Article

Employee Attrition Prediction Using Deep Neural Networks

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Abstract: Decision-making plays an essential role in the management and may represent the most important component in the planning process. Employee attrition is considered a well-known problem that needs the right decisions from the administration to preserve high qualified employees. Interestingly, artificial intelligence is utilized extensively as an efficient tool for predicting such a problem. The proposed work utilizes the deep learning technique along with some preprocessing steps to improve the prediction of employee attrition. Several factors lead to employee attrition. Such factors are analyzed to reveal their intercorrelation and to demonstrate the dominant ones. Our work was tested using the imbalanced dataset of IBM analytics, which contains 35 features for 1470 employees. To get realistic results, we derived a balanced version from the original one. Finally, cross-validation is implemented to evaluate our work precisely. Extensive experiments have been conducted to show the practical value of our work. The prediction accuracy using the original dataset is about 91%, whereas it is about 94% using a synthetic dataset.

Keywords: deep learning; machine learning; attrition prediction

1. Introduction

The competition among organizations and firms highly depends on the productivity of the workforce. Building and maintaining a suitable environment is the key that contributes to stable and collaborative employees. The human resource (HR) department should participate in building such an environment by analyzing employees' database records. Analyzing these data enables the administration to improve the decision-making to avoid employee attrition [1,2]. Employee attrition means that productive employees decide to leave the organization due to different reasons such as work pressure, unsuitable environment, or not satisfying salary. Employee attrition affects the organization's productivity because it loses a productive employee as well as other resources such as HR staff effort in recruiting new employees [3]. Recruiting new employees requires training, development, and integrating them into the new environment.

Predicting employee attrition before it occurs can help the administration to prevent it or at least reduce its effect. Some literature suggested that happy and motivated employees tend to be more creative, productive, and perform better [4]. Organizations can utilize their HR data to make such predictions depending on predictive models that can be built for this purpose. In recent years, artificial intelligence (AI) is used in many different fields such as health, education, economy, and administration [5,6]. Recently, the prediction of employee attrition using AI has received a lot of research attention. Also, the increased amount of data regarding this topic leads to more studies in this field [7,8].

This paper focuses on the prediction of employee attrition using deep neural networks, where the IBM Watson dataset has been used to train and test the network. This dataset