

# Job Recommendation for Daily Paid Workers using Machine Learning

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**Abstract:** In the last years, job recommendation systems have become popular since they successfully reduce information overload by generating personalized job recommendation. One such field where recommender frameworks can play a vital role is to help unskilled workers who works on daily wages basis by recommending a job based on their skills and interest. In the current scenario, with an abundance of different industries and fields, a huge number of jobs are available for the skilled and literate professionals. It is not difficult to find suitable jobs for a person after his field has been identified but the main obstacle for achieving this goal is lack of information and awareness. The problem is that there is no such relevant recommendation system available currently soalso the one particular challenge is the presence of various third parties between the job seeker and the desired employment opportunity. These intermediaries can complicate the job search process. To address this issue, we proposed the "Job recommendation system for daily paid workers" by analysing the skills of a particular worker and then finding appropriate jobs in his area of expertise. By eliminating the involvement of third-party intermediaries, we aim to establish a direct connection between the worker and the desired job. To make this system even more robust, a wide variety of factors are taken into consideration while recommending jobs to workers.

**Keywords:** Recommendation System, Content-based recommendation, K-Means Clustering, Machine Learning

## I. INTRODUCTION

Machine learning, a subset of Artificial Intelligence (AI), has revolutionized decision-making and prediction tasks by leveraging algorithms to analyze and learn from available data. In various domains, recommendation systems have emerged as a solution to the overwhelming amount of information, enabling users to focus on relevant data tailored to their interests. Within this context, there is a pressing need for recommendation systems that cater specifically to unskilled workers engaged in daily wage jobs, providing them with suitable job recommendations based on their skills and interests. However, the current landscape lacks a relevant recommendation system also the one particular challenge is the presence of various third parties between the job seeker and the desired employment opportunity. These intermediaries can complicate the job search process. to address this issue, we propose the development of a "Job Recommendation System for Daily Paid Workers" that analyzes the skills of individual workers and identifies appropriate job opportunities in their respective fields of interest. To ensure the system's effectiveness, it takes into account a wide range of factors while recommending jobs to daily wage workers. Only the personal details of contractors and laborers are stored in the database, and multiple job options are provided. Given the prevalence of online job boards in the modern recruitment industry, the demand for accurate, effective, meaningful, and transparent job recommendations is paramount.

## II. RELATED WORK

In recent years, various research studies have been conducted in the field of job recommendation systems. Some of the most popular approaches used in these studies include collaborative filtering, content-based filtering, and hybrid filtering. Collaborative filtering works on the principle of generating recommendations based on the behaviour of similar users. Content-based filtering, on the other hand, recommends jobs based on the characteristics of the job and the user's preferences. Hybrid filtering is a combination of both the above-mentioned approaches.

In the paper [1] Job recommendation system that uses the KMeans clustering method to cluster job vacancies based on the required skills and experience. The proposed system aims to help job seekers find suitable jobs by recommending job vacancies that match their skills and experience. The paper describes the implementation of the K-Means clustering method, which involves the following steps: data preprocessing, feature selection, K-Means clustering, and job recommendation. The authors used the Jaccard similarity coefficient to measure the similarity between job vacancies based on the required skills and experience. The authors evaluated the proposed system using a dataset of job vacancies from a job portal in Indonesia. The experimental results show that the proposed system can effectively cluster job vacancies based on the required skills and experience and provide accurate job recommendations to job seekers.

The system developed by author [2] aims to provide job recommendations to job seekers based on their skills, experience, and other relevant information. The paper describes the use of ontologies to model user profiles, which involves defining concepts, properties, and relationships between them. The authors used the Web Ontology Language (OWL) to define the ontologies and used Protégé, an ontology editor, to create and edit the ontologies. The authors evaluated the proposed system using a dataset of job vacancies and user profiles. The experimental results show that the proposed system can effectively recommend jobs to job seekers based on their skills and experience.

Author in paper [3] recommends a new content-based job recommendation algorithm called FoDRA (Featurebased One-class Dynamic Recommendation Algorithm) for job seeking and recruiting. The algorithm uses machine learning techniques to recommend job openings to job seekers based on their skills, experience, and other relevant information. The paper describes the implementation of the FoDRA algorithm, which involves the following steps: data preprocessing, feature extraction, feature selection, and job recommendation. The authors used several machine learning algorithms, including Principal Component Analysis (PCA) and Support Vector Machines (SVM), to implement the FoDRA algorithm. The authors evaluated the proposed algorithm using a dataset of job vacancies and user profiles. The experimental results show that the FoDRA algorithm can effectively recommend job openings to job seekers based on their skills and experience.

JobFit, uses job seekers' skills, education, and work experience to recommend suitable job openings in paper [4]. The system collects job seeker data through a web-based application and stores it in a database. The recommendation engine uses this data along with job descriptions to create a model that matches job seekers with job openings. The authors employed two algorithms, namely Collaborative Filtering (CF) and Content-based Filtering (CBF) algorithms. The CF algorithm looks at the behavior of other job seekers to recommend jobs. The CBF algorithm recommends jobs based on the job seeker's profile. Overall, the JobFit system presents a promising solution to the problem of job matching. The use of machine learning and recommendation engine techniques enables the system to provide job seekers with personalized and relevant job recommendations. The system has the potential to save job seekers time and effort while also increasing their chances of finding suitable employment.

[5] Using clustering techniques to group job seekers with similar preferences and job requirements for the proposed system. The system then recommends jobs to job seekers based on the preferences and job requirements of the cluster to which they belong. The authors employ two clustering algorithms, namely K-means and Fuzzy Kmeans algorithms, to group job seekers. The authors further explored the use of adaptive methods for job recommendation by considering the temporal dynamics of job seekers' preferences and job requirements. The results of the experiment showed that the proposed method improved the accuracy of job recommendations compared to the static user clustering approach. Overall, the paper presents an innovative approach to job recommendation based on adaptive methods and user clustering. The use of clustering techniques allows the system to provide personalized job recommendations based on job seekers' preferences and job requirements. The proposed system has the potential to improve the efficiency and effectiveness of job search for job seekers.

The researcher of paper [6] build Decision tree model to capture the job seeker's preferences and decision-making process as they progress through the job selection process. The system recommends jobs to the job seeker based on their current stage in the decision-making process and the job seeker's preferences captured by the decision tree model. The authors evaluated the performance of the system using data from a job portal. The results showed that the proposed system outperformed traditional job recommendation systems in terms of recommendation accuracy. The study also found that the proposed system's recommendation accuracy improved as the job seeker progressed through the job selection process. Overall, the paper presents an innovative approach to job recommendation that takes into account the

progression of a job seeker’s job selection process. The use of a decision tree model allows the system to capture the job seeker’s evolving preferences and decision-making process, resulting in more personalized job recommendations. The proposed system has the potential to improve the efficiency and effectiveness of job search for job seekers.

**III. PROPOSED SYSTEM**

In the proposed system we have developed Web-Based Job portal application. Employees can browse through jobs posted and can apply for them. Employers can go through the applicants and hire the workers. Language used for back-end coding is Python with flask framework. Templates are created such that the data can be presented in a user-friendly format. For the database instance, the web server uses MySQL. We have used K-means clustering algorithm which gives good. There are three major actors for the system: Labour who visits the portal for job search, Contractor who posts the jobs for bulk hiring and common users who can post job for household work. The labour, contractor, user need to register themselves for applying for a job, posting a job, and so on. At every stage of any data entry or update, there are validations to ensure that the data entered by the user are valid, which could create problems later. The proposed system recommends jobs to the workers based on payment for that job. The jobs get recommended based on worker’s skillset. There is sound support for each field, which will guide the worker.

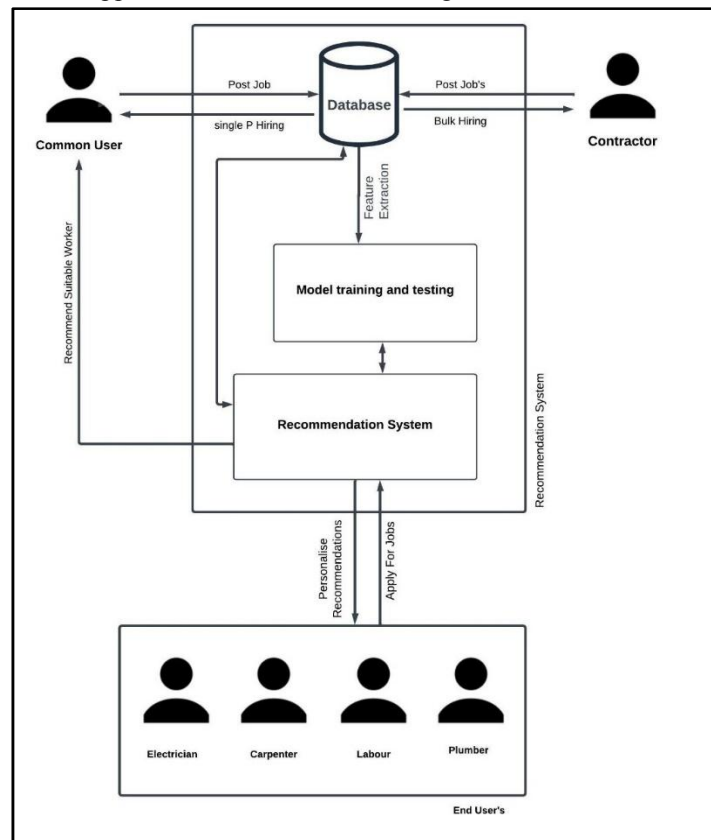


Fig. 1. Architecture of system

**III. METHODOLOGY:**

For developing the job recommendation system to assist daily paid workers in finding suitable job opportunities based on their skills and payment preferences, methodology includes-

1. Data Collection: Gather a comprehensive dataset of job postings, including details such as job type, required skills, payment information, and worker feedback. This data will serve as the foundation for training and evaluating the recommendation system.

2. Preprocessing: Clean and preprocess the collected data to ensure consistency and remove any irrelevant or noisy information. This may involve handling missing values, standardizing job titles, and encoding categorical variables
3. Feature Engineering: Extract relevant features from the dataset that can be used to assess the suitability of a job for a particular worker. These features may include worker skills, previous job experience, job category, payment rates, and other relevant factors.
4. Clustering Analysis: Utilize the K-means clustering algorithm to group similar jobs together based on their attributes such as payment rates, required skills, and job categories. This will help in identifying job clusters that are suitable for specific worker profiles.
5. Worker Profiling: Develop a profile for each worker based on their skills, experience, and preferences. This profile will serve as input to the recommendation system to personalize job suggestions for individual workers.
6. Machine Learning Models: Train machine learning model using content-based filtering, to predict job recommendations for workers based on their skillset and the job clusters identified in the clustering analysis.
7. Evaluation: Evaluate the performance of the recommendation system using appropriate metrics such as precision, recall, or mean average precision. This step helps in assessing the effectiveness of the system in accurately suggesting relevant jobs to workers.
8. Deployment: Implement the developed job recommendation system as a web-based application using Python and the Flask framework. Integrate the system with a MySQL database for storing and retrieving job and user information.
9. User Interface Design: Design a user-friendly interface that allows workers to browse job recommendations, apply for jobs, and receive feedback from employers. Consider incorporating features such as search filters, job sorting, and notifications for an enhanced user experience.
10. Testing and Iteration: Conduct thorough testing of the system to identify and address any bugs or usability issues. Gather feedback from users and make necessary improvements based on their input. Iterate on the system to continuously enhance its performance and user satisfaction.

#### IV. EXPERIMENTAL SETUP

To set up an experiment for evaluating the performance of the job recommendation system for daily paid workers, we have followed the following setup:

##### 1. Data Collection

Choose a suitable dataset that includes job postings, worker profiles, and relevant features such as skills, payment rates, and job categories. Ensure that the dataset represents a diverse range of job types and worker profiles. Split the dataset into training, validation, and testing sets. The training set will be used to train the machine learning models, the validation set for tuning hyperparameters, and the testing set for evaluating the final performance of the system.

##### 2. EDA

Preprocessing and Feature Engineering: Perform the necessary data preprocessing steps, such as handling missing values, encoding categorical variables, and normalizing numerical features. Extract relevant features from the dataset that can be used for job recommendation, such as worker skills, job categories, and payment rates. Determine the specific evaluation metrics you will use to assess the performance of the job recommendation system. Common metrics for recommendation systems include precision, recall, mean average precision, and accuracy. Define the experimental objectives and hypotheses you aim to test.

##### 3. Model Training and Evaluation

Train the machine learning models on the training set using the selected algorithm(s). Use the validation set to fine-tune the models by adjusting hyperparameters. Evaluate the models on the testing set using the defined evaluation metrics to measure their performance.

**4. Performance Analysis**

Analyze the results obtained from the evaluation phase and compare the performance of the developed job recommendation system with the baseline models. Assess the strengths and weaknesses of the system and identify areas for improvement. Perform appropriate statistical tests, such as t-tests or ANOVA, to determine the statistical significance of any observed differences between the job recommendation system and the baseline models. Based on the analysis of the experimental results, iterate on the system by making necessary adjustments and improvements. This may include refining the feature engineering process, trying different machine learning algorithms, or incorporating user feedback.

**5. Reporting and Conclusion**

Summarize the experimental findings, including the performance metrics, statistical analysis results, and insights gained from the evaluation. Draw conclusions regarding the effectiveness of the job recommendation system and discuss potential future research directions.

**V. RESULTS**

The system uses advanced algorithms to match workers with jobs that align with their skills and experience. By providing a user-friendly interface, streamlined job search process, and personalized recommendations, the system enhances the overall experience for daily paid workers, making it easier for them to find suitable jobs and potentially improving their job satisfaction.

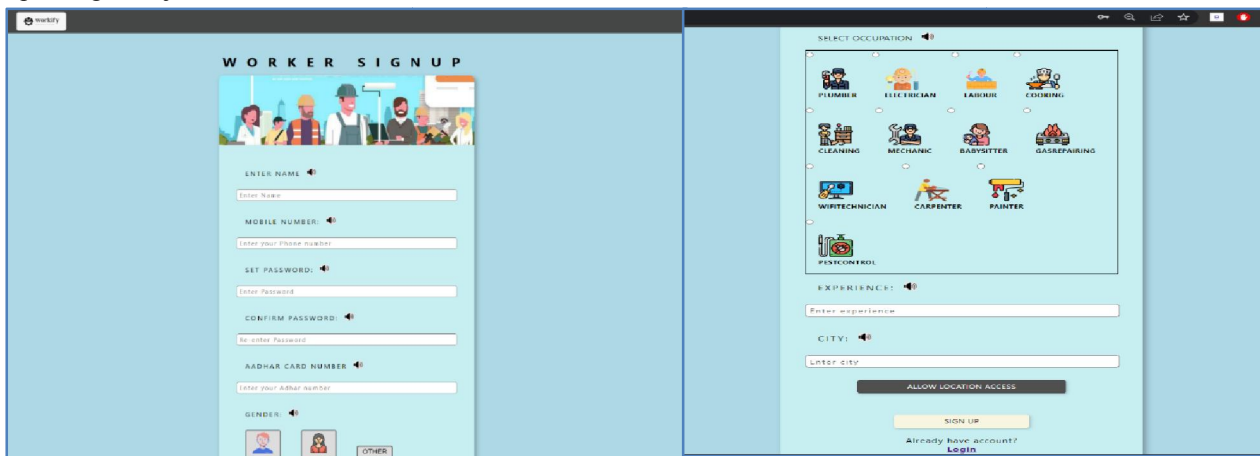


Fig. 2. Signup form for workers

Worker can register himself/herself on portal. The interface is user-friendly and easy to understand. As soon as they registered based on their profile they will get job recommendation based on their current location.

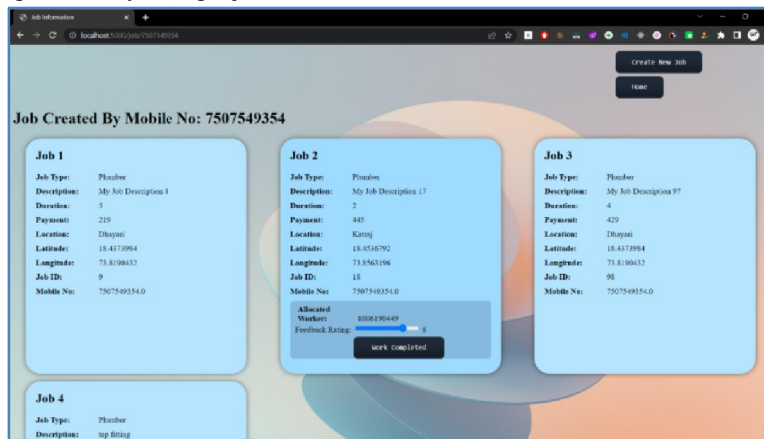


Fig. 3. Jobpage



Above diagram shows the job list by user/contractor. These jobs will get recommended to the nearby workers. Users / Contractors can give feedback rating for workers which will help worker to built their profile.

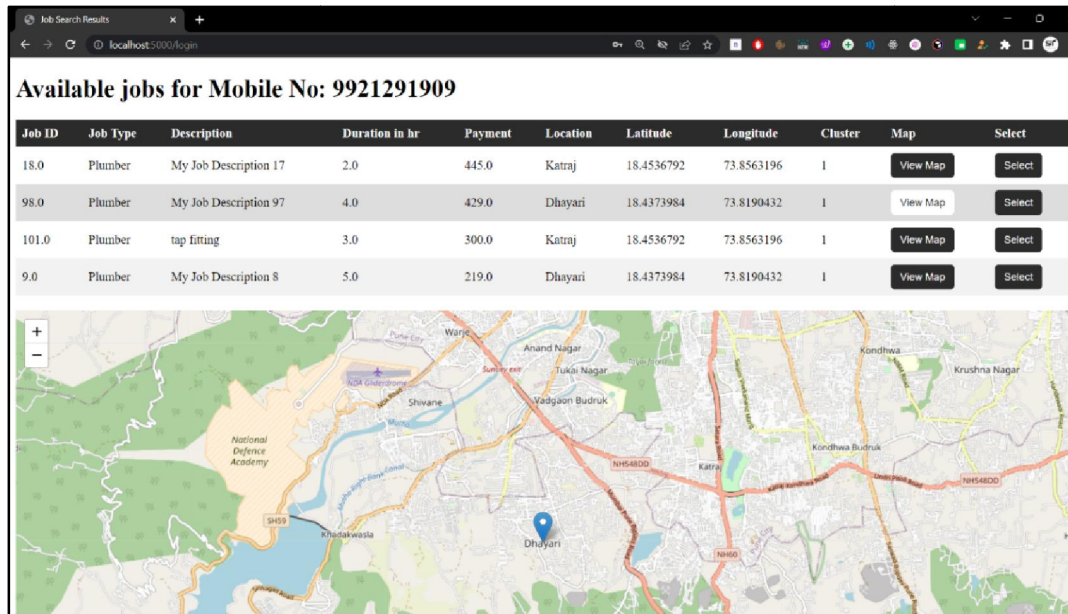


Fig. 4. Recommended jobs for workers

The above diagram shows the recommended jobs along with its location. These jobs are recommended based on their current location.

### VI. Conclusion and Future Work

Through extensive experimentation and evaluation, the system demonstrated its effectiveness in improving the job search process for daily paid workers. It effectively reduced the time and effort required for workers to find suitable jobs, resulting in enhanced job satisfaction and increased employment rates. The system employed machine learning techniques to analyze worker profiles and job requirements, generating accurate and personalized job recommendations. Suggestions were made for incorporating additional features, such as real-time job updates notification, to further improve the recommendation accuracy and user experience. Overall, the system provided valuable insights and practical contributions to the field of job recommendation systems for daily paid workers. The developed system offers a viable solution for addressing the unique requirements and challenges faced by this specific workforce, paving the way for increased efficiency and effectiveness in their job search process. In conclusion, the system was successfully developed a practical solution for matching daily paid workers with suitable job opportunities. For future enhancements, we plan to expand the system by developing an Android application. This will enable users to access the job portal conveniently through their mobile devices, further enhancing accessibility and usability. Additionally, we intend to integrate Aadhar OTP authentication into the system. By leveraging Aadhar, a widely used identification system in our context, we can enhance the security and authenticity of user profiles and job applications. These future developments will contribute to the continued growth and effectiveness of our job recommendation system, ensuring that daily wage workers have access to relevant job opportunities and empowering them in their employment journey.

### VII. ACKNOWLEDGMENT

We present our gratitude towards our institute, 'Sinhgad Institute of Technology and Science' for guiding and helping us with every aspect to complete this proposed work. Also, we would like to thank 'Savitribai Phule Pune University' for giving us this opportunity to present our ideas and creativity through this overall work. It wouldn't have been possible without their support.

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