

Skill / Job Recommender Application

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Literature Survey

[1] A content based approach for recommending personnel for job positions

Published in : IISA 2014, The 5th International Conference on Information, Intelligence, Systems and Applications

Authors : Nikolaos D. Almalis; George A. Tsihrintzis and Nikolaos Karagiannis

This paper proposes a content-based approach that takes into consideration an organisation's needs and the skills of candidate employees in order to quantify the suitability of a candidate employee for a specific job position. The proposed algorithm utilises Minkowski distance to perform a primary study in order to investigate how the personnel seeking and recruiting field could benefit further. Also, the paper conducts a three step experimental evaluation, namely, content analysis, refinement of the algorithm, and execution. The results of this experiment show that recommender systems can play an important role in the area of job seeking and recruiting.

[2] FoDRA — A new content-based job recommendation algorithm for job seeking and recruiting

Published in : 2015 6th International Conference on Information, Intelligence, Systems and Applications (IISA)

Authors : Nikolaos D. Almalis; George A. Tsihrintzis and Nikolaos Karagiannis

This paper proposes a content-based recommendation Algorithm which extends and updates the Minkowski distance in order to address the challenge of matching people and jobs. 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. On experimental evaluation in order to check the quality and the effectiveness of FoDRA, primary studies show promising results and create new prospects in the area of Job Recommender Systems (JRSs).

[3] Collaborative job prediction based on Naïve Bayes Classifier using python platform

Published in : 2016 International Conference on Computation System and Information Technology for Sustainable Solutions (CSITSS)

Authors : Savita Choudhary; Siddanth Koul; Shridhar Mishra; Anunay Thakur; Rishabh Jain

The paper aims to implement a recommendation system based on collaborative filtering techniques for job portals. The system is designed to suggest the jobs to the user depending upon his profile and by calculating a similarity index using Euclidean distance of two skill sets and then ranking them according to their naïve Bayes algorithm. The recommendation system has been implemented in python.

[4] A graph-based approach for job recommendation at scale

Published in : 2017 IEEE International Conference on Big Data (Big Data)

Authors : Walid Shalaby; BahaaEddin AlAila; Mohammed Korayem; Layla Pournajaf; Khalifeh AlJadda and Shannon Quinn

While existing systems are mostly focused on content analysis of resumes and job descriptions, relying heavily on the accuracy and coverage of the semantic analysis and modelling of the content in which case, they end up usually suffering from rigidity and the

lack of implicit semantic relations that are uncovered from user's behaviour and could be captured by Collaborative Filtering (CF) methods. Few works which utilise CF do not address the scalability challenges of real-world systems and the problem of cold-start. This paper proposes a scalable item-based recommendation system for online job recommendations. This approach overcomes the major challenges of sparsity and scalability by leveraging a directed graph of jobs connected by multi-edges representing various behavioural and contextual similarity signals. The short lived nature of the items (jobs) in the system and the rapid rate in which new users and jobs enter the system make the cold-start a serious problem hindering CF methods. The problem is addressed by harnessing the power of deep learning in addition to user behaviour to serve hybrid recommendations. The technique has been leveraged by CareerBuilder.com which is one of the largest job boards in the world to generate high-quality recommendations for millions of users.

[5] Matching People and Jobs: A Bilateral Recommendation Approach

Published in : Proceedings of the 39th Annual Hawaii International Conference on System Sciences (HICSS'06)

Authors : J. Malinowski; T. Keim; O. Wendt and T. Weitzel

While current implementations successfully reduce information overload by generating personalised suggestions when searching for objects such as books or movies, recommendation systems so far cannot be found in another potential field of application: the personalised search for subjects such as applicants in a recruitment scenario. Theory shows that a good match between persons and jobs needs to consider both the preferences of the recruiter and the preferences of the candidate. Based on this requirement for modelling bilateral selection decisions, this paper presents an approach applying two distinct recommendation systems to the field in order to improve the match between people and jobs. Finally, we present first validation test runs from a student experiment showing promising results.

[6] CaPaR: A Career Path Recommendation Framework

Published in : 2017 IEEE Third International Conference on Big Data Computing Service and Applications (BigDataService)

Authors : Bharat Patel; Varun Kakuste and Magdalini Eirinaki

Existing job recommendation systems only consider the user's field of interest, but do not take into consideration the user's profile and skills, which can generate more relevant career recommendations for users. This paper proposes CaPaR, a Career Path Recommendation

framework, which addresses such shortcomings. Using text mining and collaborative filtering techniques the system first scans the user's profile and resume, identifies the key skills of the candidate and generates personalised job recommendations. Moreover, the system recommends additional skills to students required for related job openings, as well as learning resources for each skill. In this way, the system not only allows its users to explore large amounts of information, but also expand their portfolio and resume to be able to advance their careers further.

[7] Generating Unified Candidate Skill Graph for Career Path Recommendation

Published in : 2018 IEEE International Conference on Data Mining Workshops (ICDMW)

Authors : Akshay Gugnani ; Vinay Kumar Reddy Kasireddy and Karthikeyan Ponnalagu

Given the amount of career position data of individuals available online, personalised career path recommendation systems that could mine and recommend the most relevant career paths for a user are on the rise. However, such recommendation systems typically are only effective within a single organisation where there are standardised job roles. At an industry sector level such as Information Technology or across such different industry sectors (such as retail, insurance, health care), mining and recommending the most relevant career paths for a user is still an unsolved research challenge. Towards addressing this problem, this paper proposes a system that leverages the notion of skills to construct skill graphs that can form the basis for career path recommendations. Skills are perceived to be more amenable for career path standardizations across the organisations. The proposed system ingests a users profile (in a pdf, word format or other public and shared data sources) and leverages an Open IE pipeline to extract education and experiences. Subsequently, the extracted entities are mapped as specific skills that are expressed in the form of a novel unified skill graph. Such skill graphs which capture both spatial and temporal relationships are believed to aid in generating precise career path recommendations. An evaluation of this current skill extraction model with an industrial scale dataset yielded a precision and recall of 80.54% and 86.44% respectively.

[8] Job Recommendation through Progression of Job Selection

Published in : 2019 IEEE 6th International Conference on Cloud Computing and Intelligence Systems (CCIS)

Authors : Amber Nigam; Aakash Roy; Hartaran Singh and Harsimran Waila

This paper introduces a novel machine learning model which uses the candidates' job preference over time to incorporate the dynamics associated with a highly volatile job market. In addition to that, this approach comprises several other smaller recommendations that

contribute to problems of a) generating serendipitous recommendations b) solving the cold-start problem for new jobs and new candidates. Skills are used as embedded features to derive latent competencies from them, thereby expanding the skills of jobs and candidates to achieve more coverage in the skill domain. This model has been developed and deployed in a real-world job recommender system and the best performance of the click-through rate metric has been achieved through a blend of machine learning and non-machine learning recommendations. The best results have been achieved through Bidirectional Long Short Term Memory Networks (Bi-LSTM) with Attention for recommending jobs through machine learning that forms a major part of our recommendation.

[9] Career Recommendation Systems using Content based Filtering

Published in : 2020 5th International Conference on Communication and Electronics Systems (ICCES)

Authors : Tanya V. Yadalam; Vaishnavi M. Gowda; Vanditha Shiva Kumar and Disha Girish

Currently, there are a plethora of websites which provide heaps of information regarding employment opportunities, but this task is extremely tedious for students as they need to go through large amounts of information to find the ideal job. Simultaneously, existing job recommendation systems only take into consideration the domain in which the user is interested while ignoring their profile and skillset, which can help recommend jobs which are tailor made for the user. This paper examines existing career recommendation system and highlights the drawbacks of these systems, such as cold start, scalability and sparsely. Furthermore, proposed implementations of career recommendation system using machine learning have been researched in order to identify how the recommender systems introduce features of security, reliability and transparency in the process of career recommendation. In addition, possibilities for improvements in these systems have been explored, in order to design a career recommendation system using the content based filtering approach.

[10] Explainable Job-Posting Recommendations Using Knowledge Graphs and Named Entity Recognition

Published in : 2021 IEEE International Conference on Systems, Man, and Cybernetics (SMC)

Authors : Chirayu Upadhyay; Hasan Abu-Rasheed; Christian Weber and Madjid Fathi

To enhance the job-seeker's ability to evaluate the suitability of a recommended job, the paper proposes an explainable job recommendation system, which matches the user to the most relevant jobs based on their profile. Then, the system explains to the user why each job-posting has been recommended to them. The proposed system uses a knowledge graph

(KG) structure to model job-postings and user profiles in one homogeneous structure. Graph relations between the job-seekers and job-postings are mined through natural language processing (NLP) of the textual content from job-postings and user-profiles. Based on the graph structure itself and a custom named entity classifier, a human-readable explanation is generated for each recommendation and provided to the job-seeker. The explanation includes information about the matching factors that led the system to recommend a certain job-posting to the user. The proposed system is implemented and tested on a sample data-set of user profiles and job-postings from open online repositories. The system uses BELU and Rouge-L scores to show that the proposed systems generated relevant explanations for recommended jobs