction within a single platform.

5.2 Comparison with Existing System

Traditional job portals mainly focus on job postings and resume submissions. They typically provide only basic job search filters such as location, job role, and experience. In most cases, users must manually check job eligibility and apply without knowing how well their profile matches the job requirements.

In contrast, the proposed system introduces a structured recruitment workflow with admin-based verification to improve trust and transparency. The system also provides a match percentage score, which helps users identify suitable jobs quickly and reduces irrelevant applications. Another major improvement is the inclusion of skill gap identification and learning recommendations, which are not commonly available in conventional portals. This feature supports career development by guiding users toward the skills required for their desired roles.



Overall, the proposed system offers better recruitment efficiency, higher personalization, and improved employability support when compared to existing job portal systems.

VI. CONCLUSION

This project presented a Skill Gap–Aware Intelligent Job Recommendation System designed to improve recruitment efficiency and support fresher employability. Unlike traditional job portals that mainly provide job listings, the proposed platform integrates profile-based job matching, match percentage computation, and skill gap identification within a secure role-based framework. The system enables verified companies to post vacancies and manage applications, while job seekers can create detailed professional profiles, explore relevant job opportunities, and receive personalized upskilling recommendations. Administrative verification ensures controlled access and improves trust in the platform. Overall, the system provides a unified solution that not only connects candidates with suitable job roles but also guides them toward acquiring the skills required to meet industry expectations, thereby enhancing career readiness and improving the overall recruitment process.

VII. FUTURE SCOPE

Although the proposed system provides effective job recommendations and skill gap analysis, several enhancements can be introduced in the future to improve accuracy and scalability. One major improvement is integrating resume upload and automatic skill extraction using NLP techniques, which would reduce manual profile entry. The recommendation



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engine can be further enhanced using advanced machine learning models such as TF-IDF, BERT embeddings, or hybrid recommendation approaches to improve personalization.

The platform can also include real-time analytics dashboards for companies and admins, showing statistics such as top job roles, most in-demand skills, and application trends. Another future enhancement is integrating third-party APIs from platforms such as LinkedIn or online learning providers to provide verified job data and real course recommendations. Additionally, a mobile application version of the system can be developed to increase accessibility and user engagement.

These future enhancements can make the system more intelligent, scalable, and suitable for real-world deployment.

REFERENCES

- [1] Z. Guan, J.-Q. Yang, Y. Yang, H. Zhu, W. Li, and H. Xiong, "JobFormer: Skill-aware job recommendation with semantic-enhanced transformer," arXiv preprint arXiv:2404.04313, 2024.
- [2] E. Behar, J. Romero, A. Bouzeghoub, and K. Wegrzyn-Wolska, "TIMBRE: Efficient job recommendation on heterogeneous graphs for professional recruiters," arXiv preprint arXiv:2411.15146, 2024.
- [3] X. Han, C. Zhu, X. Hu, C. Qin, X. Zhao, and H. Zhu, "Adapting job recommendations to user preference drift with behavioral-semantic fusion learning," arXiv preprint arXiv:2407.00082, 2024.
- [4] R. Ern Yap, S. C. Haw, and S. Al-Juboori, "A comprehensive review on machine learning-based job recommendation systems," International Journal on Robotics, Automation and Sciences, vol. 7, no. 2, pp. 36–55, 2025.
- [5] B.-L. Foo, C.-Y. Ting, H.-N. Goh, A. Quek, and C.-L. Cham, "Dynamic job recommendation by profiling undergraduates academic performances," Journal of Informatics and Web Engineering, 2025.



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