

A New Framework to Improve the Recruiting Process

Using Data Mining and Multi Criteria-Decision Making Techniques

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Abstract

One of the primary tasks of human resource management (HRM) is attracting and retaining a talented workforce. The first step is thus recruiting the qualified, diverse, and motivated applicants. This task is very challenging and costly as there is usually a large number of applicants for a small number of job openings. The organizations cannot possibly afford to test and evaluate all applicants using all the instruments in the selection process and they can't take the time to do. So the number of applicants has to be reduced dramatically at the very beginning of the selection process.

In addition, there is an urgent need to develop effective personnel selection mechanism to find the talents who are the most suitable for the positions and organizations. Effective recruitment can not only enhance the skills and diversity of the workforce and reduce the costs, but can also help build customer satisfaction, foster innovation, and encourage creativity.

Hence, various studies have been conducted on resumes, interviews, assessment centers, job knowledge tests, work sample tests, cognitive tests, and personality tests in HRM to help organizations make better personnel selection decisions. Various forms of technology have been introduced for this purpose in different studies.

One of the main important technologies that can be used for this purpose is data mining. Some of data mining techniques have been used in this area such as decision tree, association rule mining, clustering and neural network. This study aims to fill the gap by developing a new framework based on data mining and multi criteria decision-making (MCDM) techniques. In fact, a two-stage analysis framework is presented based on decision tree, association rule mining and analytic hierarchy process (AHP) method.

At the first stage, the decision tree technique is implemented on the historical data of hiring and recruiting. In this way, we can extract the features and the corresponding values that are important and influential for every specific position. By developing and using a questionnaire based on the extracted attributes, the number of applicants will be reduced dramatically at the beginning of the selection process. This will reduce the costs of selection which is an important factor for every organization.

At the second stage, we use the association rule mining technique on different human resource (HR) data bases as below:

- The historical data of hiring and recruiting
- The historical data of human resource performance evaluation
- The historical data of employees' retention and resignation

In this stage, we try to consider the comprehensive right screening criteria to identify the best applicants for different job positions. Accordingly, the association rule mining technique is implemented on each of the above data bases to extract the rules indicating the relation between applicant's characteristics and the target feature. In the first one, we try to extract the probability of recruiting for a new applicant based on the historical data. At the second analysis, our aim is to find the relation between different characteristics of an applicant and his/her performance. In fact, the results of this analysis indicate the probability and expectation of good performance for a new applicant. In the last one, we want to predict the retention and resignation probability of the applicant.

Based on the results, we have different probabilities for different criteria which are important in the recruiting process. Finally, we use the AHP technique to rank the applicants who were selected through the first stage of analysis. We will be able to evaluate and rank these applicants more precisely by using different criteria and their corresponding weights.

We aim to implement this framework on a real data for more validation and verification. The main advantages of the proposed framework are as below:

- 1- This framework tries to consider the comprehensive right screening criteria to identify the best applicants for different job positions. This framework uses multiple different sources of data for this purpose.
- 2- This framework proposes a MCDM approach to integrate the results of different types of analysis
- 3- This framework gives the opportunity to HR managers to consider different weights for different criteria
- 4- This two-stage framework helps the HR managers to reduce the number of applicants at the very beginning of the selection process. This will reduce the costs of selection which is an important factor for every organization.
- 5- The results of the proposed techniques are presented through some if-then rules which are relatively easy to interpret and use by the HR managers. This strengthens the practicality of results in real world projects.