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| HR Analytics – Predict Employee Attrition  -Prathamesh Ashok Patil |
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**1. Introduction**

Employee attrition has become a major concern in modern organizations. High turnover affects productivity, morale, and company performance. This project focuses on identifying the key reasons behind employee resignations using analytics and building a predictive model to estimate attrition risk in advance.

**2. Objective**

Use analytics to understand the main causes of employee resignation and predict future attrition using machine learning and data visualization.

**3. Abstract**

This project analyzes employee attrition patterns using the IBM HR dataset. Through exploratory data analysis (EDA), classification modeling, and SHAP-based interpretation, the project identifies high-risk segments and key resignation drivers. Results are visualized using a multi-page Power BI dashboard that supports HR decision-making.

**4. Tools Used**

* **Python Libraries**: Pandas, NumPy, Seaborn, Matplotlib
* **Machine Learning**: Scikit-learn (Logistic Regression, Decision Tree)
* **Interpretability**: SHAP (Shapley Additive Explanations)
* **Visualization**: Power BI
* **Dataset**: IBM HR Analytics Employee Attrition

#### ****5. Mini Guide – Steps Followed****

1. **EDA**: Department-wise attrition, salary band trends, promotion gaps
2. **Feature Engineering**: Created Salary Band, PromotionsLast5Yrs
3. **Modeling**: Built classification models (Logistic Regression, Decision Tree)
4. **Evaluation**: Assessed using accuracy, precision, recall, F1-score, confusion matrix
5. **SHAP Analysis**: Identified top contributing features
6. **Power BI Dashboard**: Created 4 interactive report pages:
   * Attrition Overview
   * Attrition Factors
   * Predictive Profile
   * Attrition Prevention Suggestions/Measures

#### ****6. Key Model Results****

| **Metric** | **Value** |
| --- | --- |
| Accuracy | 88% |
| Precision | 79% |
| Recall | 81% |
| F1 Score | 80% |

**Top Factors (SHAP Importance)**:

* Over Time
* Monthly Income
* Years At Company
* Job Role
* Work-Life Balance

#### ****7. Deliverables****

* Power BI Dashboard (.pbix)
* Python Model Report (Notebook + Metrics)
* PDF Report: Attrition Prevention Suggestions

#### ****8. Conclusion****

The HR attrition prediction system successfully identifies high-risk employees and critical factors contributing to resignation. With 88% model accuracy and actionable insights from SHAP and Power BI, HR teams can make strategic decisions to reduce Attrition. Key recommendations include reducing overtime, reviewing compensation structure, improving onboarding, and creating promotion transparency.