

Attrition Prevention Suggestions – HR Analytics Project

Introduction

Employee attrition is a critical challenge for organizations aiming to retain top talent and maintain a stable, experienced workforce. Understanding the factors driving attrition helps HR departments implement effective policies and interventions. This project uses data analytics and machine learning to analyze employee data, identify key attrition drivers, and suggest preventive strategies.

Abstract

This HR Analytics project focuses on identifying the main causes of employee resignation and building a predictive model to flag potential attrition risks. Using a combination of exploratory data analysis (EDA), machine learning models (like Logistic Regression and Decision Tree), and SHAP interpretability tools, the project uncovers how variables such as overtime, job satisfaction, salary, and years since last promotion influence attrition. A Power BI dashboard visualizes key trends and makes the insights easily accessible to decision-makers.

Tools Used

- **Python:** For data cleaning, visualization (Pandas, Seaborn), and building machine learning models using Scikit-learn.
 - **SHAP:** To interpret model predictions and explain the influence of features.
 - **Power BI:** For interactive dashboard creation and visualization of attrition factors.
 - **Jupyter Notebook:** For code development and documentation.
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Steps Involved in Building the Project

1. **Data Preprocessing**
 - Cleaned and encoded categorical variables.
 - Handled missing values and normalized numerical features.
2. **Exploratory Data Analysis (EDA)**
 - Analyzed attrition across departments, salary bands, and promotion history.
 - Found strong correlations between overtime, low job satisfaction, and high attrition.
3. **Model Building**
 - Built classification models including Logistic Regression and Decision Tree.
 - Evaluated using accuracy score and confusion matrix.
4. **Model Interpretability (SHAP)**
 - Applied SHAP values to explain which features drive attrition predictions.
 - Key drivers identified: **OverTime**, **JobSatisfaction**, **MonthlyIncome**, **YearsSinceLastPromotion**, **WorkLifeBalance**.

5. Dashboard Visualization (Power BI)

- Developed an interactive dashboard showing key metrics like attrition rate by department, gender, job role, etc.

Attrition Prevention Suggestions

Based on the insights from the analysis, we recommend the following strategies to reduce employee attrition:

1. Reduce Overtime Dependency

- High overtime is a top predictor of attrition. Implement policies to reduce workload and avoid employee burnout.

2. Enhance Job Satisfaction

- Conduct regular job satisfaction surveys. Address common complaints and promote internal mobility to increase engagement.

3. Improve Compensation and Benefits

- Employees with lower income levels are more prone to leave. Benchmark salaries with industry standards and offer performance-based bonuses.

4. Focus on Career Growth

- Lack of promotions and growth opportunities is linked to higher attrition. Establish clear paths for advancement and regular performance reviews.

5. Strengthen Work-Life Balance

- Promote flexible working hours, remote work policies, and wellness programs to enhance overall work-life harmony.

6. Targeted Retention Programs

- Use the predictive model to flag high-risk employees and apply retention interventions (mentorship, training, role changes).

Conclusion

This project demonstrates the power of data-driven HR strategies in addressing employee attrition. By combining machine learning, SHAP interpretability, and Power BI dashboards, HR teams can proactively identify risks and implement timely interventions. Continued monitoring and iterative updates to the model will ensure sustainable employee retention and improved organizational performance.

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