**REPORT**

**Project Topic: HR Analytics - Predict Employee Attrition**

**Introduction:**

Employee attrition is a critical challenge for organizations, directly impacting productivity, talent continuity, and organizational culture.

This **HR Attrition Dashboard and Python Analysis** has been developed to visually analyse employee turnover trends using key HR metrics such as age, job role, salary, education, years at company, training, promotion history and so on and so forth. By leveraging these insights, HR professionals and decision-makers can identify high-risk segments, anticipate attrition risks, and implement proactive measures to retain top talent.The analysis serves as a strategic tool to transform raw HR data into actionable intelligence, driving data-informed decisions to enhance employee engagement and organizational stability.

**Abstract:**

This project presents a dynamic **HR Attrition Dashboard** **and Analysis** designed to analyse and predict employee attrition within an organization. The dashboard is built using employee demographic and performance data to uncover patterns and key drivers behind workforce turnover.

Key metrics such as age distribution, job roles, marital status, salary slabs, years since last promotion, and training frequency are visualized to reveal high-risk segments. The analysis highlights that attrition is most prevalent among employees aged 26–35, those in roles like Laboratory Technician and Sales Executive, and individuals receiving low training or compensation.

Exploratory Data Analysis (EDA), Logistic Regression Model has explored distribution across departments, job roles, education & other fields and predict attrition across all factors respectively. SHAP Analysis has predicted that how much each feature contributes to employee attrition prediction.

This aims to empower HR leaders with data-driven insights to reduce attrition by improving onboarding, increasing employee engagement, offering competitive salaries, and enhancing career development opportunities. Ultimately, it serves as a strategic decision-support tool for building a more stable and committed workforce.

**Tools used:** Excel, Power BI, Python

**Steps Involved in Building the Project:**

**Python Analysis- Employee Attrition Prediction**

1. **Statistical Summary:** helps in understanding distribution and central tendency: **\***Employees with no recent promotions, low satisfaction scores, and no training might be more likely to leave.

\*Wide income disparity and distance from home also influence decisions to resign.

\*Years at company is 7 years while Avg. years in current role is 4.2 years. This reveals that employees tend to remain in the same role for a significant part of their tenure.

\*Avg. scores of Environment Satisfaction, Job Involvement and Relationship Satisfaction is 2.7-2.8, suggesting moderate satisfaction but potential for improvement.

# **These insights suggest** that factors like job involvement**,** career progression, and work life balance may significantly influence employee attrition.

1. **EDA- Univariate Analysis (Single Column Analysis):** Thevisualization shows the distribution of numerical columns from the dataset. Each subplot represents a histogram for a specific feature.

\*Monthly income, Daily rate and Hourly rate are right-skewed: This reveals income varies widely; most earn in the lower range. Some outliers with high compensation-possibly senior roles or specialists.

\*Percent Salary Hike: Most values are <20%. This suggests modest raises: might contribute to attrition.

# **These insights suggest** that factors like early-career employees (0-5 years) dominate more vulnerable to attrition.

# Low promotions and trainings reveal strong signs of potential disengagement.

1. Logistic Regression Model- Check Feature Importance: shows which feature most influences the prediction. High +/- coefficients suggest strong relationships with the target. \***Coefficients Insights**: Overtime + = employees working overtime are more likely to leave \*Monthly Y - = higher salary tends to reduce attrition \*Distance from Home + = long commutes may increase risk of leaving \*Job Satisfaction - = higher satisfaction is linked to lower attrition # **HR can use these analysis** to proactively retain employees at risk, reassess workload and compensation policies.
2. SHAP Analysis: Shapley Additive exPlanations is used to predict model predictions i.e. how much each feature contributes to a prediction and how they influence the model.

\***Y-axis**: Feature ranked by importance (top=most influential). \***X-axis**: Impact of that feature on the model’s prediction. Positive values push the prediction towards attrition (1), negative toward no attrition (0). \* **Color** : Feature Value- Blue= low; Pink/Red= High

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| --- | --- |
| Overtime | High Overtime (red dots on the right) strongly increases the likelihood of attrition. |
| Years at Company | Lower values (blue on the right) increase attrition, newer employees are more likely to leave |
| Years since last promotion | No recent promotion (blue) leads to higher attrition. |
| Satisfaction parameters | Lower satisfaction across three categories (blue dots on the right) correlate with attrition |
| Years with current manager | Low values correlate with higher attrition i.e. short relationship with manager means risky. |

**Conclusion:**

These insights highlight the necessity for targeted HR interventions, including enhanced onboarding, better career advancement paths and role-specific engagement strategies. By leveraging such analysis, HR teams can move beyond reactive measures and proactively shape a more stable, motivated, and productive workforce. The Power BI dashboard and Python Analysis ultimately acts as a strategic tool, not just to **understand why employees leave**, but to **take informed and targeted retention strategies.**

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