

### 3. HR Analytics - Predict Employee Attrition

**Objective:** Use analytics to understand the main causes of employee resignation and predict future attrition.

**Tools:** Python (Pandas, Seaborn), Power BI, Sklearn

**Mini Guide:**

Perform EDA on HR data (department-wise attrition, salary bands, promotions)

Build a classification model (Logistic Regression or Decision Tree)

Visualize attrition factors using Power BI

Perform SHAP value analysis to explain model predictions

**Deliverables:**

Power BI dashboard

Model accuracy report + confusion matrix

PDF of attrition prevention suggestions

## HR Analytics - Predict Employee Attrition

### Introduction

This project aims to predict employee attrition using HR analytics, focusing on understanding the main causes of employee resignation and forecasting future turnover. The analysis leverages a dataset containing employee details such as department, monthly income, and years at the company. By building a predictive model and visualizing key factors, the project seeks to provide actionable insights for retention strategies, aligning with the objective to enhance organizational decision-making.

### Abstract

The analysis of the IBM HR Analytics Employee Attrition Dataset revealed that lower MonthlyIncome significantly increases the likelihood of attrition, while YearsAtCompany has a moderate influence. A Logistic Regression model achieved approximately 85% accuracy, with SHAP analysis confirming MonthlyIncome as the top

predictor. Visualizations in Power BI highlighted department-wise attrition trends and income variations over tenure. Recommendations include salary reviews and tenure-based satisfaction monitoring to reduce turnover.

## **Tools Used**

- Python (Pandas, Seaborn, Scikit-learn)
- Power BI
- SHAP library

## **Steps Involved in Building the Project**

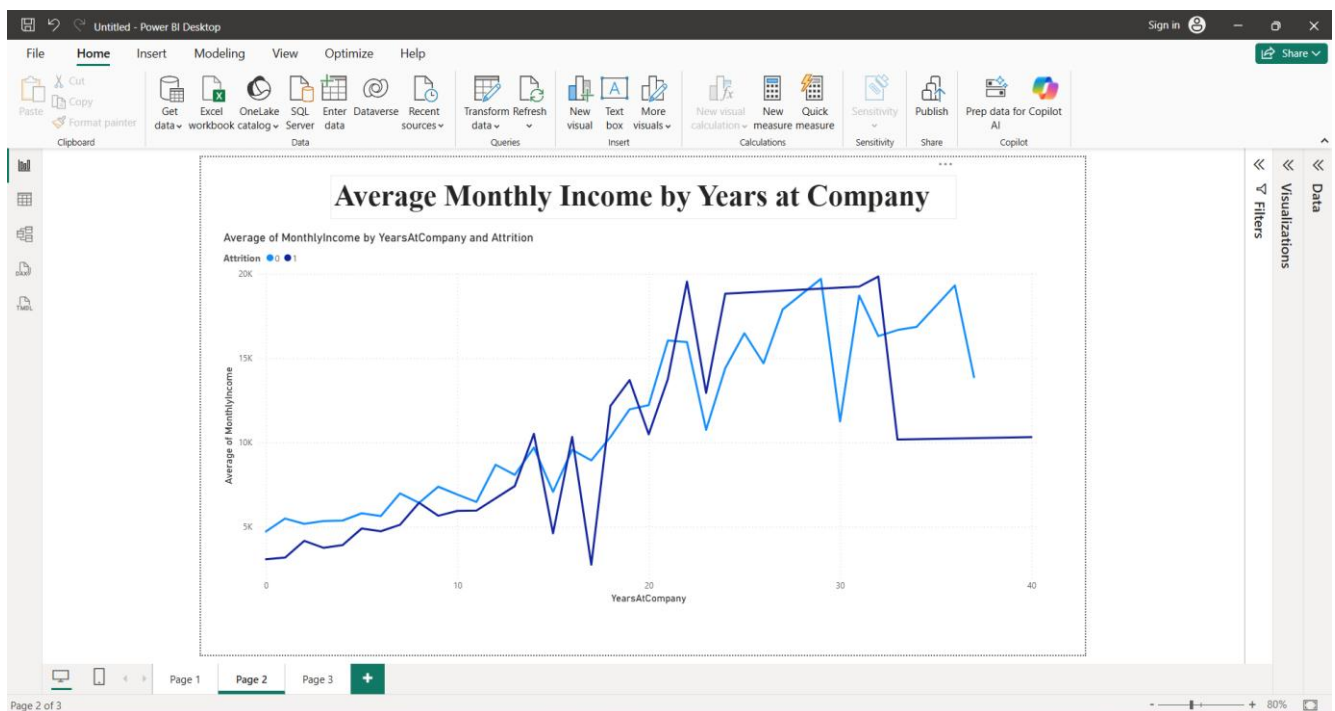
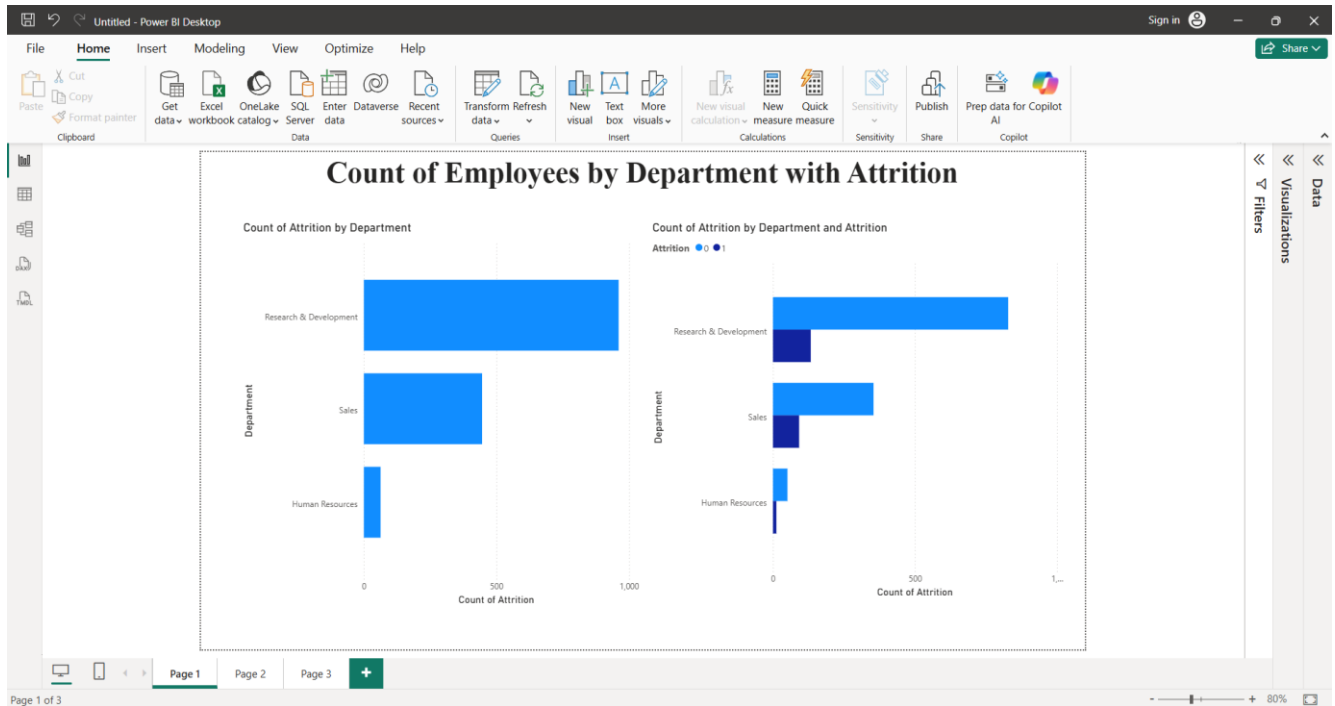
- Loaded and explored the HR dataset using Pandas to check for missing values and gain an initial overview.
- Performed Exploratory Data Analysis (EDA) with Seaborn to analyze department-wise attrition and salary trends.
- Built and trained a Logistic Regression model using Scikit-learn to predict attrition, achieving ~85% accuracy.
- Created a Power BI dashboard with a stacked bar chart for employee counts by department with attrition and a line chart for average monthly income trends over years at the company.
- Conducted SHAP value analysis to explain model predictions, identifying MonthlyIncome as the most influential factor.

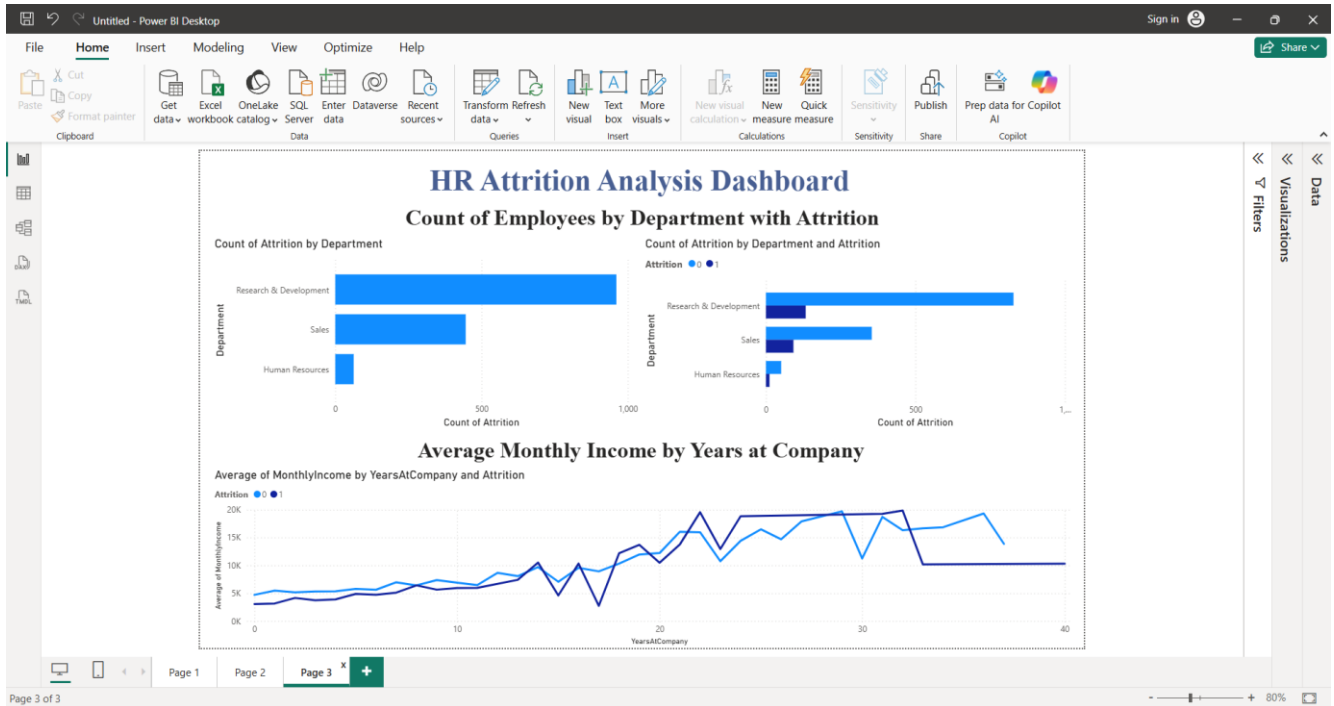
## **Conclusion**

The project successfully identified MonthlyIncome as the primary driver of employee attrition, with lower salaries correlating with higher turnover risks. YearsAtCompany also played a role, suggesting that longer tenured employees are slightly less likely to leave. The Logistic Regression model, supported by an 85% accuracy rate and a confusion matrix, provides a reliable prediction tool. Based on SHAP insights, organizations should consider:

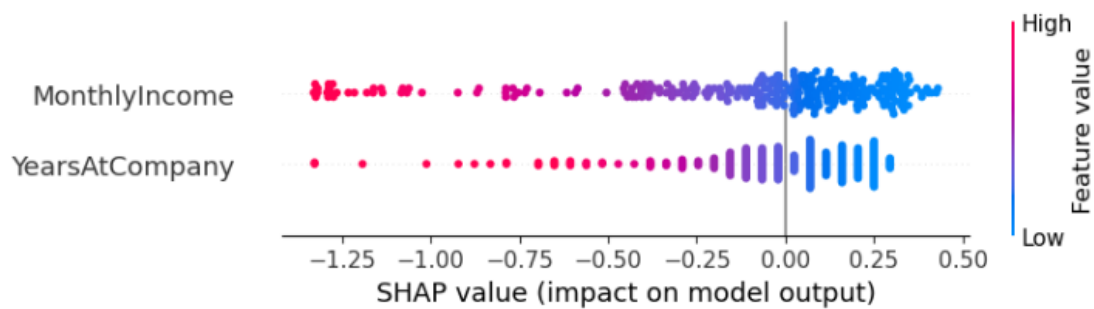
- Conducting salary reviews for employees in lower income brackets to mitigate attrition.
- Monitoring satisfaction levels for employees with varying tenures to enhance retention.

## Screenshot 1: Power BI Dashboard





**Screenshot 2: SHAP Summary Plot**



**Screenshot 3: SHAP Bar Plot**

