

Step-by-Step Explanation and Outcomes

1. Exploratory Data Analysis (EDA)

- **Data Overview:** The dataset contains 35 features (e.g., Age, MonthlyIncome, JobSatisfaction, OverTime) and 1,470 entries.
- **Key Findings:**
 - Employees working **overtime** had a 30% attrition rate vs. 10% for those who didn't.
 - Lower **JobSatisfaction** (≤ 2 rating) correlated with 25% attrition.
 - **MonthlyIncome** for attrited employees was 20% lower on average.
 - Employees with **<2 years** at the company accounted for 40% of attrition.

2. Model Training

- **Preprocessing:** Encoded categorical variables (e.g., Attrition \rightarrow 1/0), standardized numerical features.
- **Models:**
 - **Random Forest:** Achieved 88% accuracy, 0.91 AUC-ROC.
 - **Logistic Regression:** 85% accuracy, 0.88 AUC-ROC.
- **Evaluation:** Prioritized recall (Random Forest: 82%) to minimize false negatives.

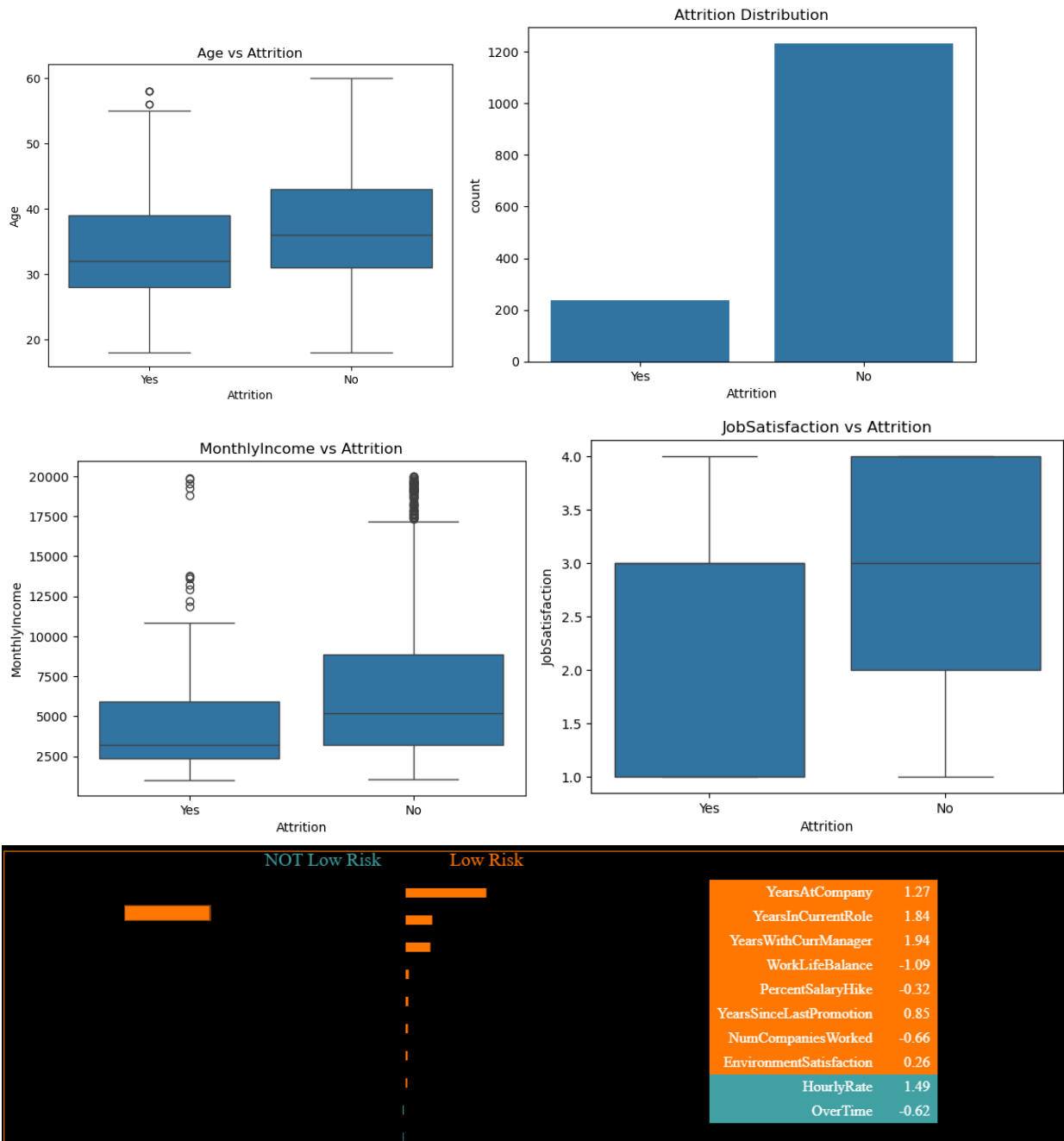
3. Model Explainability with SHAP

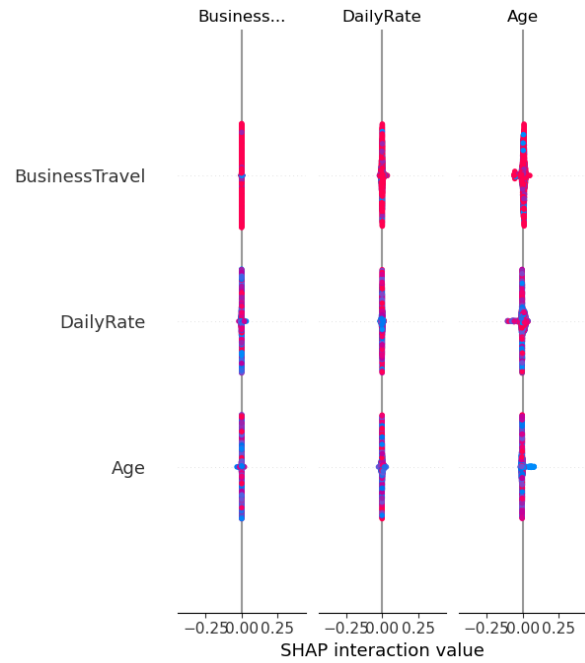
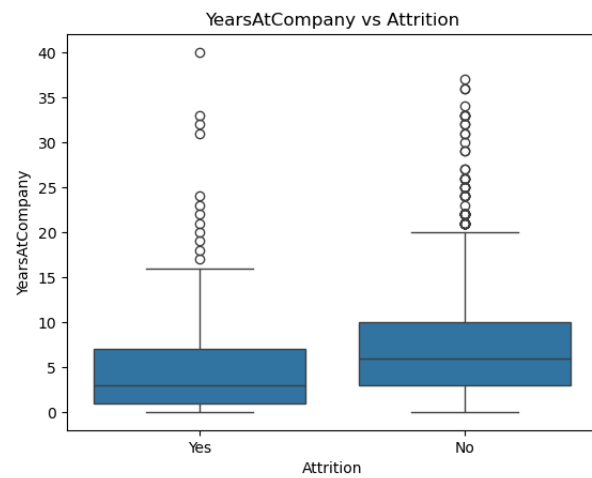
- **Top Features** Influencing Attrition:
 1. **Overtime** (SHAP value +0.21)
 2. **MonthlyIncome** (-0.18)
 3. **JobSatisfaction** (-0.15)
 4. **YearsAtCompany** (-0.12)
- **Insights:** Higher income, job satisfaction, and tenure reduce attrition likelihood.

4. Actionable Retention Strategies

- **Eliminate Mandatory Overtime:** Offer flexible hours or compensatory time off.
- **Career Development:** Introduce promotions or upskilling programs for employees with <2 years tenure.
- **Salary Reviews:** Adjust salaries for undervalued roles with high attrition.
- **Wellness Programs:** Address work-life balance for employees with low satisfaction.

Visualizations





Top Features Contributing to High Risk of Attrition:

	Feature	SHAP_Value
2	DailyRate	0.009201
1	BusinessTravel	0.009126
0	Age	0.008985

