



# Predicting Employee Promotion Using Machine Learning

Mr. Shaik Waris Basha (M.C.A). Rajeev Gandhi Memorial college Of Engineering and Technology, Nandyal

Mrs. K. JAYASRI (MTech). Rajeev Gandhi Memorial college Of Engineering and Technology, Nandyal

## Abstract

Training and development are key components of professional development for people to improve their capacity. Professional development programs are typically organized around personal information like as background, personal goals, and work experience, as well as corporate objectives and job requirements. Individual employee classification is required to promote tailored training in the professional development process. As a result, this study provides a classification approach for employee classification in order to facilitate tailored training in enterprises. Machine learning methods such as Decision Tree, Random Forest, and Support Vector Machine are investigated. To cope with imbalance data, the Synthetic Minority Oversampling Technique (SMOTE) approach is applied. In this work, the open data form kaggle is used. The training and testing data are combined to generate the data for technique validation. There are three gropes: 80:20, 70:30, and 60:40. According to the classification results, the SMOTE can increase classification performance for all classifiers. Furthermore, random forest has the highest categorization accuracy.

## 1. INTRODUCTION

### 1.1 Introduction

A technique for managing human resources in an organization is called human resource management. Training and development is a key element of human resource management. Training is a quick process that teaches the fundamental knowledge and abilities needed for any job. In contrast, development is a lengthy process that concentrates on individual or personal growth to enhance performance for the demands of future jobs, including conceptual or theoretical inputs, perspective strategic thinking, and behavioral aspects, such as leadership skills, team management, etc. Employees must be able to tackle difficult or complex tasks during the development process. So, it invests time in a lengthy process. A process of growth is called professional development (PD). Through learning and applying procedures, it makes use of prior information, abilities, and experience to enhance personal capacity. There are numerous methods to learn and grow. specialized knowledge, abilities, techniques, and skills. Since job recruitment is no longer necessary to meet company objectives or job position requirements, professional development is now a key component of many organizations. Many things can occur during the training and development process, such as personnel or organizational problems. Training and development processes, particularly for organizational problems, are typically expensive, time-consuming, and fraught with

difficulties in selecting competent people. An organization will often select personnel with a high professional growth process based on these evidences. As a result, individuals' skills and prior knowledge must be evaluated and compared to job criteria. However, every employee need a unique training and development procedure. The purpose of this paper is to provide a suitable approach for selecting the right individual for the correct training and development process in terms of personal goals and corporate objectives.

## 2. Literature Survey

• [1] Y. Asim, B. Raza, A. K. Malik, S. Rathore and A. Bilal,” **Improving the Performance of Professional Blogger’s Classification**”, 2018. International Conference on Computing, Mathematics and Engineering Technologies (iCOMET), Sukkur, Blogging is a good method for writing internet content, and those who participate in this activity are known as bloggers. A blogger can be classed into classes based on characteristics such as educational background, cultural background, and topical interests. Bloggers may choose this job due to a variety of circumstances (influencing characteristics). The topic of this study is the classification of professional bloggers and the identification of such relevant criteria. For the binary classification problem of a bloggers dataset, we employed an Artificial Neural Network. For factor identification, the Predictive Apriori association rule mining technique is utilized. In this research, the outcomes of an Artificial Neural Network are compared to those of the Random Forest and Nearest-Neighbor algorithms. It has been discovered that Artificial With 87% accuracy and 86.9% F-measure, Neural Network surpasses Random Forest (RF) and Nearest Neighbour (IB1) algorithms. The factor identification findings are compared to the results of the Alternate Decision Tree (AD Tree) technique. Both the ADTree and the Predictive Apriori algorithms yielded the same results for predictive performance measurements..

[2] T.W Ramdhani, B. Purwandari and Y. Ruldeviyani,”**The Use of Data Mining Classification Technique to Fill in Structural Positions in Bogor Local Government**” 2016 International conference on Advanced computer Science and Information Systems (ICACSIS), Malang 2016Bogor's human resources are administered by the human resources and training division, known as Badan Kepegawaian Pendidikan dan Pelatihan (BKPP). BKPP forms the Badan Pertimbangan Jabatan dan

Kepangkatan (Baperjakat) team, which is in charge of promoting, rotating, and dismissing local government personnel from structural posts below Echelon IIA. Baperjakat is having difficulty creating a draft of structural government roles. Despite the fact that BKPP has a human resources information system called SIMPEG, these operations were carried out manually. The primary goal of this study is to find patterns for filling structural positions in the Bogor Local Government. To detect filling structural position patterns, 62 classification methods were tested utilizing three data mining tools, seven data sets, and seven human resource qualities. The best algorithm in the echelon class according to the classification procedure is Classification Rule with Unbiased Interaction Selection and Estimation (CRUISE). For every echelon level, it has an average accuracy of 95.7%..

## 3. OVERVIEW OF THE SYSTEM

### 3.1 Existing System

With the increasing popularity of machine learning, computer approaches are classified into two categories: traditional methods and machine learning methods. This section covers how traditional procedures are used to describe psychosocial instabilities and how machine learning methods outperform traditional methods. In this project, the existing procedure follows a specific flow, and SVM is employed for model construction. However, it necessitates a huge memory and produces inaccurate results.

#### 3.1.1 Disadvantages of Existing System

- Low efficiency.
- Time consuming.
- High complexities.
- Resources consuming

### 3.2 Proposed System

Ten features were assessed in our anticipated model to make this comparison more distinct. Our introduced techniques were carried out using SMOTE, and the results were compared to previous works to illustrate the percentage of improvement, but a drop in performance was also observed on one occasion using Random Forest. To determine whether an employee promoted or not promoted, we used

machine learning based methods such as Decision Tree, Random Forest, and Support Vector Machine classification techniques.

### 3.3 Methodology

In this project work, I used five modules and each module has own functions, such as:

1. System Module
2. User Module

## 1. System:

### 1.1 Receive Datasets:

Receive Datasets from the user

### 1.2 Pre-processing:

Perform pre-processing on data sets

### 1.3 Training:

Use the pre-processed training dataset to train our models.

### 1.4 Generate Results:

View generated Results.

## 2. User:

### 2.1 Register:

Users can register for the Employee Classification for Personalized Professional Training Using Machine Learning Techniques and Smote application here.

### 2.2 Login:

After registering, the user can access his portal.

### 2.3 Upload

The user needs to upload the data.

### 2.4 View-Data

Later on user can upload data

### 2.5 View Pre-processing:

Later on user can view the pre-processing of data.

### 2.6 View training:

Later on, user can view the training of data.

### 2.7 View Prediction

User need to input the required fields in order to get the response from the system.

## 4 Architecture

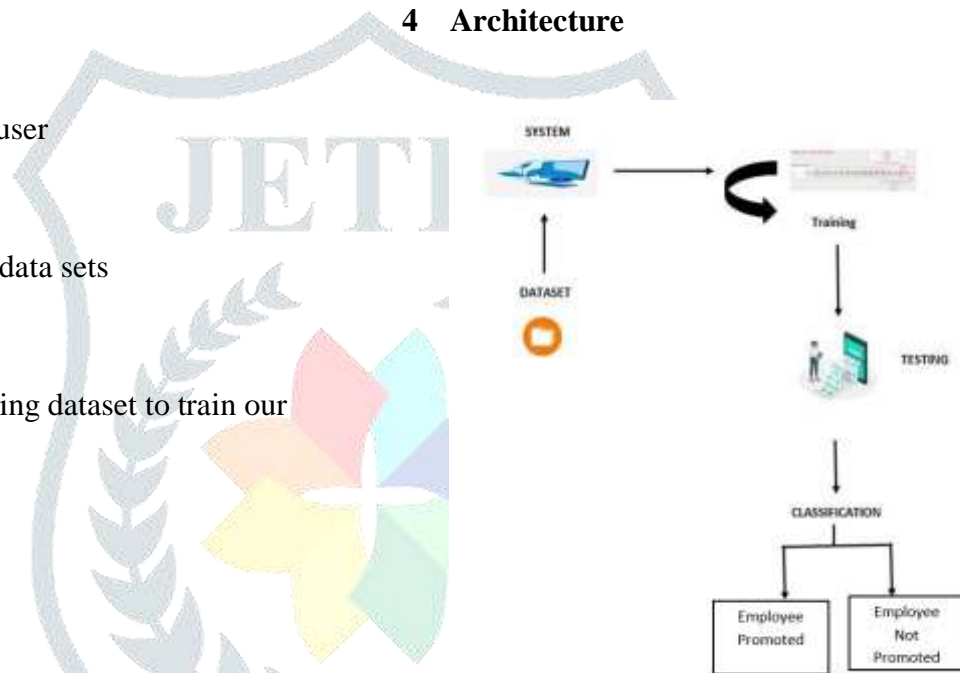


Fig 1: Frame work of proposed method

## 5 RESULTS SCREEN SHOTS

### Home Page:



**Upload Dataset:****Choose options:****Predict Result:****6. CONCLUSION**

- ✓ In this study, we created a web application that determines if an individual is eligible for promotion or not. We determined this based on a few parameters, including the employee's experience, previous year ratings, KPIs performed, average training score, and number of trainings attended. This web program also analyzed basic characteristics such as an employee's gender, age, region, education, and department to compute and reveal whether or not the individual is suitable for promotion. We employed machine learning models such as Decision Tree, Random Forest, and Support Vector Machine (SVM) to do this.

**Future Scope:**

Future study will focus on will be designed in the future, and we will enhance the use of technology to promote employees. The SVM model employed in this research performed somewhat poorly. In the future, there will be room for new models that can be used to improve the project's performance.

**7. References**

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