# Skill / Job Recommender Application

| NAME | PAPER TITLE AND AUTHOR | SOURCE AND YEAR OF THE PAPER | METHODOLOGY | ADVANTAGE | DISADVANTAGE |
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| Deepak<br><br>1. | **“A Combined Representation Learning Approach for Better Job and Skill Recommendation ”**<br><br>Vachik S. Dave, Baichuan Zhang, Mohammad Al Hasan, Khalifeh AlJadda and Mohammed Korayem | ACM International Conference on Information and Knowledge Management<br><br>October 2018 | The proposed representation learning model utilizes the pairwise ranking objective which learns job and skill vector representations into a shared latent space using three pre-processed graphs. This joint embedding approach not only provides high quality job recommendation but also provides skill suggestions required to obtain the new job | The model provides a representation learning model which can utilize the information from all three networks to jointly learn the representation of the jobs and skills in the shared k-dimensional latent space. By using three types of information networks from the historical job data: (i) job transition network, (ii) job-skill network, and (iii) skill co-occurrence network, the recommendation is achieved | The proposed representation learning framework is that it is transductive, i.e., it learns representation vectors of jobs and skills that are available in the input graphs. But, in CareerBuilder, it is often observed that new job titles and skills, and this model is needed to be retrained to obtain representation vectors of these entities so that we can utilize them in the job and skill suggestion. |
| 2. | “**Enhanced DSSM (deep semantic structure modeling) technique for job recommendation**“<br>Ravita Mishra and SheetalRathi | Journal of King Saud University – Computer and Information Sciences<br><br>October 2022 | The paper proposes a Deep Semantic Structure Algorithm that overcome the issue of the existing system. DSSM system uses the semantic representation of sparse data and it represent the job description and skill entities in character trigram format which increases the efficacy of the system. | The model provides a new approach that represents data in the sent2vec approach. The DSSM model maps the query and doc-ument and give satisfactory results. The new approach has only implemented the DSSM model with a different variation, using these results in the graph recommendation approach gives more accurate results. | The graph shows the recommendation of 50 jobs only. As we observe the MF model give recommendation smoothly 50 jobs and after that the recommendation performance gradual falls, because MF takes more iteration to computes recommendation and if dataset or jobs increases then the performance also falls |
| | **“Tripartite Vector Representations for Better Job Recommendation ”**<br><br>Mengshu Liu, Jingya Wang, Kareem Abdelfatah, Mohammed Korayem | CareerBuilder LLC Greater Atlanta Area, Georgia, US<br><br>July 2019 | To match the right person with the right job three information graphs (job-job, skill-skill, job-skill) from historical job data to learn a joint representation for both job titles and skills in a shared latent space. This helps to gain a representation of job postings/ resume using both elements, which subsequently can | Three facets of a job posting are considered: job title, job skills, and location. While a job title carries the most weight in determining what a job is, skill set defines the nuances which differ from job to job. Most job seekers are also very sensitive to the location of a job. The model encompass all three of | Need to develop an inductive learning framework to accommodate newly emerged job titles and skills, as the current model is transductive, and representation vectors only exist if it is in the input graph. Need to incorporate more features in the job representation such as education and previous experience and adjust the location embedding in a |

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| 3. | | | be combined with location | these aspects, and are able to give location sensitive, highly related job recommendations to our users. | more quantifiable way to control the radius of recommended jobs. |
| 4. | **“Job Recommender Systems: A Review”**<br>Corné de Ruijt and Sandjai Bhulai | Vrije Universiteit Amsterdam Amsterdam, the Netherlands<br><br>November 2021 | The model puts more emphasis on contributions that incorporate the temporal and reciprocal nature of job recommendations. Previous studies on JRS suggest that taking such views into account in the design of the JRS can lead to improved model performance. Also, it may lead to a more uniform distribution of candidates over a set of similar jobs. | The model includes the influence of data science competitions, the effect of data availability on the choice of method and validation, and ethical considerations in job recommender systems. Furthermore, it branches the large class of hybrid recommender systems to obtain a better view on how these hybrid recommender systems differ. | Although the model managed to further split JRS hybrids into smaller categories, still some classes comprise similar methods. It only considered literature on job recommender systems. However, such systems do not exist in isolation: they are commonly part of an e-recruitment platform also comprising candidate recommendations. |
| 5. | **“Job Recommendation based on Job Seeker Skills: An Empirical Study”**<br>Jorge Valverde-Rebaza<br>Ricardo Puma Paul Bustios<br>Nathalia C. Silva. | International Journal of Advanced Technology and Innovative Research, ISSN 2348–2370 Vol.09, October-2017. | The contributions of this work are threefold, we: i) made publicly available a new dataset formed by a set of job seekers profiles and a set of job vacancies collected from different job search engine sites; ii) put forward the proposal of a framework for job recommendation based on professional skills of job seekers; and iii) carried out an evaluation to quantify empirically the recommendation abilities of two state-of-the-art methods. The model thus presents a general panorama of job recommendation tasks aiming to facilitate research and real-world application design regarding this important issue.. | The proposed framework facilitates the understanding of the job recommendation process as well as it allows the use of a variety of text processing and recommendation methods according to the preferences of the job recommender system designer. Moreover, we also contribute to making publicly available a new dataset containing job seekers profiles and job vacancies. | This metric is highly dependent on the quality of the filtering process and the variety of job offers since there can be a shortage of offers for some specific profiles. |
| THARUN RAJ<br><br>1 | **“Learning Global Term Weights for Content-based Recommender Systems”**<br>Yupeng Gu,<br>Bo Zhao,<br>David Hardtke,<br>Yizhou Sun. | WWW '16: Proceedings of the 25th International Conference on World Wide Web April 2016 | The method proposed is an unified method that can simultaneously learn the weights of multiple content matching signals, as well as global term weights for specific recommendation tasks. The method is efficient to handle large-scale training data | This method can simultaneously learn term weights and the final relevance score between users and items.<br>The unified framework also easily allows other features not based on content matching and cosine similarity in the overall relevance model | there are multiple matching fields between users and items, and they should be considered holistically for learning term weights. |

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| 2 | **“Skills2Job: A Recommender System that Encodes Job Offer Embeddings on Graph Databases”**<br>Andrea Seveso ,<br>Anna Giabelli,<br>Lorenzo Malandri ,<br>Fabio Mercorio ,<br>Mario Mezzanzanica. | The Thirty-Fifth AAAI Conference on Artificial Intelligence (AAAI-21)2021-05-18 | The system processes 2.5M+ Online Job Vacancies posted in three different countries, generating several embeddings and performing an intrinsic evaluation of their quality and compute a measure of skill importance for each occupation in each country, the Revealed Comparative Advantage (rca). The best vector models, together with the rca, are used to feed a graph database, which will serve as the keystone for the recommender system | Identifies the most suited job on the basis of a set of user’s skills, encoding the skill relevance as emerges from real-labour market demand. | Extension of the system to all 26+1 EU Countries, enabling policy-makers to observe the labour market demand at skill level. |
| 3 | **“FoDRA - A New Content-Based Job Recommendation Algorithm for Job Seeking and Recruiting”**<br>Nikolaos D. Almalis<br>Prof. George A. Tsihrintzis<br>Nikolaos Karagiannis<br>Aggeliki D. Strati | 2015 6th International Conference on Information, Intelligence, Systems and Applications (IISA)06-08 July 2015 | The proposed algorithm FoDRA (Four Dimensions Recommendation Algorithm) quantifies the suitability of a job seeker for a job position in a more flexible way, using a structured form of the job and the candidate’s profile, produced from a content analysis of the unstructured form of the job description and the candidate’s CV. We conduct an experimental evaluation in order to check the quality and the effectiveness of FoDRA. Our primary study shows that FoDRA produces promising results and creates new prospects in the area of Job Recommender Systems (JRSs). | a content-based recommendation Algorithm which extends and updates the Minkowski distance in order to address the challenge of matching people and jobs | The algorithm was taking under consideration for an attribute only values that were closer or higher to the required one, meaning that a candidate must be qualified at a desirable level or higher. |
| | **“CaPaR: A Career Path Recommendation Framework**.”<br>Bharat Patel; Varun Kakuste; Magdalini Eirinaki | 2017 IEEE Third International Conference on Big Data Computing Service and Applications (BigDataService) 06-09 April 2017rvice) | CaPaR employs text mining capabilities, and combines them with collaborative filtering algorithms, to perform two different types of recommendations to its users, namely job and skill recommendations, such that the users can both find a job, but also identify areas and skills that are currently desired in the job market, but they might still be lacking, such that they can work on attaining them | The recommendation engine runs every half an hour and generates new jobs and skills recommendation for users. The algorithm considers profiles of new user generated after last run and also considers already existing users’ profiles. So it updates the recommendations for existing users and generates new recommendations for newly registered users every 30 minutes | Details of courses taken by the students during their studies, and also alumni data is not taken in the dataset |

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| 5 | **“Hyred: Hybrid Job Recommendation System”**<br>Bruno Coelho; Fernando Costa; Gil M. Gonçalves | 2015 12th International Joint Conference on e-Business and Telecommunications (ICETE)<br>20-22 July 2015 | This hybrid Job Recommendation System considers the user model (content-based filtering) and social interactions (collaborative filtering) to improve the quality of its recommendations and the solution is also able to generate adequate teams for a given job opportunity, based not only on the needed competences but also on the social compatibility between their members. | Explicit information from user and opportunity profiles (not only directly compared but based on their semantic distances);<br><br>implicit information, through inference of new knowledge (using the TS discovery capabilities) | .<br>it will be tried to improve the recommendation’s calculation speed both by increasing the server’s hardware capabilities as well as using the server’s multi-threading feature |
| 1 | **Job Recommendation System Using Profile Matching And Web-Crawling Deepali**<br>V Musale , Mamta K Nagpure , Kaumudini S Patil , Rukhsar F Sayyed Students, Computer Science & Engineering, K K Wagh College of Engineering, Nashik, India | NTERNATIONAL JOURNAL OF ADVANCE SCIENTIFIC RESEARCH AND ENGINEERING TRENDS Issue 2 May 2016 ISSN (Online) 2456-0774 | For profile matching, two matching methods are used: semantic matching,tree-based knowledge matching and query matching. These methods are integrated according to representations of attributes of students and companies, and then the profile similarity degree is acquired. | Recommendation is done through web portal by using keyword based search and second type of recommendation is done through profile matching and sending notification to the students. Thus proper job recommendations are provided to the students. | If entire details are filled properly then only resume of student is generated. So probability of mismatching the profile is high. |
| 2 | **Job Seekers’ Acceptance of Job Recommender Systems: Results of an Empirical Study**<br>Sven Laumer University of Bamberg sven.laumer Fabian Gubler University of Bamberg fabian.t.gubler | Proceedings of the 51st Hawaii International Conference on System Sciences \| 2018 | The paper extends general trust and recommender system research by revealing three moderators for the trust and intention relationship. It contextualizes the UTAUT2 by incorporating trust as an antecedent of a consumer’s intention to use and by revealing three moderating effects for this relationship. | It focuses especially on consumer acceptance and provides variables that are especially important in a consumer technology context | Additional factors such as user personality might also moderate the relationships tested which we have not controlled for. |
| 3 | **A Literature Review on Recommendation Systems**<br>Shraddha Gupta Masters of Computer Applications(Pursuing), Department of Computer Applications, DBGI Dehradun, India | International Research Journal of Engineering and Technology (IRJET) Volume: 07 Issue: 09 \| Sep 2020 | This paper is a review of recommendation systems that will describe recommendation system, how it works and helps in different platforms, and the different types of it with their merits and limitations | Hybrid Systems reduce the limitations of other recommendation systems and these systems enhance the accuracy and clarity of the system. | Lack of data analytics capability and the cold start problem. |
| 4 | **Assessment of Implementing Cloud-based Career and Educational Guidance System using Fuzzy Logic Modelling** | International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249-8958 | In this paper, the use of Fuzzy Logic for defining system inputs, processes, and outputs as a new representation for career and educational guidance system parameters is | These results reflect the high validity of the study sample which reflected also to the face validity of the content of the proposed app . | When new items are added to system, they need to be rated by substantial number of users before they could be recommended to users who have similar tastes with the ones rated them. |

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| | Hosam F. El-Sofany | (Online), Volume-9 Issue-3, February 2020 | introduced. Cronbach's alpha tests are used for measuring the validity and reliability of the study questionnaires' content. In this study, several analysis methods such as Spearman correlation, stepwise multiple linear regression, skewness, mean, and standard deviation have been used to determine the effect. | | |
| 5 | **Educational Career Recommendation System Using Machine Learning** Sushma Koushik , Chandana M , Lavanya , Suhas , Harshitha. | Vol. 10, Issue 8, August 2021 DOI 10.17148/IJARCCE.2021.10809 | In this project,with use of machine learning program that asks the client questions, and recommends the better stream based on the skills and academic performance provided. The program also serves as a data collection platform to support the drive for more data on course recommendation. | The problems of cold start, trust and privacy is solved in this approach and a recommendation system is built in Python. | Inability to capture changes in user behavior and Privacy concerns |
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