

Employment Recommendation System Using Machine Learning

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Abstract: - *The unorganized sector forms a significant portion of the workforce in developing countries, particularly in India. One of the important sectors of the Indian economy is the informal labour market. It is difficult for workers from various regions of the country to contact industry or entrepreneurs for jobs that are far from their state/settlement, which causes an increase in the country's unemployment rate. So, in search of job opportunities, they contact labour developers who take some of their wages as a commission to link them up. There is a close-knit kinship amongst workers, skilled unskilled, leading to sharing of information on potential work availability on a new site. If such information can be made available to the worker on a regular systematic way Workers can get gainful employment continuously without breaks. They can avoid fruitless travel in search of work with this indentation a study was conducted to find out the requirements of workers other stake holders such as contractors. In this paper, we propose a web portal with a job recommender system to connect unorganized workers to their employers and find the right job. This proposal will solve unorganized workers' difficulties with informal employment and will connect unskilled laborer's from different parts of the nation for their employment without any commission and bring positive change in the employment rate.*

Keywords: Recommendation System, Support Vector Machine (SVM), Machine Learning, Classification, etc.

I. INTRODUCTION

Machine learning is a sub-field of data science that concentrates on designing algorithms which can learn from and make predictions on the data. Presently recommendation frameworks are utilized to take care of the issue of the overwhelming amount of information in every domain and enables the clients to concentrate on information that is significant to their area of interest. Recommendation engines are a subclass of machine learning which generally deal with ranking or rating products / users. Loosely defined, a recommender system is a system which predicts ratings a user might give to a specific item. These predictions will then be ranked and returned back to the user. In this domain recommender systems play a significant role is to help unskilled workers by recommending a job based on their interest and skillset.

The COVID-19 pandemic changed the face of Indian workforce. Many workers lost their jobs due to the lockdown, impacting the livelihood of large part of population. As lockdown eases and worksites open up, many migrant labours and daily wage workers are struggling to find the right jobs. Also, there are many platforms for skilled workers to display their resumes and search for jobs and enhance their skills by posting updates but not for unskilled labourers so our system will help them to get a job and also recommend best worker to recruiter. Our system will be more useful to find the job for unskilled laborers. Benefits of employment recommendation systems is their ability to offer unique personalized service for a particular user, increase trust and customer loyalty. To make this system even more robust, it helps us to find the right job based on the workers' preferences, ratings, experience, location and other similar user's interactions.

II. RELATED WORK

Mukesh Kumar Kharita et al; Khushbu Jalan, Kiran Gawande [1] [7] have stated that Collaborative filtering is one of the most effective and adequate technique used in recommendation. The fundamental aim of the recommendation is to provide prediction of the different items in which a user would be interested in based on their preferences. Recommendation systems based on collaborative filtering techniques are able to provide approximately accurate prediction when there is enough data. User based collaborative filtering techniques have been very powerful and success in the past to recommend

the items based on user's preferences. But there are also some certain challenges such as scalability and sparsity of data which increases as the number of users and items increases. In a large website, it is difficult to find the interested information in a certain time. But the recommendation system filters out information and items that are best suitable for us. Although there are different recommendation approaches, yet collaborative filtering technique is very popular because of the effectiveness. In this work, movie recommender system has been described, which basically uses item-based technique of collaborative filtering to provide the recommendations of items, which is dynamic and will learn from the positive feedback.

Wenxing Hong et al [2] propose a dynamic user profile-based job recommendation system. To address the challenge that the job applicants do not update the user profile in a timely manner, they update and extend the user profile dynamically based on the historical applied jobs and behaviors of job applicants. In particular, the statistical results of basic features in the applied jobs are used to update the job applicants. In addition, feature selection is employed in the text information of jobs that applied by the job applicant for extending the feature. Then a hybrid recommendation algorithm is employed according to the characteristics of user profiles for achieving the dynamic recommendation.

S. R. Rimitha et al [3] [6] have stated that, the recommendation system uses prior obtained information about the user to present user interested data. Personalized results aim to provide relevant information to the user based on the user's basic information or activity with the system. The user's basic information can be modeled into a user profile using ontology. Ontology is the systematic representation of various entities in a domain and the relationships between them. In this paper, we aim to present the conceptual model for a job recommendation system that uses ontology-based user profiles. The system collects basic information and models into a user profile. The dynamic aspects such as favorite jobs list and recently viewed jobs are then used as a source of data for the system. The recommendation algorithm works on the input given to present the list of relevant jobs to the user.

Azlina Johari et al [4] in his paper presents the development of an online-based continuous assessment repository system designed to cater the needs for both lecturers and students. Conventional methods of notifying continuous assessment marks, e.g., test or assignment marks to students include displaying the students' marks on the bulletin boards or merely by returning the marked tests or assignments to students. While these are common practices, some lecturers are doing a better job by taking advantages of the Internet, i.e., by uploading their students' carry marks onto the student portal or by notifying students about their results via emails. The proposed system offers useful features for lecturers to upload their students' continuous-assessment marks onto an online database. This system provides an interface for the students to view their ongoing assessment marks throughout the semester via a web browser. Being an online based system, it provides 24-hour access for students via any types of electronic devices with data connection that are able to run a web-browser. This system offers additional advantages when compared with other online systems, where it does not only display the raw marks obtained by students, but also the analysis of the marks and targeted final exam mark based on currently achieved marks. Having such a system will benefit not only the students but also for the faculty to progressively monitor students' performance throughout the semester.

In [8] today's highly competitive job market, it is becoming increasingly important for companies to hire employees who are best fit for a job and to ensure they retain these employees in the long run. Studies have shown that employees who find their job meaningful and satisfying are generally more productive and less likely to leave the job. Human Resource professionals therefore need to ensure that proper screening of candidates is conducted during the recruitment process and that they hire the best fit candidate for a job. Given the usually high number of applicants for a particular job, the recruitment process is time consuming, and it is not always possible to conduct proper screening and interviews for each applicant. This paper presents the development of Job Fit, a job recommendation system which makes use of a recommender system, machine learning techniques and past data to predict the best fit candidate for a job. The proposed job recommendation system takes as input the requirement of a job and the profile of the applicants and outputs a Job Fit score indicating how fit each applicant is for the particular job. The system ultimately provides the HR professionals with a sorted list of all candidates with those who are more fit and apt for the job recommended first. This shall help to ensure the HR focus on the screening and interviews of only a small pool of candidates, the best ones recommended by the system, while at the same time be confident that the better candidates are not being missed.

Job recommender systems [9] are designed to suggest a ranked list of jobs that could be associated with employee's interest. Most of existing systems use only one approach to make recommendation for all employees, while a specific method

normally is good enough for a group of employees. Therefore, this study proposes an adaptive solution to make job recommendation for different groups of users. The proposed methods are based on employee clustering. Firstly, we group employees into different clusters. Then, we select a suitable method for each user cluster based on empirical evaluation. The proposed methods include CB-Plus, CF-jFilter and HyRjFilter have applied for different three clusters. Empirical results show that our proposed methods are outperformed than traditional methods.

Social network [10], e-commerce sites, blogs are new emerging platforms for people to express their opinion. These sites contain huge amount of text which can be used for different purpose like Sentiment Analysis. Sentiment Analysis is a growing field in natural language processing. Sentiment analysis is major focused on company's improvement. But sentiment analysis can be useful in recommendation system also. Based on various performance measures, this paper compares the results of machine learning algorithms like Multinomial Naive Bayes algorithm, Logistic Regression, SVM Classifier, Decision Tree and Random Forest. These algorithms are used for sentiment analysis of reviews and in turn for product recommendation. In proposed system, Random Forest shows outstanding performance. To create suitable recommendations using the analysis of emotions, there is a need to use polarity obtained through the reviews.

III. PROPOSED SYSTEM

The proposed system is a 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. For the database instance, the web server uses DB SQLite. Suitable templates are created using tkinter so that the data can be presented in a user-friendly format. We have used Support Vector Machine algorithm which gives good performance & we got 94.31% accuracy using svm algorithm. There are two major actors for the project: Labour who visits the portal for job search, Contractor who posts the jobs. The labour and contractor need to register themselves for applying for a job, posting a job, and so on. The portal has a filter search for the job seeker to search according to their required preferences. 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.

IV. SYSTEM ARCHITECTURE

System architecture is the conceptual model that defines the structure, behaviour and more views of a system. System architecture of our project is System design defines the system architecture. It also describes the modules and interfaces. The system architecture provides an insight of how the flow of process will be. Entire process of how the system will move forward that will generate the end-result is depicted.

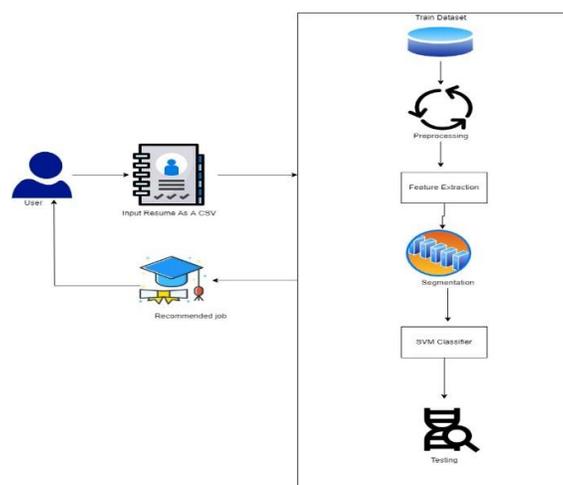


Figure 1: System Architecture

In first part (Fig 4.1), Activities such as login and register have a predefined flow and execute as per the conditions. The registration of the user will be the first activity after which they will login. After authenticating the user gets logged in.

We have a dataset of different jobs we will carry out classification with the help of SVM (Support Vector Machine) algorithm. To fetch the recommended jobs for the user with "User Id" passed in the parameters, the jobs, users and the application data are fetched from the database. The data is first pre-processed, and data needed for training the model are collected and the last activity is recommending the jobs. To recommend a job to a candidate, the Recommendation System requires some features. The features for the User are User Id, Username, Gender, Date of birth, Role, Job category, Job type, Preferred job location, Phone number. The features for the Jobs are Job Id, Job title, Location, Job type, Description, Job category, Daily Wages, Company Name.

V. CONCLUSION

In our proposed system we have improvised and modified the recommendation systems. This Employment Recommendation System has considered many parameters like ratings, experience, location etc. For implementing algorithm, python is used along with SVM algorithm and some machine learning libraries. Machine learning has been improvising the recommendation systems, also it brings more possibilities to improve performance of recommendation system. In future work we will develop android application and provide multiple language facility for workers for searching jobs in regional language. We will also add ratings feature at workers end so contractor can easily finalize workers based on the ratings and feedback. Our system is useful for government sites as they are in need of workers.

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