

## Skill or Job Recommender – Literature Survey

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### Abstract:

In the last years, job recommender systems have become popular since they successfully reduce information overload by generating personalized job suggestions. Although in the literature exists a variety of techniques and strategies used as part of job recommender systems, most of them fail to recommending job vacancies that fit properly to the job seekers profiles. Thus, 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

iii) carried out an evaluation to quantify empirically the recommendation abilities of two state-of-the-art methods, considering different configurations, within the proposed framework.

Thus, we present a general panorama of job recommendation task aiming to facilitate research and real-world application design regarding this important issue.

### [1] Job Recommendation through Progression of Job Selection

*Authors: Aakash Roy, Amber Nigam and Harsimran Walia, Hartaran Singh*

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

This paper introduces a novel machine learning model that incorporates the dynamics of a highly volatile job market by using candidates' job preferences over time. Additionally, this strategy includes a variety of smaller recommendations that worsen the issues with a) producing serendipitous recommendations. b) addressing the cold-start issue for new jobs and candidates. Skills are used as embedded features to derive latent competencies from them, thereby expanding job and candidate skills to achieve higher coverage in the skill domain. This model was created and tested in a proper job recommender system, and the best possible performance of the click-through rate metric was accomplished by combining machine

learning and non-machine learning recommendations. The best results were obtained using Bidirectional Long Short-Term Memory Networks (Bi-LSTM) with Attention for recommending jobs via machine learning, which forms a significant portion of our recommendation.

## **[2] CaPaR: A Career Path Recommendation Framework**

*Authors: Magdalini Eirinaki, Bharat Patel, Varun Kakuste*

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

Existing job recommendation systems only consider the user's field of interest and ignore the user's profile and skills, which could result in more relevant career recommendations for users. CaPaR, a Career Path Recommendation framework, is proposed in this paper to address such shortcomings. The system scans the user's profile and resume, identifies the candidate's key skills, and generates personalised job recommendations using text mining and collaborative filtering techniques. Furthermore, the system suggests to student's additional skills needed for related job openings, as well as learning resources for each skill. As a result, the system not only allows its users to explore vast amounts of information, but also to expand their portfolio and resume in order to advance their careers.

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

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

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

The purpose of this paper is to implement a recommendation system for job portals based on collaborative filtering techniques. The system is designed to suggest jobs to the user based on his profile and by calculating a similarity index between two skill sets using Euclidean distance and then ranking them using their naive Bayes algorithm. Python was used to implement the recommendation system.

## **[4] Generating Unified Candidate Skill Graph for Career Path Recommendation**

*Authors: Akshay Gugnani, Karthikeyan Ponnalagu and Vinay Kumar Reddy Kasireddy*

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

Given the amount of career position data of individuals available online, personalized 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 organization where there are standardized 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 organizations. The proposed system ingests a user's 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.