**HR Analytics for Employees Attrition Report**

**Project Title:**

**HR Analytics on Employees Dataset**

**Objective:**

The primary goal of this analysis is to understand the key factors influencing employee attrition. The notebook investigates various demographic and job-related features to identify patterns in employee resignations. This can help organizations retain valuable talent and improve employee satisfaction.

**Dataset Overview:**

**The dataset includes various attributes like:**

* **Age**
* **Job Role**
* **Monthly Income**
* **Distance from Home**
* **Education Background**
* **Attrition (target variable)**

**Key Steps in the Notebook:**

1)Importing Libraries:

* **Used libraries include: pandas, NumPy, matplotlib, seaborn, SkLearn, xgboost, imblearn, shap**

2)Data Loading and Preprocessing:

* Dataset is loaded using pandas.
* Label encoding is used for categorical features.
* SMOTE is used to address class imbalance (common in attrition data).

3)Exploratory Data Analysis (EDA):

* Visual analysis using Seaborn and Matplotlib.
* Trends in attrition across departments, income levels, commute distance, etc.

4)Modeling:

1) Two machine learning models are used:

* **Random Forest Classifier**
* **XGBoost Classifier**

5)Model Interpretation:

SHAP (SHapley Additive exPlanations) helps interpret the model predictions and identify key influencing features.

Model Performance:

| **Metric** | **Random Forest** | **XGBoost** |
| --- | --- | --- |
| Accuracy | 87% | **89%** |

**Business Insight Report**

**1. What factors are causing employees to leave?**

According to model analysis and SHAP interpretation:

* **Low Monthly Income** is a strong predictor of attrition.
* **Long Commute Distances** negatively affect employee satisfaction.
* **Job Role Mismatch** — employees in Sales or HR roles have higher attrition rates.
* **Education Level vs Job Position** mismatch often causes dissatisfaction.

**2. What departments should they focus on?**

* **Sales Department**: Consistently shows the highest attrition rates.
* **Human Resources**: Needs attention due to burnout or possible misalignment with company culture.

**3. Actionable Suggestions:**

* **Competitive Compensation**: Regular reviews of salary structures, especially for at-risk roles.
* **Remote/Hybrid Work Policies**: Reduce commuting burdens for employees living far from the office.
* **Career Development Plans**: Offer upskilling and internal mobility programs.
* **Regular Feedback Loops**: Implement pulse surveys and feedback channels to catch dissatisfaction early.
* **Department-specific Retention Strategies**: Tailor support and incentives for high-risk departments.