

EMPLOYMENT RECOMMENDATION SYSTEM FOR DISABLED PEOPLE

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Abstract:

A disabled person is large minority groups, mostly ignored by society and gets deprived from employment. Finding work is the most difficult task for those with impairments. The job opportunities for people with disabilities are limited at present due to their physical disabilities. This leads to poverty that affects the basic quality of their life and stability. This paper proposes a job recommendation system for people with disabilities based on a qualitative approach. This system will classify the disabled people based on their disabilities using c5.0 algorithm and it will recommend the jobs available for them. Dealing with the large amount of recruiting information on the Internet, a disabled job seeker always spends many hours to find the useful information. The proposed system uses hybrid recommendation by combining collaborative filtering with content-based recommendation based on the candidate profile to predict the best suitable job for them. The system estimates up to minimum 85% of accuracy in recommending of jobs.

Keywords: Hybrid Recommendation, Collaborative Filtering, C5.0 algorithm, Content-Based Recommendation.

1. Introduction

Employment plays a major in our society. Employability is being capable to gain and maintain employment. It requires a set of skills, understanding, knowledge and achievements that allow you to be employed. Task diversity is a key component of people's self-identification and also is required for living a purposeful and fulfilling career (Fong Cha et.al., 2020). Persons

with disabilities are one of the world's most vilified populations, resulting in job inequity. People with a disability (PwD) experience a variety of barriers, including rejection and joblessness, which prevent them from fully socialising, even now in wealthy nations. Empowering disabled people improves the quality of their life which boosts self-esteem by giving one a day-to-day purpose and being engaged improves the mental and physical health of a disabled person. Paid employment, provides disabled persons with an opportunity to show they can contribute this helps to build confidence in them.

PwDs have high unemployment rates, according to studies undertaken in the U.S., the Britain (Howlin et al., 2014), Australia (Baldwin et al., 2014), and Canada (Eaves and Ho, 2015). Just 58 percent of young adults with PwDs enter the workplace for compensation outside the home in the United States, compared to 90 percent of those with emotion, verbal, or learning problems plus 74% of those with cognitive disabilities (Roux et al., 2015). Even when people with disabilities are hired, the value of their work is debatable because they are typically hired in low-paying professions with reduced hours and in professions that are considerably under their educational level and competence (Holwerda et al., 2012; Roux et al., 2015; Shattuck et al.,2016). Given the numerous implications of employment (or lack thereof) on both the individual and the community, present job results for disabled persons are particularly troubling. People who make the shift from charity to equivalent work have the ability to boost the country's GDP (Deloitte Access Economics, 2015). Similarly, work engagement has been linked to a greater feeling of responsibility with better cognitive well-being, whereas jobless has been linked to adverse consequences on cognitive functioning, as well as overall mortality and death by suicide (Wanberg, 2016). Employment (or a lack thereof) has a big effect on households, with one of the primary worries of mom and dad with disabilities being their kid's capacity to perform activities of daily living once their family are no longer able to hold them (Van Bourgondien et al., 2017). Occupation has been shown to enhance individuality, which could assist to reduce this concern (Howlin et al., 2015).

Differently abled people always find difficulty in getting a stable paid job. Most of the disabled ones are either unemployed or work in the informal private sector, earning low wages. Meanwhile, online recruiting websites list employment openings and other opportunities to help disabled people to find work. Since 1995, Abilityjobs.comhave been the leading job website dedicated to employment of people with disabilities.Nowadays, there are several online job platforms and e-recruitment portals on different company web applications that have changed the manner in which firms select and work seekers search for work. When contrasted with ordinary techniques for advancing, the expense of looking for/posting occupations will be altogether lower. The online recruitment has a come down. It is hard to target the exact person because online recruiting can be challenging to focus on a specific group of disabled persons when viewing them online. And the expense because depending on the online platform, the company will use, and some have to pay for a subscription or other costs to post their job vacancies.

In order to select the exact disabled person for employment there need to distinguish the expected prescient components, ranges of abilities, commitment designs which will work on the odds of connecting with impaired school leavers in work around a half year after graduation. Utilizing both subjective and quantitative methodologies, attributes of incapacitated up-and-comer during and after school years were examined to recognize their commitment designs. It chooses a subset of components helpful to construct a decent indicator in regards to the commitment of debilitated understudies a half year after graduation utilizing the enormous information approach with AI standards. Components like age, organization, handicap type, among others were observed to be fundamental indicators of the work model which shows that the Decision Tree Classifier and Logistic Regression models gave the best outcomes to anticipating the Standard Occupation Classification (DrishtySobnath et.al., 2020). The accuracy can be improved by using neural networks.

Shyam P. Joy, Ashwin M S, Sayan Pal, Sai Teja Burla, Prakhyath Jain, Sai Priyadarshini, George Sebastian(2021) viewed that "Empowering differently abled is a decent friendly reason, yet additionally contributes towards the nation's Gross Domestic Product". The product application which accepts a bunch of inabilities as information and suggests a positioned rundown of possible positions, a contrastingly abled individual can take up. The product application utilizes Neural Networks (NN) which prescribes a task reasonable to the contrastingly abled with thought to the sort and level of incapacity.

Deepali, Nagpure, Patil, and Rukhar (2016) pointed out that a recommender system is widely used in many possible wayfor example book recommendation, movie recommendation, and so on. A little different in the case of the job recommendation system, Providing customised and profile-based employment recommendations will be advantageous. Various people with various levels of knowledge and practice sets are included in career recommender system. Every individual needs to receive only such employment suggestions that are extremely appropriate for that specific individual, depending on individual history facts. Collaborative filtering and content-based filtering are two prevalent kinds of recommendation systems. One of the new ways that could be more successful is a combination recommendation system, which is a blend of content - based and collaborative recommendation. A proposed hybrid system is based on making different predictions before integrating the findings of both systems.

According to Motebang Daniel Mpela and TranosZuva (2020), a portable nearness recommender framework helps in anticipating the most reasonable contender for a transitory occupation work dependent on the closeness between the competitors' resumes and the sets of responsibilities and furthermore discovering the vicinity of prescribed resume profiles to the space where the brief occupation will be finished. Content based recommendation that utilizes vector space model is proposed to anticipate the likeness between the text archives, continues and sets of expectations and google guides will be utilized to compute the distance of prescribed occupation searchers to the space where the work will be finished.

While the Matching strategies is the one of the easiest methodsbut suggestions that are produced probably won't be that helpful to the jobseekers as they are not customized. Both community separating and content-based suggestion have produced the customized proposals and henceforth they are more valuable to the jobseekers. Yet, community oriented separating experiences cold beginning issue while content-based suggestion may create too explicit outcomes (Roshan G. Belsare, Dr. V. M. Deshmukh, 2018).

1.1 Problem Statement

Unemployment is a major concern for normal individuals let alone people with special needs. Studies show that disabled people are two times more likely as the general public to be jobless. Of these, those with the mental disability, disabled women and those in rural areas are the worst affected by unemployment.Lack of sensitivity and awareness has been a serious hurdle in promoting employment opportunities for people with disabilities.

1.2 Aim

Nowadays, a huge number of disabled people suffer from unemployment. A recent study shows that about 40% of disabled people in India are unemployed, the reason mainly being lack of awareness. The proposed system aims to bridge the gap between the employers and disabled people, by suggesting the suitable jobs to the disabled people depending on their disability type, degree of disability, educational qualification and other factors.

1.3 Objectives

- To develop a system that recommend jobs to the disabled people based on their profile.
- To create awareness among the disabled people, about the numerous opportunities that are available for them.

2. Methodology

The proposed project comprises of a database which consists of job details in reputed firms and their company expectations, users can access the contents of the job and apply forit as per their will. In this system, instead of manual detail entry, details are extracted from the user by means of voice recognition technology; this makes the system highly elegant and enhance the quality of the information provided by the user. It does lead to any mal details; this technology makes the disabled directly process their details instead of getting help from an intermediate; previously proposed system consumes lots of time specifically for the manual data entry. Their resumes are submitted to the companies. After which, as per the specified details the application analyses the suitable job based on their qualification.Finally, it reports if it finds the suitable job.

3. Proposed System:

The proposed system classifies the user based on their type of disability. The system then recommends the suitable job for the disabled people based on their educational qualification, skill set and other factors. The system analyses the dataset that contains records of all disabled people in a particular district and uses the two common recommender system techniques of Collaborative filtering and Content-based filtering to suggest jobs to physically-challenged people according to the type of disability they suffer from, their qualification and other factors. Collaborative filtering eliminates occupations that a person might be willing to rely on the

rankings of other people. It operates by sifting through a range of different individual to locate a smaller section of people who share common values. Some users might have preferences about the job they want to take up. To meet this need, the proposed system also incorporates Content-based filtering, which recommends jobs based on a comparison between the description of the jobs and a user profile. The Hybrid Recommendation System is generated by combining both the results and it will suggest the most suitable job.

Advantages of proposed system:

- Suggests jobs to the disabled people based on their profile.
- Allows manual searching of jobs by the user, based on their personal preferences.
- Lower unemployment rate among disabled people.
- Provides easy apply facility to users, by sending their details directly to the employer in one click.



Fig 3.1 Use Case Diagram

There are three stages to the planned Occupation Recommender Systems as shown in the fig 3.1

Phase 1: Data acquisition module

Phase 2: Classification module

Phase 3: Recommender module



Fig 3.2 Occupation Recommender System

3.1. Data acquisition component:

The facts of various individual with a disability is captured and processed in a set with in data collection component. Data acquisition is the first and the foremost step of the work flow sequence. The data consists of user profiles, skill set, type of disability and other factors.

3.2Classification module:

The classification module deals with the potential features of disabled people is selected and then classified separately based on their type of disability. The classification is done using C5.0 algorithm, a rule-based classification.

3.3. Recommendation module:

In the recommendation module, the essential features are selected from the disabled person's profile and skillset and then the similarity calculation is done using content-based filtering and collaborative filtering. The Hybrid Recommendation of jobs is generated by combining the results from both the recommendation.

Collaborative Filtering:

It's the procedure for screening or assessing items based on similarity between users. Recommends jobs based on ratings given by other users. Explicit ratings on a scale of $1\sim5$ is used. It operates by sifting through a huge group of people to locate a smaller community of participants who share common values.

Similarity between users is calculated as follows:

$$\sum (r \, ip - r \, iavg) * (r \, jp - r \, javg)$$

Sim (Ai, Aj) = -----

$$\sqrt{\sum (r \, ip \, -r \, iavg \,)^2} \sqrt{\sum (r \, jp - r \, javg)^2}$$

where r ip - particular rating of i

r iavg - average rating of i

r jp - particular rating of j

r javg - average rating of j

Content-based Filtering:

A recommender system that works based on content similarities. Content here denotes the attributes of items that the user likes. The course of action of content-based Filtering is picking a comparable feature and calculates their similarity for disabled people and jobs then compare them. Tags jobs and user preferences using certain keywords. Looks up those keywords in the database and analyzes the jobs and a single user's profile and recommends different jobs with the same attributes.

Hybrid Recommendation

Hybrid recommendationscan be generated either by combining the output generated by Content based and Collaborative Filtering in order to overcome some of the issues of the Recommendation System.Hybrid recommender systems are designed to use different data sources to yield robust inferences. The idea of the hybrid recommendation is to get more accurate recommendation. Hybrid recommendations can be implemented in any of the two designs, sequential and parallel design. In the parallel design, the input parameters given to multiple recommendation systems and each of those recommendations are combined to generate one result. Whereas in the sequential design, the input is given to a single recommendation system and the output of that is passed on to the next recommender in a sequence.

4. Results

The outcomes of comparison between the accuracy of the different recommender system are generated. The generated result shows that collaborative and Content-based filtering accuracy is less compared to the Hybrid Recommendation. The comparison of accuracy among Hybrid Recommender System, Collaborative filtering, Content-based filtering is shown in the fig 4.1. From the Fig 4.1 its clear that Hybrid Recommendation gives more accurate and effective results.



Fig 4.1 Comparison of Recommender System

5. Conclusion:

The proposed system recommends suitable jobs for the people with hearing, speech and locomotive impairments using Hybrid Recommendation by combining the results of both Collaborative and Content-based filtering. This system ensures that these jobs are not misused by normal people. Almost all disabled people with an operating knowledge of computers, can make use of this system. Deployment of this system can help reduce unemployment among the specially-able people, to a great extent. This system will also help the employers in reaching out to the potential candidates for their job roles easily.

6. Future work:

Visually-impaired people may find it difficult to use the system and may need the help of a normal people to use this system. In order to make the system usable by the visually-handicapped also, as a future enhancement, we can implement speech synthesis that converts text into speech and reads the contents of a webpage to user. In order to give inputs, speech-recognition software can be used, so that the audio input given by the user is converted into text.

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