

# Recruitment Graph Model for Hiring Unique Competencies using Social Media Mining

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**Abstract:** Recruiting unique skill candidate is challenging task for HR professionals. Social networks provide access to the information about the possible job candidates. The cost to process all the nodes in the public network is huge and sometimes result may not be good. This work presents Recruitment Graph Model for LinkedIn network. The repertoire resource for which the recruiter is searching may present in recruiter's company but may not be free. Suppose the recruiter wants to select the candidate with the same skill-set. It may possible that in the professional communities of repertoire node's LinkedIn network, the same skill-set nodes may exist. The recruitment graph model processes the skillfull candidate details of all the nodes in the communities of repertoire node to find similar nodes. For top few similar nodes, calculate the group centrality of the respective suggested nodes. The group centrality indicates the influentially of the suggested nodes. The similar node with large group centrality is suggested to the recruiter. The experimental results show that the efficiency of the proposed graph model is better than the traditional method to handle all the nodes in the public network.

**Keywords:** Centrality; Human Resource; LinkedIn; Node Similarity; Recruitment; Social Networks.

## 1. Introduction

Recruiting unique skill-set candidates is one of the challenging tasks for recruiter. Social networks were initially designed for socializing with family and friends. Nowadays these networks are become important professional tool in the field of recruitment. The proposed work considers linked-in social network. Linked-in is the largest professional network with more than 433 million members in 200 countries and territories.

Details of linked-in user contain summary, experience, skills, education, certifications, courses, publications, patents, professional groups, and recommendations etc. The proposed graph model identifies unique skill-set candidate for hiring. The procedure to obtain the candidate node using social media mining is as follows:

Consider the Job description for which the recruiter needs to hire. Recruiter has to give the detailed priority decision for hiring the candidate based on the Job Description. It may possible that the employee (repertoire node) exists in the

recruiter's company with the same skill-set; but may not be free, working on some other project. The proposed work considers this particular case. There may be high possibility that the repertoire node is in contact with the same skill-set nodes that are in his linked-in communities. This model selects the top few similar nodes based on the high content similarity. In addition to this, for each similar node selected, it calculates the group centrality for recommended nodes. The candidate node with highest group centrality is recommended for hiring.

## 2. Motivation

Recruiting unique skill is challenging task for HR professionals. Social networks provide access to the information about the job candidates. The cost to process all the nodes in the public network is huge and sometimes result may not be good. The proposed work considers linked-in social network. Linked-in is the largest professional network with more than 433 million members in 200 countries and territories. Details of linkedin user contain Summary, Experience, Skills, Education, Certifications, Courses, Publications, Patents, Professional Groups, and Recommendations etc. By using these details, the proposed graph model identifies unique skill-set candidate for hiring.

## 3. Scope and objectives

### A. Scope of this project

- This application processes for suitable resume for the particular job description from the huge data of resume.
- This application helps for finding the information for candidates who is having unique skill sets.

### B. Objective of this project

- The objective of this work is to show how sentimental analysis can help improve the user skill over a social network or system interface. The learning algorithm will learn what our emotions are from statistical data then determine the mood.

#### 4. Literature review

This literature review summarizes all the relevant literature researched during the course of this project. It presents certain approaches used by many researchers for sentiment analysis and improvement of sentimental classification. Sentiment Analysis (SA) is an ongoing field of research in text mining area. SA is the computational treatment of opinions, sentiments and understanding of text. Walaa Medhat et. al. [1] presented many recently proposed algorithms' enhancements and explored various SA applications.

There are three constraints are used to train a cross domain sentiment classification method. D. Bollegalaa et. al. [2] evaluated the performance of the individual constraints as well as their combinations using a benchmark dataset for cross domain sentiment classification. Their experimental results show that some of the combinations of the proposed constraints obtain results that are statistically comparable to the current state-of-the-art method for cross domain sentimental classification.

Ali Athar et. al. [3] proposed an approach based on machine learning to achieve the particular business goals in the field of sentimental analysis. They presented different ensemble approaches to unify the desired classifiers for the improvement of sentimental classification.

Current approaches in aspect-based sentiment analysis avoid or neutralize unhandled issues emerging from the lexicon-based scoring (i.e., Senti WordNet), whereby lexical sentimental analysis only classifies text based on influence word presence and word count are limited to these surface properties. This is coupled with considerably low detection rate among accurate concepts in the text. To address this issues, Ali Marstawi et. al. [4] proposed the use of ontology to i) enhance aspect extraction process by identifying features pertaining to accurate entities, and ii) eliminate lexicon-based sentiment scoring issues which, in turn, improve sentiment analysis and summarization efficiency.

#### 5. Proposed work

##### A. Hiring decision dataset

Hiring priorities are prepared by HR recruiter based on the job description.

| 1  | Experience | Matching Keywords | Selection_Priority |
|----|------------|-------------------|--------------------|
| 2  | 1          | 0                 | 999                |
| 3  | 1          | 5                 | 999                |
| 4  | 1          | 10                | 999                |
| 5  | 1          | 13                | 999                |
| 6  | 1          | 20                | 999                |
| 7  | 1          | 25                | 999                |
| 8  | 1          | 31                | 999                |
| 9  | 1          | 37                | 999                |
| 10 | 1          | 42                | 999                |
| 11 | 1          | 24                | 999                |
| 12 | 1          | 26                | 4                  |
| 13 | 1          | 29                | 999                |
| 14 | 1          | 32                | 999                |
| 15 | 1          | 36                | 999                |
| 16 | 1          | 39                | 999                |
| 17 | 1          | 42                | 4                  |
| 18 | 1          | 44                | 999                |
| 19 | 1          | 47                | 999                |
| 20 | 1          | 48                | 999                |
| 21 | 1          | 50                | 999                |
| 22 | 1          | 52                | 3                  |

Fig. 1. Priorities set by HR Recruiter with respect to the Job

##### B. Job description data set

Sample Job Description posted by HR Recruiter for Data Scientist Position

Role: Data Scientists/Data Analyst  
 Exp: 3 yrs  
 Location: Bangalore  
 Skills:  
 Strong analytical problem-solving skills with appreciation for Math and Business and ability to get hands dirty as required  
 Highly proficient in use of Excel, SQL and R/Python. Knowledge of BI tools like Tableau and Spotfire is an added advantage  
 Efficient project and people management skills  
 Strong attention to detail and comfortable handling multiple projects  
 Good communication and presentation skills - written and Verbal  
 Please send your resume to nirag.gosalia@myntara.com

Fig. 2. Sample Job Description posted by HR Recruiter for Data Scientist Position

##### C. Input data for selecting candidate

| 1  | NodeID | Experience | Matching Keywords | GroupCentrality |
|----|--------|------------|-------------------|-----------------|
| 2  | 1      | 1          | 85                | 0.041           |
| 3  | 3      | 3          | 93                | 0.125           |
| 4  | 4      | 3          | 40                | 0.056           |
| 5  | 6      | 2          | 55                | 0.008           |
| 6  | 7      | 8          | 99                | 0.0906          |
| 7  | 10     | 0          | 90                | 0.089           |
| 8  | 11     | 3          | 92                | 0.0606          |
| 9  | 13     | 4          | 80                | 0.1612          |
| 10 | 14     | 3          | 70                | 0.04            |
| 11 | 18     | 5          | 82                | 0.02            |
| 12 | 19     | 0          | 90                | 0.607           |
| 13 | 20     | 1          | 75                | 0.015           |
| 14 | 22     | 3          | 60                | 0.112           |
| 15 | 26     | 4          | 68                | 0.004           |
| 16 | 28     | 10         | 52                | 0.106           |
| 17 | 29     | 4          | 92                | 0.118           |
| 18 | 30     | 2          | 70                | 0.03            |
| 19 | 35     | 6          | 62                | 0.1             |
| 20 |        |            |                   |                 |

Fig. 3. Input data for selecting candidate

##### D. HR login

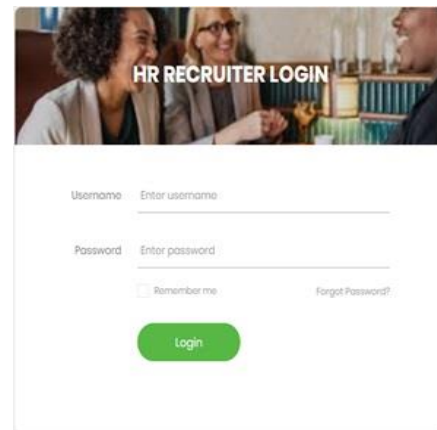


Fig. 4. HR Login

##### E. HR home page



Fig. 5. Home Page

**F. Selecting train\_test split**

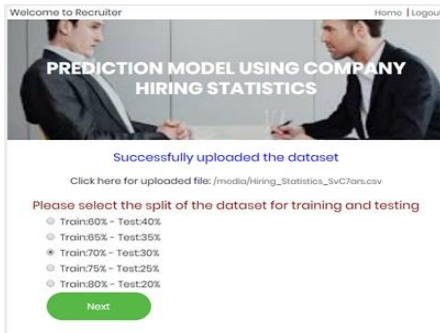


Fig. 6. Train\_Test\_Split

**G. Algorithm details**

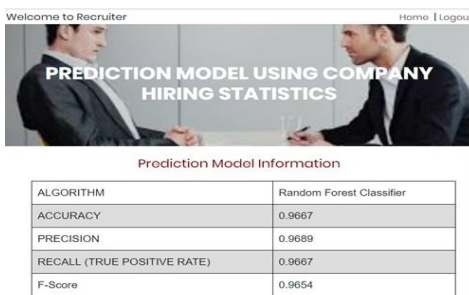


Fig. 7. Algorithm Details

**H. Enter the input for selecting candidate**

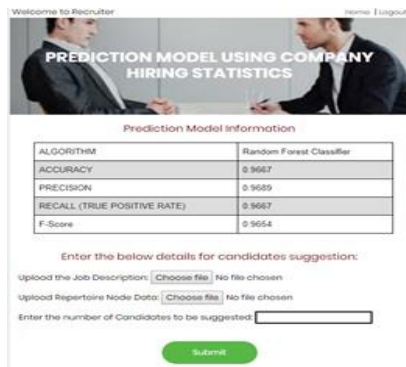


Fig. 8. Selecting candidate

**I. Candidate suggestions**

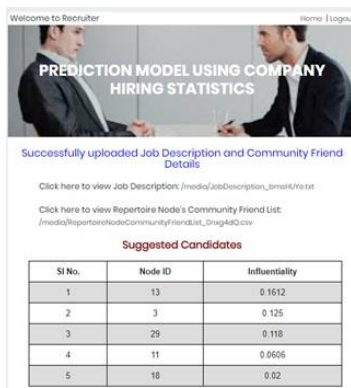


Fig. 9. Candidate suggestions

**6. Conclusions**

This project proposes recruitment graph for hiring from social media recruitment is the essential function of any organization. Using social network, the HR recruiter finds the employee who are matching the particular organization it will collect complete information of the candidate who posted the resume in job portal. The recruitment graph model processes the professional details of all the candidate which are given in LinkedIn network. Suggest the priority node with high group centrality of their recommended nodes. The experimental results for four datasets prove the effectiveness of the proposed method. This application finds out the hiring process of the candidate according to their work experience.

**7. Future enhancements**

The application without future enhancements thought of is considered to be an obsolete application. Given the applications field in which this is created, it is meant to be changed in the future. The only way to keep the application useful in the long term is by releasing updates very often. The application's features were planned out in the initial pages with features that were to be included in the current version. Whenever the technology used changes, the application features also changes. These features also change when the new requirements arise. The application can be considered for enhancement on these areas

- The accuracy of the model can be improved by further optimizing the algorithm.
- The model can be tested using different algorithm resulting in different accuracy rates.

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