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PREPARATION FOR EMPLOYEE PROMOTION BASED ON MACHINE LEARNING

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ABSTRACT—Promotion processes are one ofthe most important processes in terms of human resources. A promotion processorganized fairly within the organization is a managerial tool that motivates employees and contributes to business continuity. Promotion isan important extrinsic motivation for many employees. It ensures the employee's engagement and commitment to the organization and contributes to the continuity of his current performance. It is also an important rewarding and performance control mechanism for the organization. Many factors such as seniority, performance level,competencies, age, awards, training score, organizational commitment of the personnelwho will be promoted are taken into consideration. In this study, a predictionmethodology will be studied based on the criteria evaluated for the employees in the promotion processes by Machine Learning algorithms such as Support Vector Machine, Artificial Neural Network, and Random Forest.Random Forest achieved the highestperformance with 98% accuracy, 96% precision, 1.0% recall and 98% f1-scorevalueswith ROS approach. This study could be used by HR and manager to predict the probability of promotion so that managers can find the rightparameters for someone to get promoted.

Index terms—Machine Learning Algorithms, Principal Component Analysis, Support Vector Machine.

I. INTRODUCTION

One of the most delicate topics in anyemployee's life is promotion. Promotion is the assignment of an employee to a higher-level position in terms of responsibility, authority and pay. When the promotion procedure isapplied correctly, the company's success grows as well as the employees' motivation and devotion to the organization. Seniority andqualification are the most important factors in employee advancement. The company's careermanagement success is contingent on establishing a clear and objective promotion policy and applying it fairly. Under what conditions, by whom and how promotions willbe made, what qualifications are required for promotion to each position should bedetermined in advance and presented to allpersonnel.

Greater responsibility, increased duties, increased privileges, and increased authority are all markers of job advancement. Accordingto studies [1-2] promotions have a favorable and significant impact on employee work performance. Haryano et al. [3] stated that promotion has a beneficial impact on job performance. Promotion is the transition of any personnel inthe enterprise from their position to another task that will increase their authority and responsibilities even wider and increase their status.

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The fact that the employees come to a better place than they are in the institution be an increase in motivation for the workers. Because it is of great importance for the employee to know that his/her labor will be rewarded and that he/she will have the opportunity to rise, both in terms of increasing his/her commitment to the job and working more efficiently. When this is the case, both production, efficiency and quality will increase. This will enable the company to continue its production with great profitability. As a result, both the employee and theemployer will be happy. If an employee is promoted and given more benefits, they become more satisfied and committed to their work. Satisfied employees work harder andmore readily, and employee turnover is minimized [4]. According to Dean and Joseph [5], work promotion is defined as a growth in the workforce or employees already employed in better jobs, as measured by more responsibilities, facilities, achievements, higher qualification demands, higher status, andincreased earnings or salaries. Tessema andSoeters [6] have the same research thatperformance practices have sufficientrelationship with employee promotion. According to Knowles et al. [7], the goal of jobpromotion is to provide high- performing individuals with more recognition, position,and acknowledgment. Obtain personal fulfillment, pride, a greater social status, and ahigher salary. Workplace motivation,discipline, and productivity are allon the rise. Ensure employee stability, evaluate employee promotions using assessment indicators, evaluate employees on a timely basis, and be transparent. Because of new occupations, job promotion chances have a variety of effects on businesses. Providing employees with opportunities to improve their creativity and innovation for the benefit of the firm. Other employees are motivated by expanding employee knowledge and job experience. Due to a mutation in the role, a neworganizational structure is being implemented.According to the research findings of Shahzadet al. [8], there is a significant relationshipbetween employee performance and promotion. He stated that there should be certain principles regarding promotions in company policies since promotions have a positive relationship with employee performance and organizational productivity.

Promote the post to another so that it does not become empty. Employees who are promoted to the appropriate position appreciate and benefit from their work environment, enhancing their productivity. To make job promotion prospects more accessible to applicants.

This paper proposes a decision support systemdesigned for a Human Resource (HR) department about eligibility of employees' promotion. The study's contribution is the using of imbalanced dataset techniques to copewith imbalanced problem. Another contribution of the paper is to focus on parameter tuning. Employees who may be promoted as a result of this study will be identified, and

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HR will be able to use thisinformation to improve key performance indicator (KPI) KPIs in promoted jobs. RF outperformed the other algorithms with 98% accuracy, 96% precision, 1.0 recall and 98% f1-score rate obtained among SVM and ANN in this study.

II. LITERATURE SURVEY

According to McIntyre [9], staying with a company for 10 years and getting promoted 3-4 times in that 10 years is ideal. "At a time likethis, those numbers look good on a resumetoo," McIntyre says. According to him, it seems reasonable for an employee with a careerlife of 30 years to be promoted an average of 10-15 times. The study proposed by Hameed et al. [10] used Variable adaptive momentum (BPVAM) backpropagation and principal component analysis (PCA) analyzes together, which can increase the classification accuracy,for the identification of epilepsy cases from EEG signals, and they also performed a comparative analysis with some automated techniques. Mutlu et al. [11] proposed a Convolutional Neural Network (CNN)-based model for the diagnosis of liver disease using the BUPA and ILPD datasets.

CNN's performance was compared to machinelearning approaches such as Naive Bayes (NB),Support Vector Machine (SVM), K- neaest Neighbors (KNN), and Logistic Regression (LR). Their work indicated that CNN is effective in classifying liver disease, achieving75.55% and 72.00% accuracy in theBUPA andILPD datasets, respectively. Rasheed et al. [12]proposed a model that predict Parkinson's disease in the early stage. After using the variable adaptive moment- based backpropagation algorithm of ANN, known asBPVAM, to classify the same dataset, theycombined BPVAM and PCA to use the size reduction technique. They showed with their studies that BPVAM-PCA is more efficientthan BPVAM. Ufuk [13] proposed a model of the regression analysis that found a strong correlation between emotional commitment, continuation commitment, and normative commitment and how people perceive promotion techniques. The proposed algorithmwas used to determine the personnel to be promoted in a business and priority values weredetermined for the candidate personnel. Linguistic variables were used to evaluate candidate personnel based on factors, and clarification of fuzzy weights was done with a clarification process developed on the basis of α-shear and optimism index [14]. In Pakistan'sbanking sector, this study examined the relationship between employee advancement, performance appraisal, and work satisfaction with employee performance.In Smart PLs, 280 bank personnel were sampled using the SEM analysis method. The findings show that private bank executives should give more importance to recognitionand incentive

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policies, as employees expect to be rewarded for their achievements [15]. Employee promotion in both contexts goes with either a superior grade or an increase in pay within the group. It is a continuous procedure based on professional qualification and length of service and is accepted to be onestep ahead in the job within a promotion [16]. The author stated that human resources activities such as remuneration, promotion and performance evaluation have a significant and positive connection with the job performance of the employees.

III. PROPOSED SYSTEM

The overview of our proposed system is shownin the below figure.

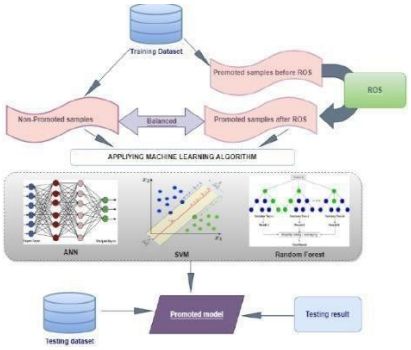

Fig. 1: System Overview

Implementation Modules

User Module

- In this module, user register and login to thesystem enter the employee details and predict whether employee promoted or not.

Preprocessing

- In this module, we take the employee data set and perform the preprocessing steps likedata cleaning, data transform, and data normalization. Finds the independent and dependent variable to further evaluation.

Split Data

In this module, the service provider split the used dataset into train and test data of ratio 70 % and 30 % respectively. The 70% of the datais consider as train data which is used to train the model and 30% of the data is consider as test which is used to test the model.

Train Model

- In this module, we use train data to train the model. Here we are using Machine Learning models

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likes SVM, RF.

Test Model

- In this module, we use test data to test the model. And construct the confusion matrix to calculate the accuracy, precision, and recall to evaluate the model performance. Prediction

- In this module, the load employee dataset to predict whether the employee promoted or not.

Implementation Algorithms

Random forest

- It generates multi decision trees from whicheach decision tree uses a part of data sampleand predicts the result.
- Then the result which was achieved by maximum number of trees is considered as the final prediction.
- Random forest is a Supervised Learningalgorithm which uses ensemble learning method for classification and regression. Random forest is a bagging technique and the trees in random forests run in parallel
- without any interactions.
- A Random Forest operates by constructing several decision trees during training time and output-ting the mean of the classes as the prediction of all the trees.

Support Vector Machine

In machine learning, support-vector machines (SVMs, also support-vector networks) are supervised learning models with associated learning algorithms that analyze data forclassification and regression analysis. An SVM trainingalgorithm builds a model that assigns new examples to one category or the other, making it a non-probabilistic binary linear classifier.

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IV. RESULTS

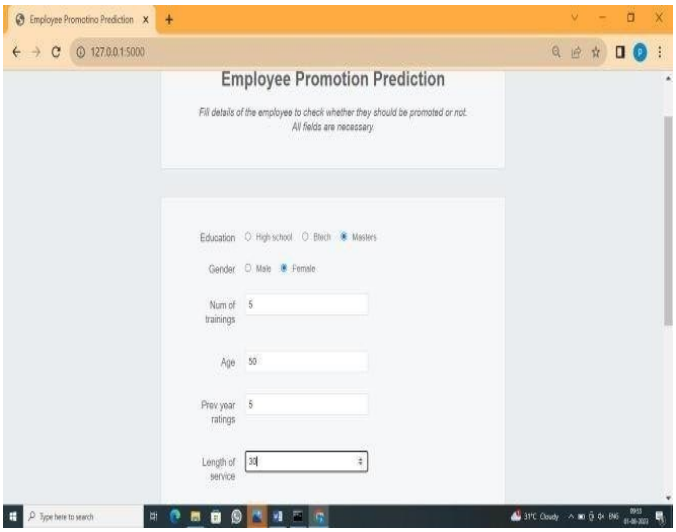

Fig. 2: Home Page

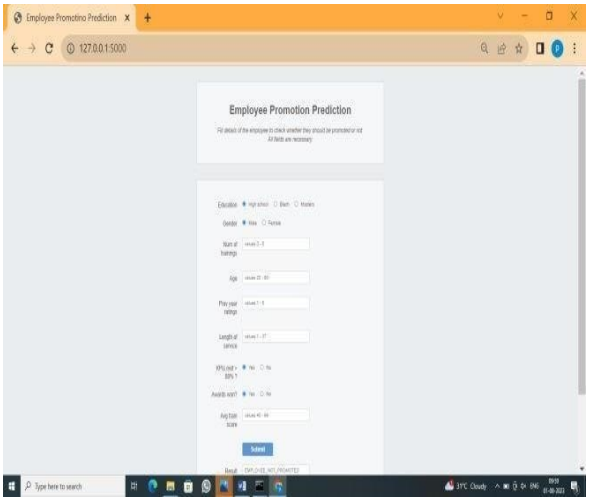

Fig. 3: Employee login

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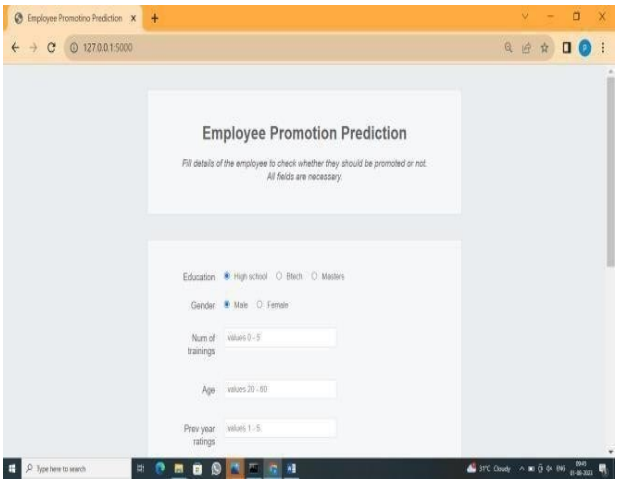

Fig. 4: Predicting Employee Data

CONCLUSION

We use the P-wave arrival time differences andthe location of the seismic stations to locate the earthquake in a real-time way.

Random forest (RF) has been proposed to perform this regression problem, where thedifference latitude and longitude between the earthquake and the seismic stations are considered as the RF output. The Japaneseseismic area is used as a case of study, which demonstrates very successful performance andindicates its immediate applicability. We extract all the events having at least five P- wave arrival times from nearby seismic stations. Then, we split the extracted events into training and testing datasets to construct amachine learning model. In addition, theproposed method has the ability to use only three seismic stations and 10% of the availabledataset for training, still with encouraging performance indicating the flexibility of theproposed algorithm in real- time earthquake monitoring in more challenging areas. Despitethe sparse distribution of many networksaround the world, which makes the random forest method difficult to train an effectivemodel, one can use numerous synthetic datasets to compensate for the shortage of ray paths in a target area due to insufficient catalogand station distribution.

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