

PROJECT REPORT

HR Analytics Attrition Prediction

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Introduction

Employee attrition is a major challenge faced by organizations today. Understanding the reasons for attrition and predicting it in advance can help businesses retain talent and reduce costs. This project focuses on building a machine learning model to predict employee attrition and suggest preventive measures using an HR dataset.

Abstract

This project aims to analyze employee data to identify patterns related to attrition. A classification model was trained to predict whether an employee is likely to leave the organization. Furthermore, SHAP (Additive explanations) was used to explain model predictions and offer data-driven suggestions for attrition prevention. The insights derived can support HR decision-making and improve employee retention strategies.

Tools Used

- **Python** – Data preprocessing, modeling, SHAP interpretation
 - **Google Colab** – Coding and notebook environment
 - **Power BI** – Dashboard visualization of HR data
 - **GitHub** – Project version control and sharing
 - **FPDF** – Generating PDF reports
 - **Libraries** – pandas, scikit-learn, matplotlib, seaborn, shap, fpdf
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Steps Involved in Building the Project

1. **Data Collection**
 - Used the "WA_Fn-UseC_-HR-Employee-Attrition.csv" dataset.
2. **Data Preprocessing**
 - Handled missing values, encoded categorical data, and normalized features.
3. **Model Building**
 - Trained and evaluated multiple classifiers (e.g., Random Forest, Logistic Regression).Selected the best-performing model based on accuracy and confusion matrix.

4. Model Evaluation

- Used metrics like accuracy, precision, recall, and the confusion matrix.
- Visualized results using seaborn heatmaps.

5. Model Interpretation with SHAP

- Implemented SHAP to explain model predictions and feature importance.

6. Attrition Prevention Suggestions

- Generated a PDF with personalized recommendations for HR practices to reduce attrition.

7. Dashboard Creation

- Designed an interactive Power BI dashboard for HR decision-makers.

8. GitHub Upload

- Uploaded all project files including notebook, dataset, model results, and Power BI report.

Conclusion

This project successfully demonstrates how machine learning can be applied in HR analytics to predict employee attrition and suggest actionable strategies. By leveraging explainable AI tools like SHAP and data visualization through Power BI, the project offers clear insights for HR professionals to enhance employee satisfaction and retention.