

IBM HR Analytics Dashboard

Analyze, Predict & Understand
Employee Attrition



The Problem

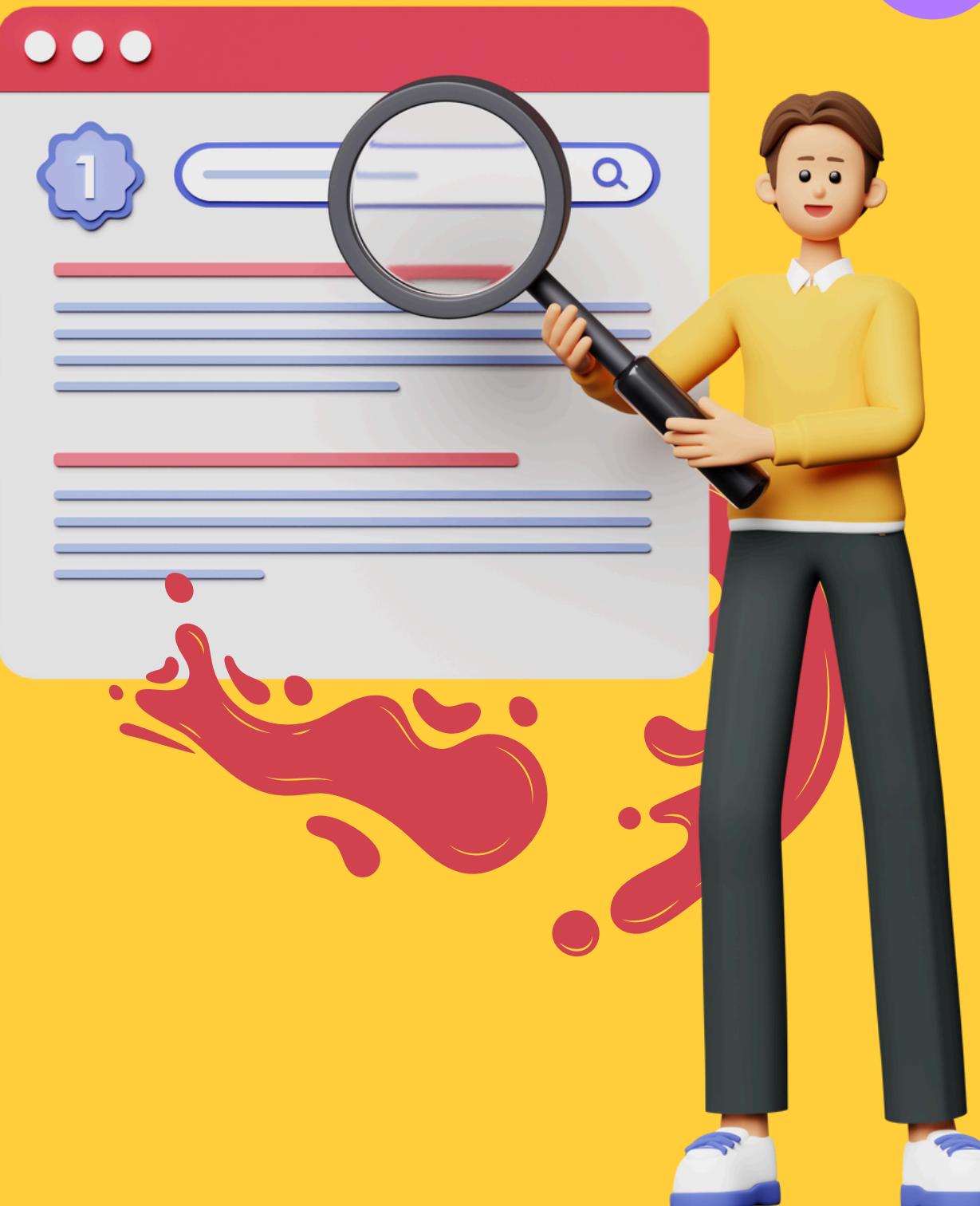
Employee attrition (resignations) significantly affects company productivity, hiring costs, and project timelines.

Goal:

To analyze employee data and predict which employees are likely to leave, so HR can take proactive action.

Challenges:

- Identifying key factors causing attrition
- Visualizing employee trends clearly
- Making ML predictions understandable to non-technical HR managers



Dataset Overview

IBM HR Analytics Employee Attrition & Performance Dataset

This dataset contains detailed employee information, designed to help analyze and predict employee attrition (resignation) patterns.

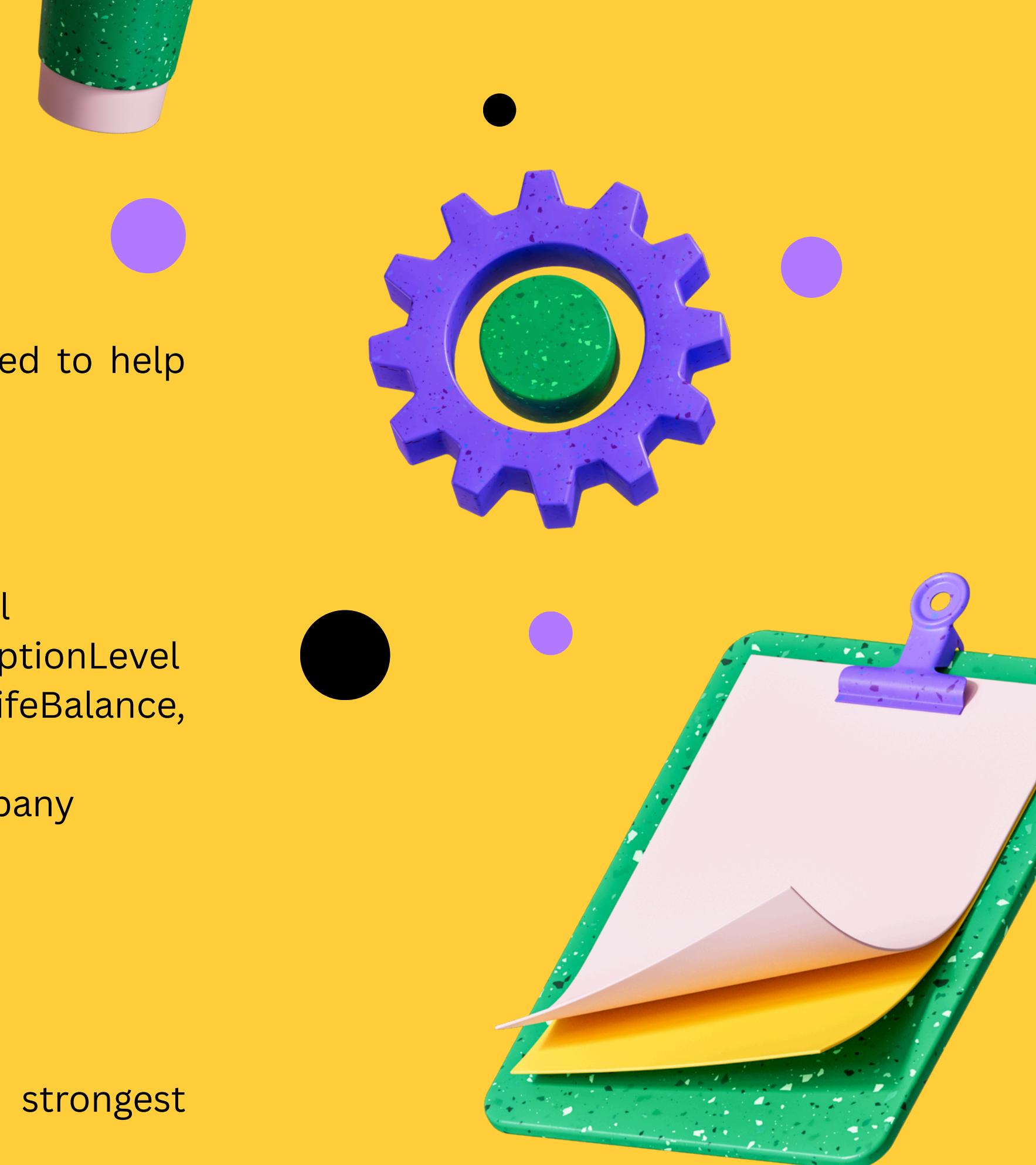
Key Features:

- Demographics: Age, Gender, Education, MaritalStatus
- Job Details: Department, JobRole, JobLevel, BusinessTravel
- Compensation: MonthlyIncome, PercentSalaryHike, StockOptionLevel
- Performance & Environment: PerformanceRating, WorkLifeBalance, JobSatisfaction
- Other Factors: DistanceFromHome, OverTime, YearsAtCompany

Target Variable:

- Attrition: Indicates whether an employee left the company
- (Yes = Employee Left, No = Employee Stayed)

OverTime, JobSatisfaction, and MonthlyIncome are the strongest indicators of employee attrition.



End-to-End Project Workflow

Exploratory Data Analysis(EDA)

Visualized trends using Seaborn & Matplotlib to find attrition patterns

Data Cleaning & Preprocessing

Removed duplicates, handled missing values, encoded categorical columns

Data Collection

Gathered IBM HR Employee Attrition dataset (1,470 records, 35 features)

Model Building (Random Forest)

Trained ML model to predict employee attrition (~88% accuracy)

Explainability (SHAP Analysis)

Identified key drivers like OverTime, MonthlyIncome, JobSatisfaction

Dashboard Development (Streamlit)

Built interactive dashboard for visualization & prediction



IBM HR Analytics Dashboard - Visualization & Prediction

Developed an interactive dashboard using Streamlit to visualize HR data and predict employee attrition in real time.

Insights Dashboard

- Shows Attrition by Department, Job Role, and Gender.
- Displays company KPIs (Total Employees, Attrition Rate, Avg Income).

Correlation Heatmap

- Visual representation of relationships between numeric features.

Prediction Tab

- Enter employee details (age, income, satisfaction etc.) to predict if they'll stay or leave.

Explainability Tab (SHAP)

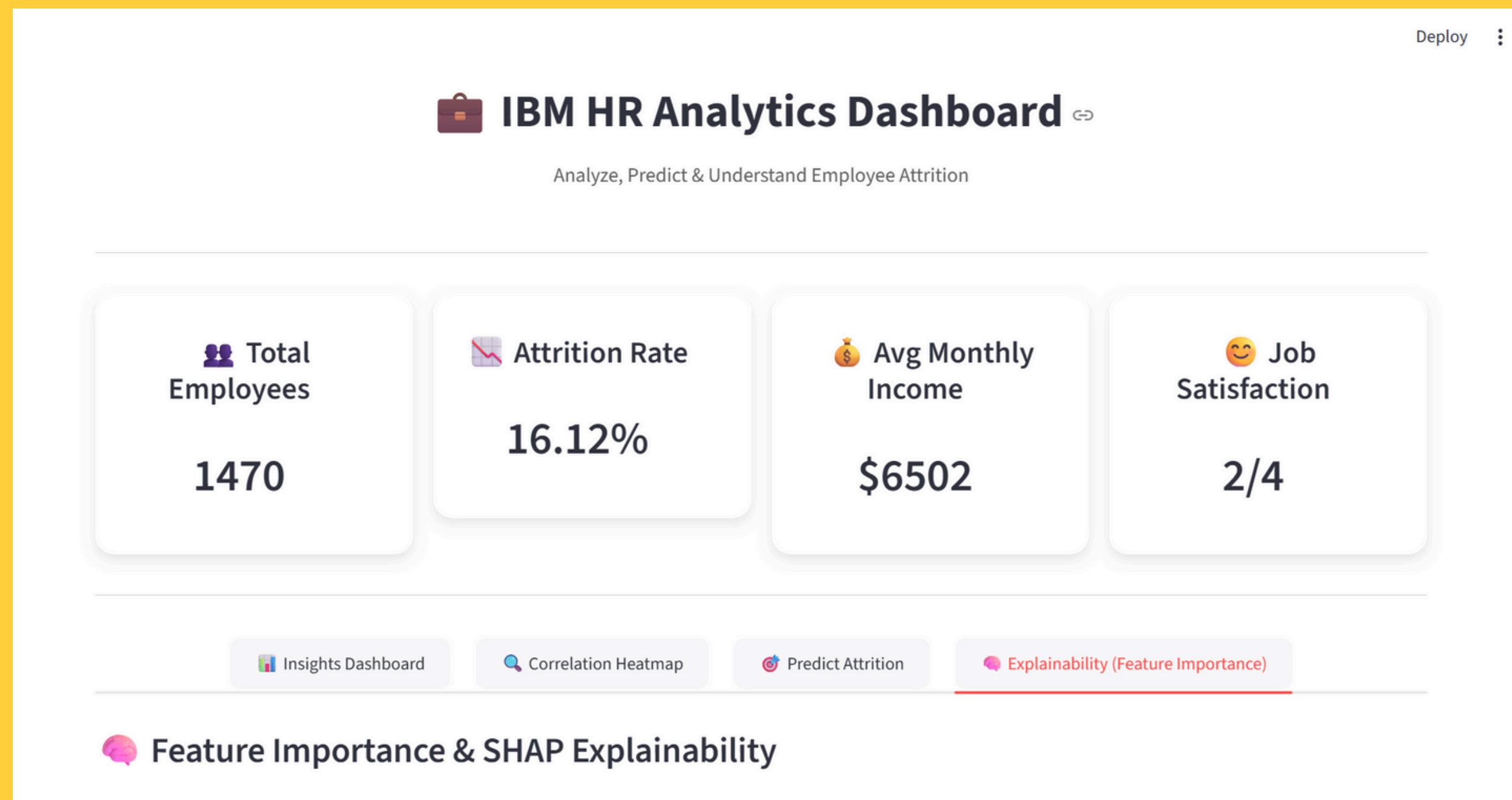
- Highlights top factors influencing attrition for transparency.

Demo Predictions

- Displays sample employee cases to show model accuracy and confidence levels.



"Here's the interactive Streamlit dashboard I developed. It gives HR a clear overview of key metrics and allows real-time predictions. Each section – from insights to SHAP explainability – helps managers understand not just who might leave, but why."



Deploy :



Machine Learning Model & Performance Metrics

Algorithm Used: Random Forest Classifier

Why Random Forest?

- Handles both numerical and categorical data
- Reduces overfitting through ensemble learning
- Provides feature importance for explainability

Employees with OverTime, Low Job Satisfaction, and Low Monthly Income have a higher chance of attrition.

Random Forest provided high accuracy and good interpretability for HR use.

Metric	Score
Accuracy	88%
Precision	84%
Recall	81%
F1-Score	82%

- Python Libraries: Scikit-learn, Pandas, NumPy, Matplotlib, Seaborn, SHAP
- Framework: Streamlit (for deployment)
- IDE: VS Code



Explainability - Understanding Employee Attrition

To make the model explainable, I used SHAP analysis. It breaks down each prediction into feature contributions – showing HR why an employee might leave. For example, overtime, low income, and poor work-life balance are the strongest attrition drivers. This helps HR take early action with confidence.

- OverTime: Employees working overtime are more likely to leave
- MonthlyIncome: Lower income increases attrition risk
- JobSatisfaction: Low satisfaction correlates with higher attrition
- Age: Younger employees tend to switch jobs more often
- WorkLifeBalance: Poor balance contributes to employee turnover



Model Demonstration - Employee Attrition Predictions



Here are three sample employees tested on my model. You can see that the predictions make logical sense – employees with low salary, overtime, and poor satisfaction are predicted to leave.

Meanwhile, employees with better balance and satisfaction are likely to stay.

This proves the model is reliable and aligned with HR intuition.

Age	Monthly Income	OverTime	Job Satisfaction	Work-Life Balance	Model Prediction
25	₹2,500	Yes	2	2	Likely to Leave (Low income, overtime)
38	₹8,500	No	4	4	Likely to Stay (Good satisfaction)
45	₹4,500	Yes	1	2	Likely to Leave (Low satisfaction, overtime)



Business Impact

- Early detection of employees likely to leave
- Reduced hiring & training costs
- Data-driven HR decisions
- Improved employee retention

Future Scope

- Real-time data integration
- Automated HR alerts
- Bulk prediction & PDF reports
- Cloud deployment for company-wide access

The dashboard helps HR predict, explain, and prevent attrition – saving cost and improving employee satisfaction.



Conclusion

- Built a complete HR Analytics Dashboard to analyze and predict employee attrition.
- Achieved 88% model accuracy using Random Forest Classifier.
- Used SHAP for explainability – showing why employees might leave.
- Helps HR make data-driven retention decisions.

“This project bridges data science and human resources – helping companies retain talent through predictive insights.”



THANK YOU

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