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Data-Driven Attrition Prediction for Talentgigs, Chennai

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Abstract

Staff turnover is a serious problem in any organization that impacts on organizational stability, productivity and competitiveness. High attrition results in extra recruitment and training expenses, lower employee morale and team cohesiveness. The traditional HR approach that employs reactive analysis and manual judgement are often found to be inadequate for forecasting. This work gives more emphasis on the understanding of the effectiveness of Data-driven machine learning approach to predict employee attrition in TalentGigs, Chennai. The goal of this study was to create and benchmark several machine learning models to determine which is the most accurate and reliable predictor of attrition risk. A synthetic employee attrition dataset was used as the secondary data source. The analysis tools employed were Python and libraries like Scikit-learn, Pandas, and XGBoost. The study result showed that the highest accuracy of 75.81% was obtained from the XGBoost algorithm during the prediction of Attrition. Overall, the study highlights the potential of AI-powered predictive models in HR, allowing organizations to make proactive, data-driven decisions that help reduce turnover, control costs, and create a more stable workforce.

Keywords: Employee Attrition, Machine Learning, Predictive Analytics, HR Analytics, XGBoost, Talent Retention

Introduction

Artificial Intelligence (AI) in the Human Resource Management (HRM) is gaining significance in the rapidly evolving business landscape. The traditional HR practices are predominantly manual and rely on simple digital tools, preventing the making of timely and accurate decisions. As companies evolve and HR management becomes more complex, there is a clear requirement to have smarter systems in place, which will help with better planning, prediction and overall efficiencies in the HR operations.

TalentGigs, a digital HR solutions startup, is now employing platforms such as LinkedIn, Indeed and applicant tracking systems (ATS) to manage.

Recruitment and job activities. These tools are used for basic tasks and are not as sophisticated as tools with advanced features such as prediction or personalization. As a result, the organization has a hard time analyzing employee behavior, determining whether there are any risks, like employee attrition, and making data-informed decisions that will enhance overall performance.

This project addresses these challenges with four machine learning models: Employee Attrition Prediction, Employee Retention Strategy Recommendation, Cost Prediction, and Course Recommendation. These models can be used to detect employees that are at risk, to determine the right course of action, to identify training programs and to estimate costs more effectively for the HR team. The integration of these models within a unified framework that is both intuitive and accessible to HR professionals allows for more informed and agile decision-making.The project brings together these models through an integrated system that is user-friendly, enabling HR professionals to make more informed and agile decisions, which in turn will contribute to better employee satisfaction, organizational efficiency, and long-term growth.

Literature Review

According to Gowda, P., Kudache, S. B., et al. (2025) in the article "Employee Attrition Prediction Using Data-Driven Machine Learning Models," one of the major issues facing companies is employee attrition, which impacts productivity, operational costs, and employee morale. Where attrition can be predicted, proactive retention and efficient HR management can be put in place. The study identifies important factors contributing to attrition from the organization, including performance, demographic, job satisfaction and turnover history.

Ogah, I. G. In his research paper titled "Investigating Employee Attrition using Machine Learning Techniques" (2025), he studied the underlying factors behind which employees might not be able to communicate openly in exit interviews, using machine learning techniques to explore the reasons for employee attrition. The novelty of this research is the use of the model-based approach to causal inference to make conclusions.

The study by Haque et al. (2025) revealed that high turnover rates among employees have a negative effect on organizational morale, productivity, and continuity. In this study, the machine learning methods were used to predict the employees who are likely to quit, namely Clear AI, Random Forest, and the Logistic Regression. The highest accuracy obtained was 85.71% by Random Forest. Overtime, marital status and stock options were found as key drivers of attrition through the feature importance analysis.

Sinha, A. (2025) noted that employee turnover is a significant issue for organisations, impacting productivity and driving up recruitment costs. The goal of the project was to predict employee turnover using various machine learning models including Artificial Neural Networks, Random Forest and Support Vector Machines.

Sharma, N. D., Aswath, et al. (2025) proved that in the competitive present-day business environment, working with data has become essential to human resource management. This study analyzed the use of AI and Machine Learning (ML) in HR Analytics for improving employee performance, retention, and organizational productivity.

In their research on HR analytics for data-driven employee attrition management, Law, J. J. X., & Mahadi, N. (2024) acknowledged that HR Analytics has become an essential data-driven tool for enhancing HR decision-making. The research investigated the utilization of HR dashboards, specifically Power BI, as a single tool for workforce trend and pattern visualization.

Raj et al. (2024) showed that the predictive models achieved good accuracy based on high AUC values of the obtained ROC curve, which shows their effectiveness in retention planning. The results also indicate some significant correlations between job satisfaction, workload, and career development as factors contributing to turnover.

Ozdemir, F., Coşkun, M., et al. (2020) reported that forecasting attrition is now. essential for proactive workforce planning and retention strategies. However, conventional approaches for HR forecasting are not always enough. This research used the HR data set in IBM and tried different classification models and found that data mining can be used effectively to determine the likelihood of employee attrition.

Objectives of The Study

To understand the factors that affect staff turnover with a data-centric approach to analysing internal HR data.

- To build 4 machine learning models that predict employee's retention and attrition risk

Research Gap

Previous research on employee attrition only attempts to predict employees' exit, neglecting to offer any practical solutions for HR professionals. This leaves a gap, since organizations require systems that are more than predictive and allow them to make decisions. This paper seeks to fill that void with a multi-model approach that not only identifies attrition risk, but identifies important factors and recommends appropriate HR interventions to mitigate those risks. The system's predictive and prescriptive capabilities enable HR professionals to make proactive decisions and take action to minimize employee turnover.

Research Methodology

The nature of this study was prescriptive analytics, as the main purpose was to gain more knowledge about predicting employee attrition and providing actionable recommendations. Secondary data collection was through the Kaggle platform, wherein the "Employee Attrition Classification Dataset" was downloaded and analysed. The sample size of the dataset was 74,498 samples. The tools used for analysing the responses were Python programming language with libraries such as Scikit-learn, Pandas, NumPy, Matplotlib, Seaborn, and XGBoost. The area of the study was TalentGigs, Chennai.

Data Analysis and Discussion

The data has been analysed by building multiple machine learning models, where the models learned patterns from the training data and were evaluated on test data.

Model Comparison for Employee Attrition Prediction

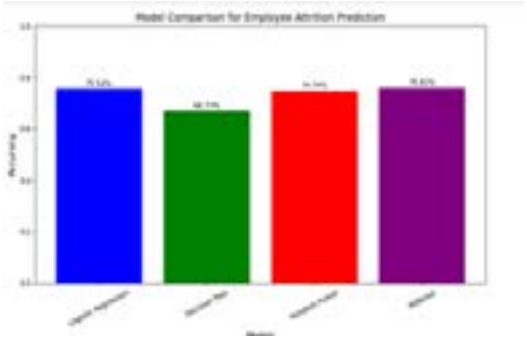

Figure 1 Model Comparison for Employee Attrition Prediction

Interpretation

Various machine learning algorithms were compared to predict the employee suggestions using the dataset. The results are as follows:

- Logistic Regression: 75.54% accuracy
- Decision Tree: 66.91% accuracy
- Random Forest: 75.09% accuracy
- XGBoost: 74.75% accuracy

A Logistic Regression algorithm was chosen for prediction as it had the highest accuracy of 75.54% across all the algorithms. This will be used in this model to predict the outcome of the employee suggestion based on the inputs from the user.

Model Comparison for Employee Segmentation

Interpretation

Different machine learning algorithms were compared and used to predict employee attrition using the dataset. The following are the results:

- Logistic Regression: 75.54% accuracy
- Decision Tree: 66.77% accuracy
- Random Forest: 74.74% accuracy
- XGBoost: 75.81% accuracy

Based on the accuracy rates, the XGBoost algorithm has the highest accuracy of 75.81%, so it was chosen for making predictions. This model is going to be utilized to predict whether or not the person is leaving the company according to the given input.

Model Comparison for Employee Suggestion

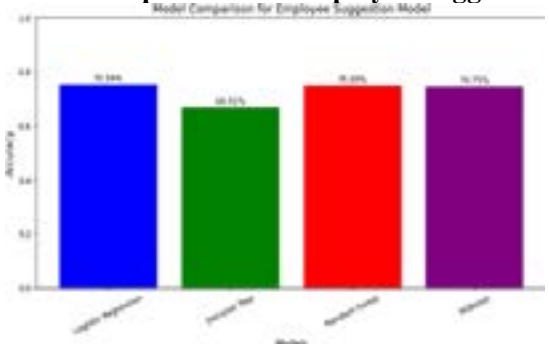

Figure 2 Model Comparison for Employee Suggestion Model

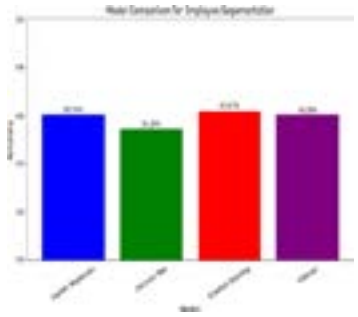

Figure 3 Model Comparison for Employee Segmentation

Interpretation

Several machine learning algorithms such as logistic regression, neural networks, decision trees, and support vector machines, were compared to predict employee segmentation from the given data. The results are as follows:

- Logistic Regression: 60.34% accuracy
- Decision Tree: 54.29% accuracy
- Gradient Boosting: 61.67% accuracy
- XGBoost: 60.26% accuracy

The Gradient Boosting algorithm, which has the highest accuracy (61.67%), was chosen to make predictions. This model will be used to classify users as employees by means of user inputs.

Model Comparison for Employee Cost Analysis

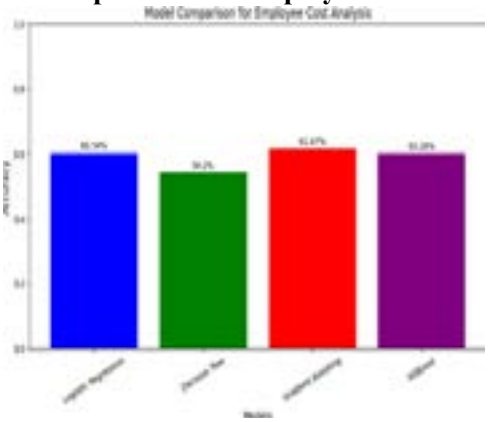

Figure 4 Model Comparison for Employee Cost Analysis

Interpretation

Several machine learning models were compared on the dataset and analyzed with respect to the cost of employees. Now the results are:

- Logistic Regression: 60.34% accuracy
- Decision Tree: 54.20% accuracy
- Gradient Boosting: 61.67% accuracy
- XGBoost: 60.26% accuracy

The Gradient Boosting algorithm which had the best accuracy of 61.67% was chosen for predicting. This model will be applied to look into the pattern of cost of employees on the basis of the inputs given by the user.

Findings

The employee attrition prediction model can be used to determine which employee is likely to leave the company so that HR can take appropriate action in time and increase employee retention. The course recommendation model recommends the most appropriate training courses depending on the employee's preferences, which can improve the skills and overall performance. the business to improve its employee retention.The retention strategy model gives practical ideas like training, promotion, or monitoring, to help the business improve employee retention. organizations can handle employees more effectively. The cost prediction model provides an estimate of employee-

related costs, which aids in making informed financial decisions and planning for resources. By embedding these AI-driven models into HR practices, organizations can enhance decision-making and boost efficiency. AI's application in HR fosters ongoing improvements and drives innovation within the company. The models demonstrate the organization's application of contemporary talent management technology.

Suggestions

- Provide HR Professionals the ability to effectively leverage AI based systems for predicting employee attrition, planning for employee retention, employee cost estimation, and course recommendation.

  Make sure that the same data is used in all models and that it is accurate, up-to-date and well-maintained, to create more reliable predictions.
- Encourage continuous learning and adaptability to keep up with advancements in AI technologies used in HR systems.
- Work with industry professionals to improve model performance and adhere to industry best practices for AI in HR solutions.

Ensure that data security and privacy are robustly managed, with sensitive employee data protected across all modules.

Use the course recommendation model to offer employees relevant training courses, which will enhance their skills and career development.

Continuously test and review all models (attrition, strategy, cost and course recommendation) for errors, biases, and opportunities for enhancement.

Analyze data from the retention strategy and attrition models and proactively take measures to reduce employee turnover.

Use the cost prediction model to aid financial planning and optimal use of the available resources in the organization.

Connect all four models into a single HR system to increase efficiency, minimize manual effort, and aid decision-making.

Conclusion

The organization is appreciating the value of keeping their workers (Economically i.e. cost of recruitment and productivity perspective). The study was able to successfully create an XGBoost model that attained an accuracy of 75.81% for their employee attrition prediction. Overall, the implementation of AI-powered models in HR processes at TalentGigs is a positive development that could help enhance efficiency and streamline the way HR is managed. Other enhancements can be achieved by using real-time data and expanding the datasets to include more and diverse data and to improve the models. The suggestions and recommendations, when implemented, will be more beneficial for the organization in terms of future aspects, enabling TalentGigs to stay competitive and effectively manage the challenges of a dynamic work environment.

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