

HR Analytics Report

Introduction:

Employee attrition is a persistent challenge for organizations, impacting productivity, talent continuity, and overall organizational health. Understanding why employees leave and being able to predict potential resignations can empower HR departments to take preventive actions and build a stronger, more stable workforce. This project leverages data analytics and machine learning to explore the key factors influencing employee attrition. By analyzing historical HR data from IBM, we aim to uncover patterns in employee behavior, work environment, and personal attributes that contribute to resignation. The ultimate goal is to provide actionable insights and predictive capabilities that support strategic HR decisions focused on employee retention and organizational growth.

Abstract:

This project focuses on predicting employee attrition using historical HR data from IBM. The objective is to identify the primary factors that lead to employee resignation and build a predictive model that assists HR in taking proactive retention measures.

The analysis involved data cleaning, exploratory data analysis (EDA), feature engineering, model training using logistic regression, and SHAP-based interpretation for transparency. Key visualizations were developed in Power BI to highlight high-risk roles, departments, and employee segments.

Findings reveal that overtime, low satisfaction, and specific job roles such as Sales and R&D are strong indicators of attrition. The insights derived from this analysis can be used to refine HR strategies, enhance employee engagement, and reduce turnover.

Tools Used:

- Python (Pandas, Scikit-learn, SHAP, Seaborn, Matplotlib)
- Google Colab
- Power BI

Steps Followed:

1. Loaded IBM HR dataset into Google Colab.
2. Cleaned & encoded data; dropped irrelevant columns.
3. Performed EDA to uncover attrition trends by role, age, and satisfaction.
4. Built a logistic regression model to predict attrition.
5. Used SHAP to interpret key features influencing attrition.
6. Created Power BI dashboard with interactive visuals and filters.
7. Summarized insights and provided actionable HR recommendations.

Key Insights:

- Overtime is the strongest predictor of attrition. Employees working overtime are significantly more likely to resign.
- Sales and R&D job roles experience the highest attrition, indicating a need to review role expectations, workload, and support.

HR Analytics Report

- Employees aged 18–25 show elevated resignation risk, suggesting early-career disengagement or unmet expectations.
- Lower environment and job satisfaction scores are closely tied to higher attrition, highlighting areas for workplace improvement.
- Longer tenure with the current manager is associated with lower attrition, suggesting the value of stable leadership and manager-employee trust.
- Attrition varies significantly by department, with some areas requiring urgent intervention in engagement and retention strategies.

Conclusion:

The HR attrition analysis successfully identified key drivers contributing to employee resignation, such as overtime, job role, satisfaction levels, and years spent with the current manager. Through predictive modeling and interpretability using SHAP, the project provides HR with a clear, data-driven foundation for targeted retention strategies.

By leveraging this analysis, organizations can proactively focus on at-risk employee groups, optimize workload distribution, and enhance overall employee experience. The Power BI dashboard further enables decision-makers to interactively explore attrition patterns and drive policy-level improvements.

This project demonstrates the practical application of data science in HR and sets the stage for future extensions, including real-time attrition alerts and deeper integration with internal HR systems.

Dashboard Snapshot:

