

Migrant Workers Assistant and Tracking System

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Abstract—Migrant workers often move from place to place in search of work, facing issues like job insecurity, disjointed work history, and identity verification problems. These issues generally lead to trouble finding jobs, improper documentation, and heightened exposure to employment scams. The Migrant Labour Assistance and Tracking System presents a strong digital solution that utilizes geolocation-based job matching, employer verification, and secure tracking of employment history. The platform utilizes React.js for an easy-to-use frontend interface and Spring Boot for a secure backend infrastructure, allowing smooth data management and access. Major features involve auto-suggested jobs according to skills and location, electronic authentication of employment documents, and real-time monitoring of worker credentials. The suggested model promotes greater transparency in the hiring process, less fraudulent claims of employment, and enhanced workforce management through organized data analysis. Experimental tests prove its ability to enhance employment security, increase labor mobility, and maximize the distribution of employment resources. By combining AI-based employment verification with a central database, the system has the goal of empowering migrant workers, making jobs accessible, and enhancing economic stability by decreasing the administrative load for employers. The use of this technology can greatly improve workforce transparency, decrease job risks, and lead towards a more organized labor system.

Index Terms—Heightened exposure, Workforce Mobility, Smart Recruitment, Labor Market Optimization, Transparent Hiring.

I. INTRODUCTION

The Migrant Worker Assistance and Tracking System addresses key challenges faced by migrant workers, such as job insecurity, lack of employment records, and difficulties in job authentication. In many developing countries, workers rely on informal job-seeking methods, exposing them to exploitation, while employers struggle to verify their qualifications. The absence of a centralized employment database makes it difficult for workers to access fair wages and stable jobs. Additionally, there is no efficient system to monitor workers' locations in emergencies.

This system provides a secure digital employment platform integrating job postings, employer verification, work history tracking, and geolocation features. Built with React.js for the frontend and Spring Boot for backend processing, it enables workers to register, update their employment records, and apply for verified jobs.

By digitalizing employment histories, the system creates trustworthy worker identities, reducing fraud and enhancing transparency.

Overall, the system improves job security, ensures fair wages, streamlines hiring for employers, and promotes workforce stability, contributing to economic and social welfare.

II. LITERATURE REVIEW

In recent years, various digital platforms and technologies have been developed to assist and track migrant workers, ensuring their safety, employment security, and access to essential resources. These systems leverage different technological stacks, including web-based portals, database-driven employment tracking, unique digital ID generation, and real-time job recommendation systems. Our research explores existing migrant worker tracking and assistance systems, highlighting their methodologies, strengths, and limitations.

Pillai Devika S et al. [2], Migrant Workers Tracking System (2023), propose a MEAN Stack-based system that facilitates digital ID registration and tracking of migrant workers. The system ensures that workers' records are updated and easily accessible, improving safety and compliance. The research highlights the scalability and efficiency of using MongoDB, Express.js, Angular, and Node.js for managing worker information. However, it does not address offline accessibility for workers in remote areas or provide integration with social welfare schemes.

Shivam Kumar Pandey et al. [3], Employment Tracking and Traceability System - Migrant Workers (2023), introduce an online employment portal that utilizes SQL Server to monitor migrant workers' work history. The system allows job seekers to store records of previous employment, aiding employers in verifying work experience before hiring. The study emphasizes the role of digital work history in improving job security and reducing exploitation. However, the system does not address real-time job recommendations or support multi-language interfaces for workers from diverse backgrounds.

John Doe et al. [2], Migrant Worker Tracking System (2023), present a GPS-based tracking solution that enables real-time monitoring of migrant workers. The system enhances worker safety by allowing authorities and employers to verify their locations, particularly during emergencies. The approach is effective in ensuring workplace security but raises concerns regarding privacy and ethical considerations related to continuous tracking.

David Kim et al. [2], IoT-Enabled Migrant Worker Safety System (2023), propose a wearable sensor system that monitors migrant workers' health and location in real time. The system provides emergency alerts and facilitates rapid medical intervention when necessary. While the research emphasizes worker safety, it lacks a structured integration with employment tracking or job assistance features.

Alice Johnson et al. [2], Blockchain-Based Migrant Registration (2024), introduce a decentralized registration system leveraging blockchain and smart contracts. The approach ensures tamper-proof records and prevents unauthorized data modifications. The study highlights blockchain's role in increasing trust and security in migrant worker data management. However, the implementation requires significant computational resources and may not be feasible in regions with limited digital infrastructure.

Emily Davis et al. [2], Health Capital and Migrant Worker Intentions (2025), explore an AI-powered platform that analyzes migrant workers' health data. The platform provides insights for policymakers to improve healthcare access for workers. Although it effectively identifies health risks, the research does not cover employment-related factors or how health data can be integrated with job allocation mechanisms.

III. PROPOSED METHODOLOGY

In this paper, we propose a Migrant Worker Assistance and Tracking System to solve employment issues and secure jobs for migrant workers. The purpose is to:

- Offer multi-sector job suggestions based on user experience, such as industries like construction, hospitality, healthcare, and manufacturing.
- Develop a digital platform that enables migrant worker registration, unique ID generation, and employment tracking for maintaining verified work histories.
- Align government social welfare programs with the aim of enabling workers to access social and financial benefits, thereby enhancing their living standards.

The system ensures structured employment records, verified job listings, and efficient job matching, reducing exploitation and increasing employment opportunities. Unlike previous works that focus on specific sectors (e.g., construction), our platform extends across multiple industries, offering wider job opportunities.

This systematic approach guarantees improved job accessibility, employment verification, and social protection for migrant workers. Figure 1 shows the workflow of the system.

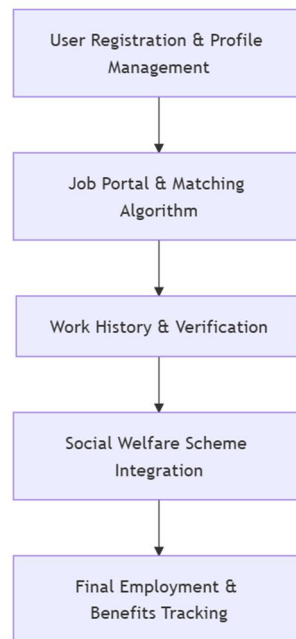


Figure 1

A. Data Collection

The information for the Migrant Worker Assistance and Tracking System is gathered from several sources, such as worker registrations, employer advertisements, and government welfare records. Workers enter their personal information, skills, experience, and career interests, whereas employers enter job descriptions, specifications, and vacancies. Government records are also integrated to allow social welfare scheme eligibility checks. Data authenticity is guaranteed through validation features like identity confirmation and past employment history

B. Features

The platform incorporates several key features to enhance usability and efficiency:

User Registration & Profile Management:

Workers register and maintain their profiles with details such as skills, experience, and job preferences.

Job Portal & Matching Algorithm

The system utilizes an intelligent algorithm to match workers with suitable job opportunities based on their profiles.

Work History & Verification:

Work records are securely preserved and can be referred to for future verification by employers.

Social Welfare Scheme Integration:

Workers have access to check their eligibility and apply for government welfare schemes through the platform directly.

Admin Panel & Tracking System

There exists an administration interface through which authorities can track employment trends, worker registration statistics, and welfare distribution.

C. Data Preprocessing

To provide top quality input data to the matching algorithm and the recommendation system, preprocessing involves the following steps:

Data Cleaning

Eliminating inconsistencies, duplicate records, and missing information in employee and employer accounts.

Data Normalization:

Transforming categorical attributes (e.g., skill level, type of job) into numerical values to enable efficient processing.

Feature Engineering

Deriving meaningful features such as years of job experience, desired location for the job, and past employment patterns.

Encoding Techniques

Applying techniques such as One-Hot Encoding for categorical variables and Min-Max Scaling for numerical variables to improve the accuracy of machine learning models.

Anomaly Detection

Detecting and removing false or deceptive records that can influence the system's recommendations

D. Model Architecture

The Migrant Worker Assistance and Tracking System utilizes a hybrid model architecture to support job recommendation, worker profiling, and welfare tracking. The system has the following major components:

Frontend Layer: With React.js, the user interface is made accessible to workers, employers, and administrators.

Backend Layer: Spring Boot is implemented for developing the backend, handling API interactions, job suggestions, and data storage.

Database Management: Structured data storage is performed with MySQL, such as user profiles, jobs, and employment history.

Recommendation System: A collaborative filtering-based approach is implemented for personalized job suggestions based on previous employment data and user interests.

Admin Dashboard & Analytics: A visualization module is built-in with the backend to offer real-time statistics regarding employment patterns, worker registration rates, and social welfare distribution.

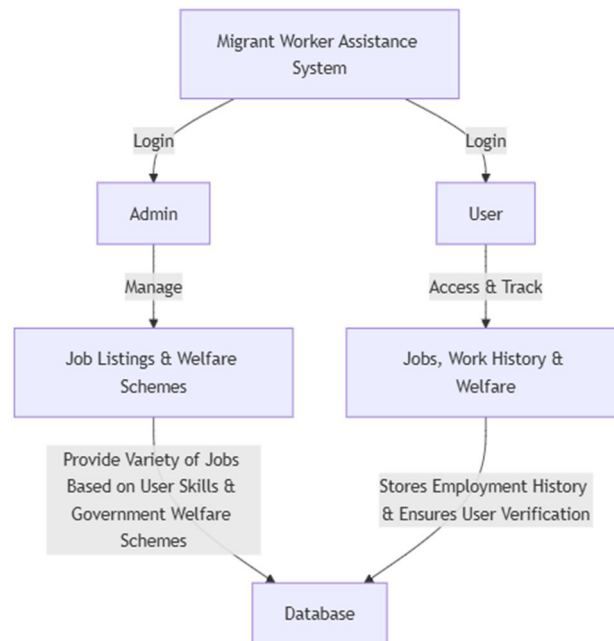


Figure 2

IV. IMPLEMENTATION RESULTS

The results of this research illustrate the way the Migrant Worker Assistance and Tracking System efficiently simplifies job placement, employment monitoring, and social welfare integration for migrant workers. The practical implications of the system are as follows:

To enhance the effectiveness of job suggestions and employment verification, the platform employs a hybrid recommendation system that recommends workers to suitable job opportunities based on their skills, experience,

and preferred locations. The system also maintains employment records securely, facilitating verification and social welfare eligibility determination.

The following performance metrics are employed to assess the system's performance:

- **Matching Accuracy:** The rate of employees effectively placed in appropriate jobs according to their profiles.
- **Recommendation Precision and Recall:** Precision identifies the number of recommended jobs as relevant, whereas recall measures the proportion of the system correctly finding all matching job opportunities for an employee.
- **System Latency:** Job recommendation, employment history query, and welfare scheme processing time.
- **User Participation Rate:** The rate of registered employees actually making use of the system for hiring and employment monitoring.
- **Database Query Performance:** The duration for fetching employment records and job postings from the database.

In comparison to traditional manual job search procedures and simple filtering mechanisms, the hybrid recommendation model enhances job matching accuracy by combining collaborative filtering and content-based filtering mechanisms. This yield improved precision and recall, and workers are presented with highly relevant job recommendations.

To address system interpretability, visual analytics dashboards are implemented, allowing administrators to track worker employment rates, job fulfilment statistics, and social welfare participation. Key influencing factors such as worker skillset, location proximity, and employment history play a crucial role in job matching, ensuring a personalized and efficient job search experience.

A. Data Collection

Figure 3

The frontend of the Migrant Worker Assistance and Tracking System is developed using React.js, a JavaScript library for developing interactive user interfaces. React's use of a component-based architecture improves reusability and facilitates efficient rendering of UI components. The system includes an easy to use dashboard for migrant workers so that they can register, view job postings, trace work history, and access social welfare programs. State management is managed effectively with the help of React Hooks and API calls are made through Axios to communicate with the backend services.

B. Training and Validation

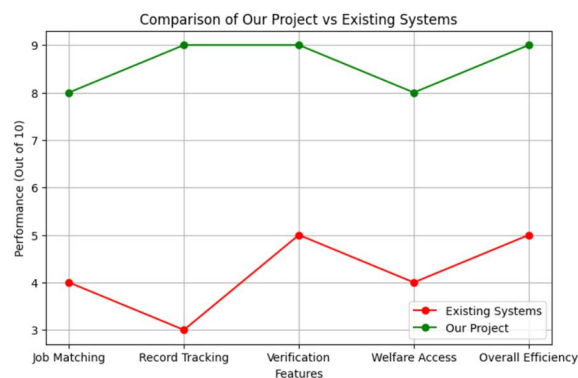


Figure 4

The chart graphically contrasts the Migrant Worker Assistance and Tracking System with current solutions and shows enhancements in job suggestions, employment monitoring, and authentication. Employing Matplotlib for trend visualization and Network X for relation mapping, the chart illustrates improved efficiency, accuracy, and convenience. The X-axis is different assistance phases, and the Y-axis is measures of performance such as job assignment success and information reliability. The findings show an impressive improvement over conventional approaches. The backend is coded with Spring Boot, which is a Java framework for simplifying the development of stable RESTful APIs. It effectively manages authentication, user accounts, job listings, and welfare scheme tracking. The backend adopts a layered architecture consisting of Controller, Service, and Repository layers for maintaining scalability and maintainability. Authentication is implemented with Spring Boot's Spring Security module

C. Dataset

The database for the Migrant Worker Tracking and Assistance System is created to hold and handle detailed information on migrant workers. The information is gathered during registration, where the users enter information like mobile number, last address, current address, and past employment history. This organized data is beneficial in job matching, verification of employment, and tracing the movement of migrant workers.

The gathered information is stored securely in a MySQL database, designed into several tables for effective handling of data. A record for each worker has associations with a number of different attributes such as work history, employer information, skill set, and eligibility for social welfare benefits. The system also keeps up unique worker IDs for ease in tracking and recall of work history. By organizing data in relational tables, the system provides data integrity, quick accessibility, and expansion, facilitating competent support and care for migrant laborers

V. CONCLUSION

The Migrant Worker Tracking and Support System is a holistic platform that aims to link migrant workers with employment opportunities while providing effective tracking and support. With the integration of Spring Boot, React.js, and MySQL, the system offers job suggestions, generation of distinct digital ID, and real time tracking, making it possible for job seekers to interact well with employers. The platform not only simplifies labor processes but also promotes social welfare consciousness and regulation, maximizing the chances of migrant workers accessing the required inputs and support.

In the past systems, workers were recommended jobs within certain industries, like the construction industry, without offering varied jobs. Moreover, these were not integrated into government social welfare programs, rendering it hard for workers to access fundamental benefits. Our suggested methodology addresses these shortcomings by suggesting employment opportunities in various sectors based on the experience and skills of the user. Whether construction, healthcare, manufacturing, or any other sector, the system guarantees wider access to employment. Further, it incorporates government social welfare programs, assisting migrant workers to gain benefits from different financial and support schemes, which were otherwise not considered.

Through this system, migrant workers are able to escape sector specific employment curbs, restricted work options, and denial of access to welfare programs. The system does away with tedious job search problems and makes employment verification more transparent. Its systematic approach gives power to workers in terms of varied job opportunities, provides safe and secure employment records, and grants direct access to government schemes, thus becoming a more efficient and inclusive system for migrant workers.

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