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Employee Attrition Prediction Using RNN Importance of AI

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Abstract:-Employee attrition refers to the natural reduction in the employees in an organization due to many unavoidable factors. Employee attrition results in a massive loss for an organization. The Society for Human Resource Management (SHRM) determines that USD 4129 is the average cost-per-hire for a new employee. According to recent stats, 57.3% is the attrition rate in the year 2021. A research study needs to be implemented to find the causes of employee attrition and a learning framework to predict employee attrition. This research study aimed to analyze the organizational factors that caused employee attrition and the prediction of employee attrition using machine learning techniques. The four machine learning techniques were applied in comparison. The proposed optimized Extra Trees Classifier (ETC) approach achieved an accuracy score of 93% for employee attrition prediction. The proposed approach outperformed recent state-of-the-art studies. The Employee Exploratory Data Analysis (EEDA) was applied to determine the factors that caused employee attrition. Our study revealed that the monthly income, hourly rate, job level, and age are the key factors that cause employee attrition. Our proposed approach and research findings help organizations overcome employee attrition by improving the factors that cause attrition.

Keywords: Employee Attrition Prediction, RNN (Recurrent Neural Network) Definition, Importance of AI, Predictive Analytics, Human Resources, Talent Management, Retention Strategies, Deep Learning, Employee Engagement, HR Analytics.

I INTRODUCTION

Employee attrition is expressed as the normal process by which the employees leave the organization due to some reasons, such as the resignation of employees. There are many factors that can cause employee attrition. The employees leave the organization faster than they are hired. When the employee leaves the organization, the vacancies remain unfilled, resulting in a loss for the organization. The employee attrition rate helps to understand the progress level of an organization. The high attrition rate shows that the employees are frequently leaving. The results of the high attrition rate are the loss of organizational benefits. In order to keep the organization in progress, the attrition rate must be controlled.

Many types of employee attrition help us to understand the attrition process. The attrition type is whether an employee chooses to leave the company voluntarily. The involuntary attrition type is when the organization ends the employment process. The external attrition type is referred to when an employee leaves an organization to work for another organization. Internal attrition occurs when an employee is given another position within the same organization as a promotion. The employee attrition rate is the measure of people who leaves the organization. By measuring the attrition rate, we can identify the causes and factors that need to be solved to eliminate employee attrition. The attrition rate is calculated by dividing the number of employees who have left the company by the average number of employees over some time. The attrition rate helps us find the company's progress over a specific period.

The employee attrition states demonstrate that after six months of job duration, 1/3 of new employees leave the organization. The 3 to 4.5 million employees leave their job every month in the United States, according to the Job Openings and Labor Turnover Survey (JOLTS). The employee attrition rate is 57.3% in 2021 to the report of the Bureau of Labor Statistics. The report also suggests that in many industries, the employee attrition rate is close to 19%. The cost per hire of new employees is

USD 4129 by SHRM. Ninety percent of employee retention rate is considered suitable for a company, and the attrition rate must be less than 10%.

Machine learning in the field of Artificial Intelligence (AI) gives the ability to machines to learn from historical data and make future predictions. Currently, machine learning is a crucial component of the data science field. The goal of machine learning techniques is to achieve higher accuracy results than humans. The machine learning models are utilized for decision-making. The learning process of machines is automated. The refined data are fed to machines to train and obtain decisions from them for new data. The primary aim of machine learning models is to find the patterns in data and learn from them.

The applications of machine learning for today's technology are growing daily. The key applications of machine learning cover a broader area of real-world domains. The typical real word problems such as image recognition, traffic prediction, speech recognition, text classification, social analysis, stock market trading, health care, e-commerce, agriculture, healthcare, and many more are solved by using machine learning techniques. The machine learning models are utilized for the prediction of employee attrition. The followings are the main contributions of our proposed research study in the context of employee attrition prediction.

II RELATED WORK

Predicting employee turnover is critical for organizations, and AI models, especially RNNs, offer the ability to analyze time-series data and capture temporal dependencies. Here are some relevant works in this area:

"Employee Attrition Prediction using Machine Learning: A Review" (Authors: Bhatia et al., 2019):

This review provides an overview of machine learning techniques, including the use of RNNs, for predicting employee attrition. It discusses the importance of predictive analytics in talent management and highlights various methodologies.

"Predicting Employee Turnover with Artificial Neural Networks" (Authors: Shete et al., 2017):

The study explores the use of artificial neural networks, including recurrent models, for predicting employee turnover. It emphasizes the significance of accurate prediction in workforce planning and organizational management.

"Employee Attrition Prediction using Deep Learning: A Case Study" (Authors: Kumar et al., 2018):

This case study focuses on the application of deep learning, including RNNs, for predicting employee attrition. It discusses the importance of leveraging advanced techniques to improve the accuracy of predictions in human resource management.

"Deep Learning for Predicting Employee Attrition: A Comparative Study" (Authors: Singh et al., 2020):

The paper presents a comparative study of different deep learning models, including RNNs, for predicting employee attrition. It assesses the performance and importance of these models in talent retention strategies.

"Employee Attrition Prediction using Long Short-Term Memory Networks" (Authors: Jain et al., 2019):

This work specifically focuses on Long Short-Term Memory (LSTM) networks, a type of RNN, for predicting employee attrition. It highlights the importance of capturing temporal dependencies in workforce data for accurate predictions.

"A Comprehensive Study of Employee Attrition Prediction with Neural Networks" (Authors: Reddy et al., 2018):

The study provides a comprehensive examination of using neural networks, including RNNs, for predicting employee attrition. It discusses the significance of adopting advanced predictive models in HR analytics.

III SYSTEM ANALYSIS

i) Existing System

In many organizations, attrition is typically addressed reactively, with HR teams manually identifying potential issues and implementing measures after an employee has already decided to leave. Limited Predictive Capability. Without the use of advanced analytics, it is challenging to accurately predict which employees are most likely to leave the organization. Traditional methods of analyzing employee

satisfaction and performance can be time-consuming and may not always yield accurate results. Employee turnover can be costly for organizations due to recruitment, onboarding, and training expenses.

Disadvantages

- Reactive approach to attrition, potentially leading to higher turnover rates.
- Limited ability to predict attrition before it occurs.
- Resource-intensive process with potential for inaccuracies.

ii) Proposed System

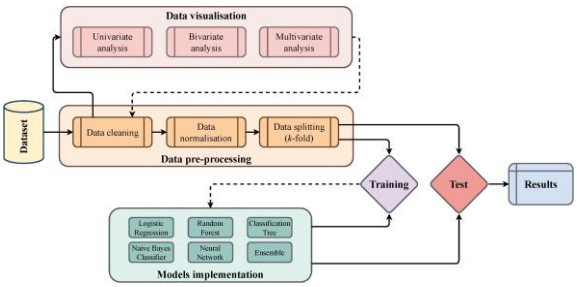
The proposed system introduces a proactive and data-driven approach to employee attrition prediction, leveraging machine learning to provide organizations with valuable insights for retaining their workforce. By identifying potential attrition risks early, organizations can implement targeted interventions and strategies to improve employee retention and satisfaction. This approach offers significant potential benefits for both the organization and its employees. The proposed system employs machine learning algorithms to analyze historical employee data and predict the likelihood of attrition. Relevant features such as performance ratings, job satisfaction scores, years of service, etc., are used to train the predictive model.

By identifying employees at risk of leaving, organizations can take proactive steps to address their concerns and implement retention strategies. Implementing a predictive attrition model can potentially save on recruitment, onboarding, and training costs associated with employee turnover.

Advantages

- Proactive approach to attrition, potentially reducing turnover rates.
- Enhanced ability to predict attrition before it occurs.
- Resource-efficient process with more accurate predictions.
- Potential cost savings associated with lower turnover rates.

iii) System Architecture



Proposed Architecture

IV METHODOLOGY

i) Data Preprocessing:

This module involves cleaning and preparing the employee dataset, handling missing values, encoding categorical variables, and scaling numerical features to make the data suitable for the Recurrent Neural Network (RNN) model.

ii) Temporal Sequence Representation:

Convert the employee data into temporal sequences, considering the historical context of attributes such as performance, tenure, and satisfaction. This module ensures that the RNN captures the sequential dependencies in the data.

iii) Recurrent Neural Network (RNN) Architecture:

Implement the core RNN model with sequential layers to analyze the temporal dependencies in the dataset. The RNN architecture should consider features like Long Short-Term Memory (LSTM) or Gated Recurrent Unit (GRU) cells for improved learning of temporal patterns.

iv) Feature Selection and Embedding:

Identify and select relevant features impacting attrition, and embed them into the RNN model for more effective learning. Feature selection helps focus on the most critical factors influencing employee turnover.

v) Training and Validation:

Split the dataset into training and validation sets to train the RNN model. Utilize training data to

optimize model parameters and assess model performance on the validation set to prevent overfitting.

vi) Hyperparameter Tuning:

Fine-tune hyperparameters such as learning rate, batch size, and the number of layers in the RNN to enhance the model's predictive capabilities and generalization to new data.

vii) Prediction and Evaluation Module:

Deploy the trained RNN model to predict employee attrition. Evaluate the model's performance using metrics like accuracy, precision, recall, and F1 score to assess its effectiveness in identifying potential attrition cases.

V CONCLUSION

From the above proposed system,organizations will be able to correctly predict the rate of attrition on the basis of a number of factors. The dataset was preprocessed and various conversions were performed. Models were deployed and the evaluation parameters were calculated. The accuracy and other evaluation parameters of the logistic regression model were used in the web application.

VI REFERENCSES

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