IBM HR Analytics Employee Attrition & Performance

Problem Statement:

Employee attrition is a major challenge for organizations, leading to high hiring costs, loss of experienced talent, and disruptions in productivity. **People leave for various reasons**—low salaries, lack of career growth, poor work-life balance, or feeling undervalued. If HR can identify employees who are at risk of leaving, they can take proactive steps to improve job satisfaction and retention.

This analysis will explore key patterns in employee turnover, looking at factors like salary, job satisfaction, and benefits. By using predictive modelling, we can help organizations spot potential attrition risks early and take action—whether that's improving workplace policies, offering better growth opportunities, or addressing employee concerns before they decide to leave

Objective:

This study aims to identify key factors driving employee attrition, including salary, job satisfaction, career growth, workplace policies, recognition, and engagement. By uncovering these influences, organizations can address high turnover rates and enhance employee retention.

Hypothesis:

Higher employee attrition leads to increased costs related to recruitment, hiring, and training replacements. Employee attrition negatively impacts productivity and profitability in organizations.

Exploratory Data Analysis(EDA):

Attrition by Department:
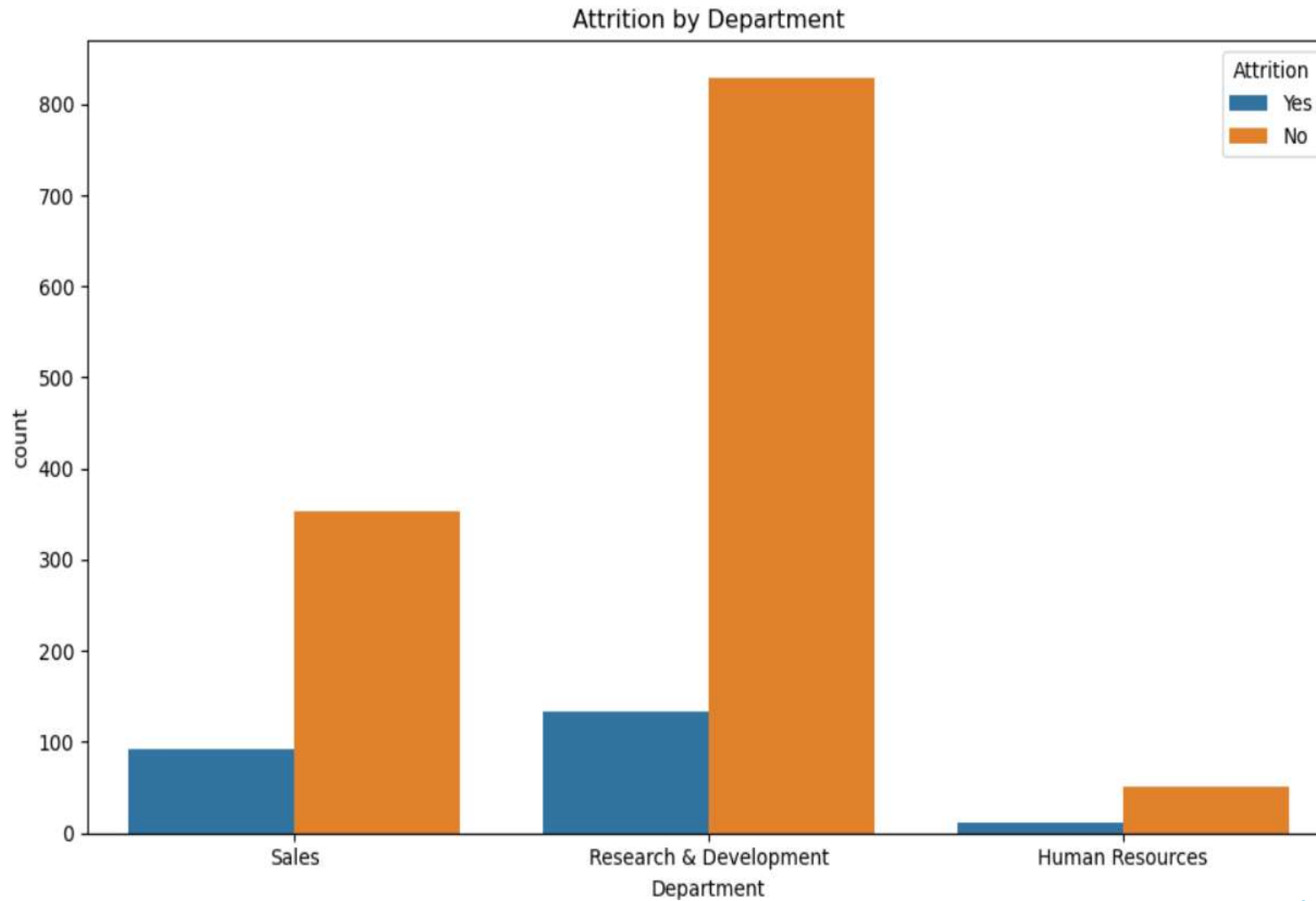
The image is a bar chart that compares employee **attrition** (those who have left) and **retention** (those who have stayed) across **three departments**: **Sales, Research & Development, and Human Resources**. It uses color-coded bars to show the data—**blue for those who left**, **orange for those who stayed.**

Key insights include:

- **Sales**: More employees have stayed than left, but the gap isn't extremely wide.

- **Research & Development**: The highest retention rate among departments, with significantly more employees staying compared to leaving.

- **Human Resources**: Slightly higher retention than attrition, but it's closer to an even split compared to the other departments,

This visualization provides valuable insights into department-specific turnover rates, which can help in identifying areas requiring focused strategies to improve employee satisfaction and retention.

Attribution by Job Role

Attrition by Job Role:
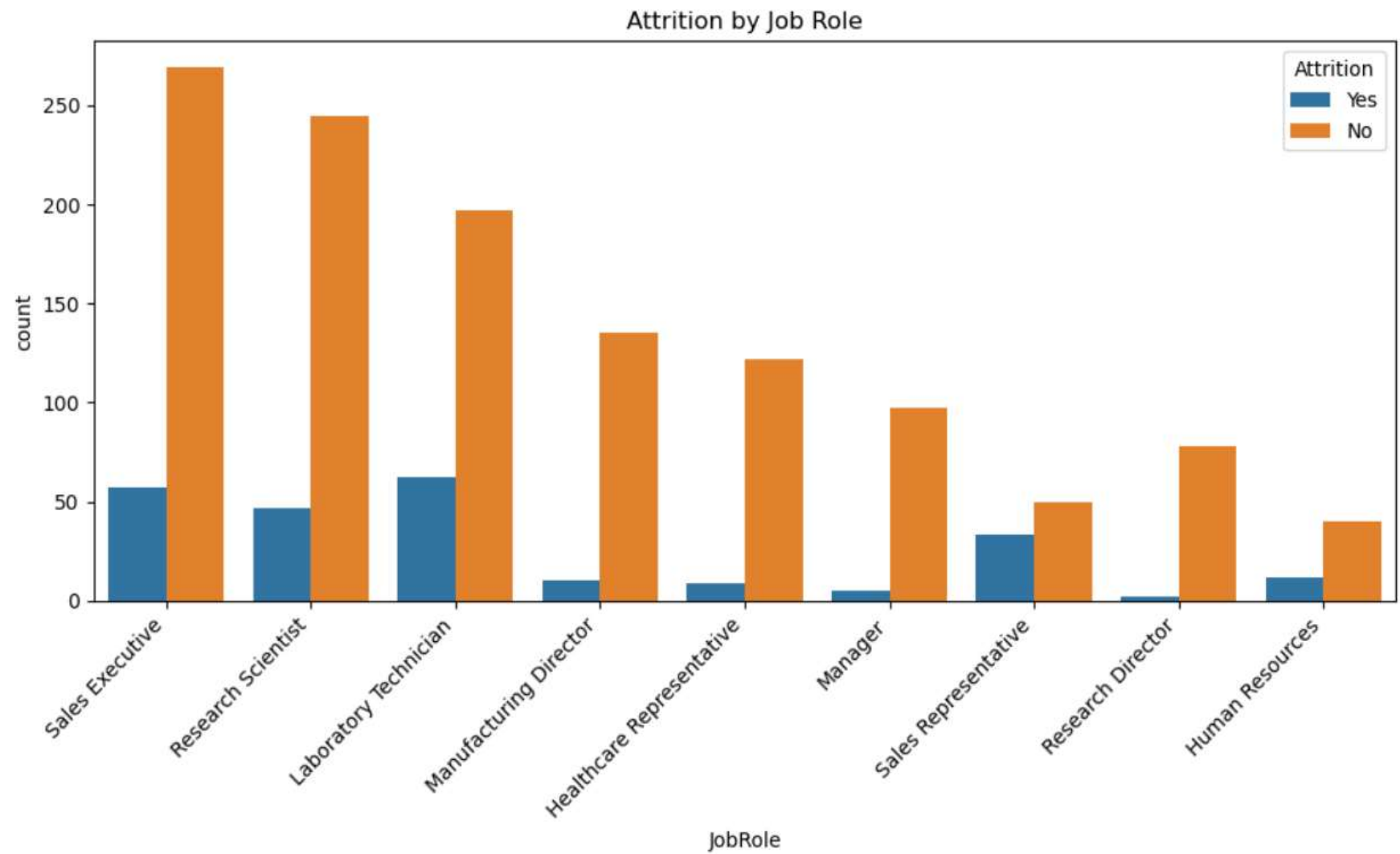
This bar chart shows how employees are leaving or staying across different job roles. Each role—like Sales Executive, Research Scientist, and Manager has two bars.
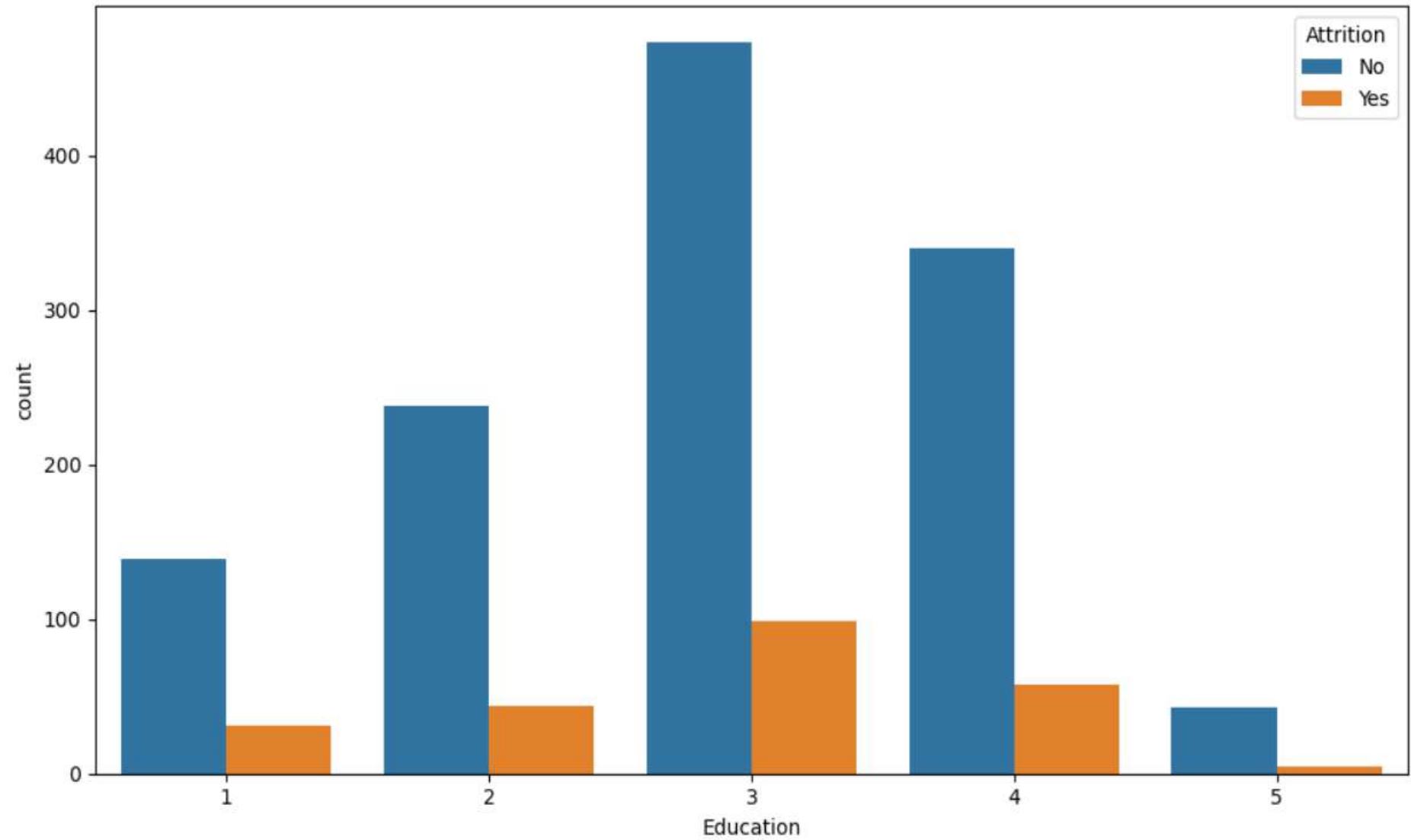
- **The blue bar represents employees who left (attrition)**
- **The orange bar shows those who stayed (retention).**

Some roles, such as Sales Executive and Research Scientist, demonstrate higher retention rates, indicating that most employees in these roles tend to stay with the company. Other roles might show closer proportions of attrition and retention, pointing to potential concerns in maintaining staff within those positions.

Overall, the chart offers a clear snapshot of workforce dynamics by job role, enabling organizations to focus on areas that need strategies to improve retention or reduce turnover.

Attrition by Education:

Attrition by Education Level

It visually represents the number of employees who stayed (retention) and those who left (attrition) across five education levels. The x-axis indicates education levels, ranging from 1 to 5, and the y-axis shows the count of employees.

The bars are color-coded:

- **Blue**: Employees who stayed (retention).
- **Orange**: Employees who left (attrition).

Key observations:

- **Education Level 1**: A small number of employees left compared to those who stayed.

- **Education Level 3**: The highest retention among all levels, with only a small fraction leaving.

- **Education Level 5**: Represents the lowest count of both retention and attrition, possibly indicating fewer employees at this level overall.

Correlation between performance Rating, Job satisfaction & Attention:

This image is a heatmap showcasing the correlation between three variables: **Performance Rating**, **Job Satisfaction**, and **Attrition**.

The heatmap uses colours ranging from **blue to red** to represent correlation values, where blue signifies a low correlation (closer to 0.00) and red indicates a high correlation (closer to 1.00).

Insights from the image:

- **Performance Rating** correlates perfectly with itself (1.00) but has no correlation (0.00) with Job Satisfaction.

- **Job Satisfaction** correlates perfectly with itself (1.00), but no data is shown for its correlation with Attrition.

- No data is displayed for correlations involving Attrition.

This visualization provides an overview of relationships between these variables, potentially helping organizations understand patterns in employee performance and satisfaction. However, the lack of correlation data with Attrition limits its application for analysing turnover.

Attrition by Work-Life Balance:

It illustrates the relationship between employees' work-life balance and attrition rates.

- The x-axis represents different work-life balance ratings, from **1** (poor) to **4** (excellent).

- The y-axis shows the count of employees for each rating.

There are two color-coded bars:

- **Blue bars** represent employees who left the organization (attrition).

- **Orange bars** represent employees who stayed (retention).

Key observations:

Employees with a work-life balance rating of 3 have the highest retention. Ratings 1 and 4 show fewer employees overall but higher attrition rates. Rating 2 reflects moderate retention, with more employees staying than leaving.

This chart provides insights into how work-life balance impacts employee turnover, indicating that improving work-life balance for certain groups could help reduce attrition rates.

Job Satisfaction vs Monthly Income (Attrition Impact):
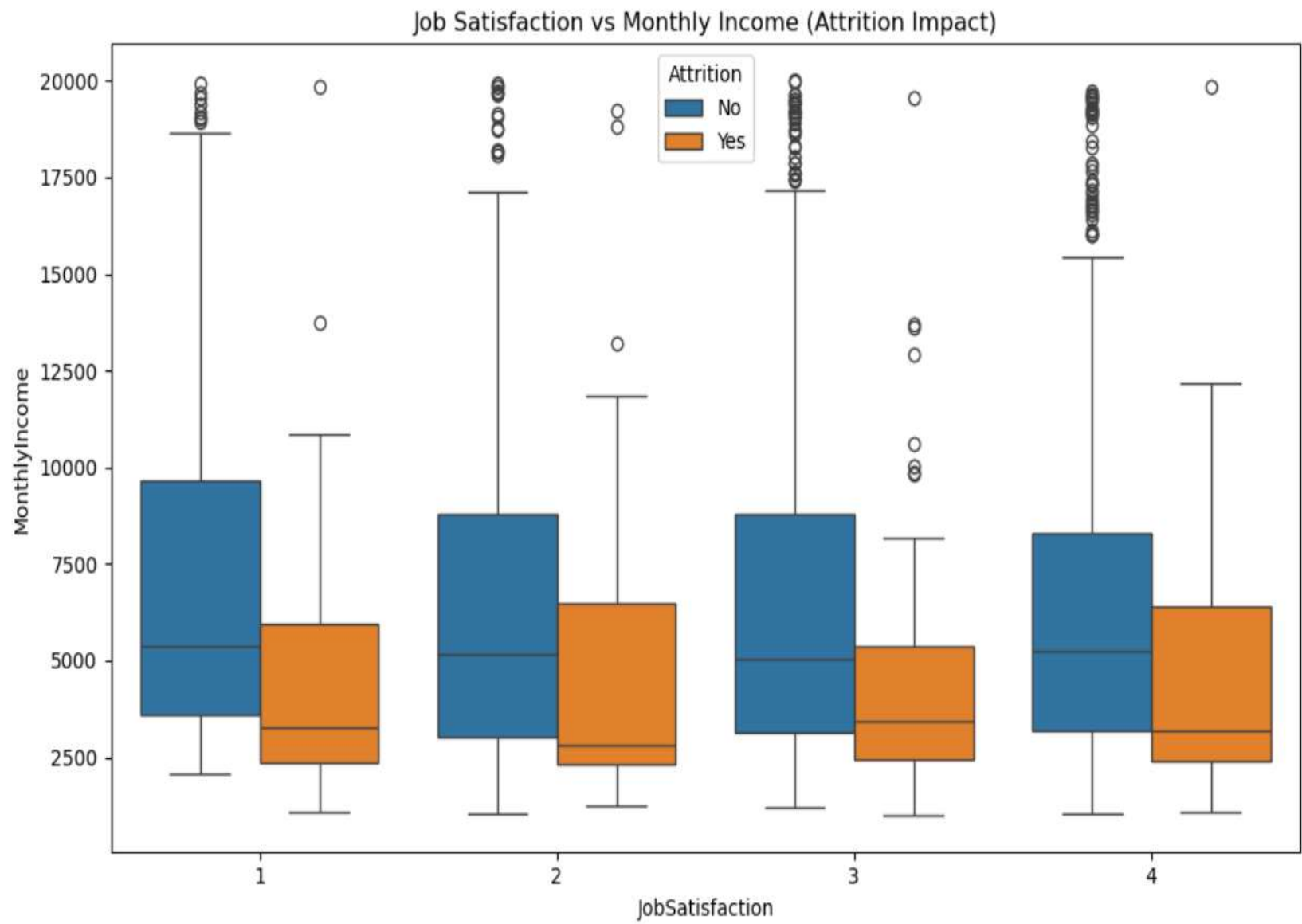
It visualizes the relationship between employees' job satisfaction levels, their monthly income, and whether they experienced attrition.
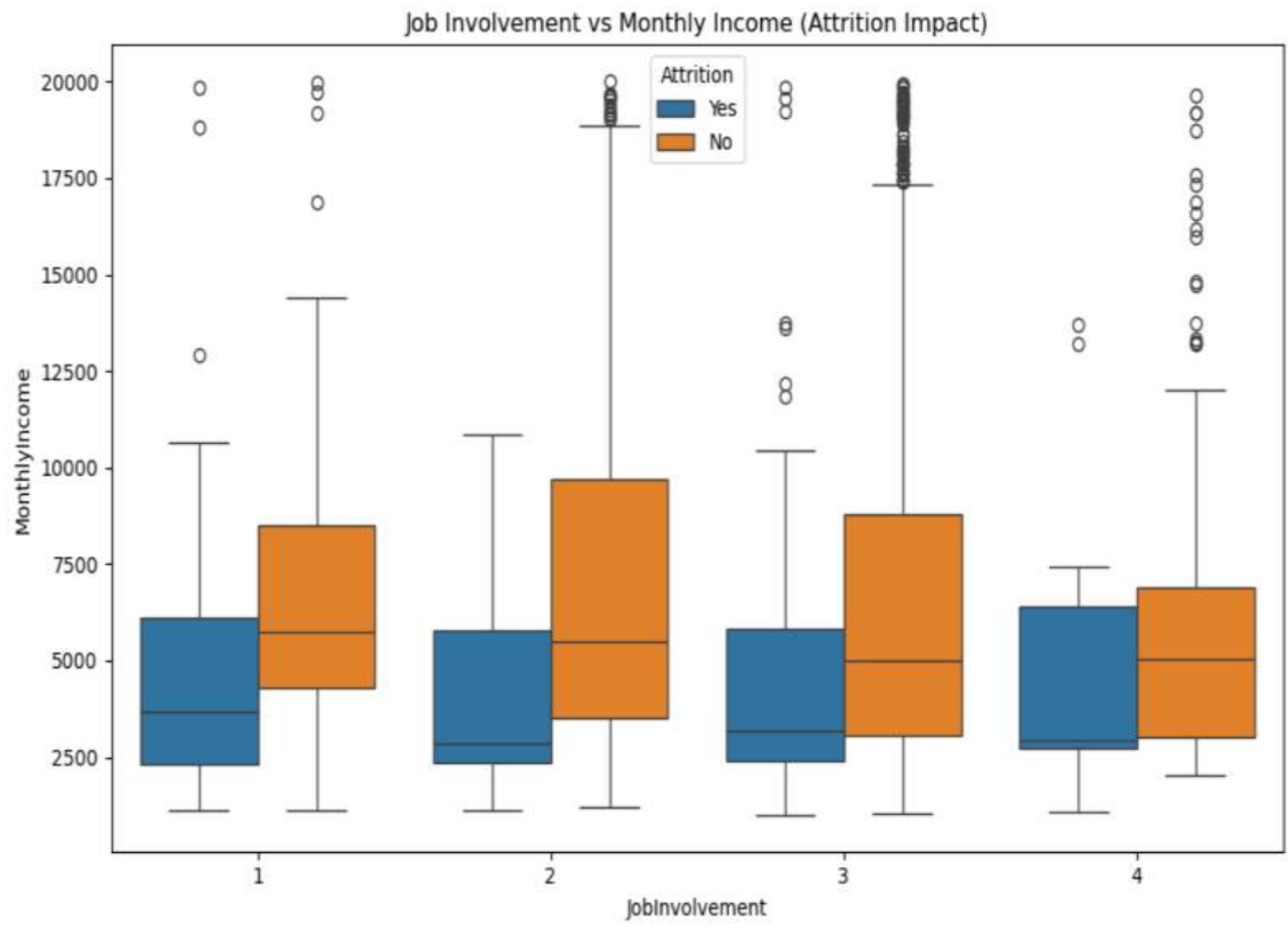
Here's how it's structured:

- **X-axis**: Represents job satisfaction levels, categorized from 1 (lowest satisfaction) to 4 (highest satisfaction).

- **Y-axis**: Indicates monthly income, ranging from 0 to 20,000.

- Each satisfaction level has two box plots:

  - **Blue**: Monthly income for employees who stayed.

  - **Orange**: Monthly income for employees who left.

Key observations:

- Employees who stayed (blue box plots) generally have higher incomes across all satisfaction levels.

- Employees who left (orange box plots) tend to have lower income, which might suggest a connection between income and attrition.

- The distribution of income within each satisfaction level reveals variability, with medians, quartiles, and outliers clearly marked.

- This visualization highlights how income and job satisfaction interplay with attrition, offering insights into retention trends.

Job Involvement vs Monthly Income (Attrition Impact):

Job Involvement vs Monthly Income (Attrition Impact)

It explores the relationship between employees' job involvement, their monthly income, and attrition status.

How it's structured:

- **X-axis**: Represents levels of job involvement, categorized from 1 (low involvement) to 4 (high involvement).

- **Y-axis**: Displays monthly income, ranging from 0 to 20,000.

- For each job involvement level, there are two box plots:

    o **Blue**: Shows the income distribution for employees who left the organization (attrition: yes).

    o **Orange**: Represents the income distribution for employees who stayed (attrition: no).

What the data shows:

    o Employees who stayed (orange plots) generally have a higher range of income across all levels of job involvement.

    o Employees who left (blue plots) tend to show a lower distribution of income, which might hint at a connection between lower pay and higher attrition rates.

    o The box plots reveal the spread of income, including medians, quartiles, and outliers, offering a detailed view of the income variance within each category of job involvement.

This visualization provides valuable insights into how job involvement and income influence attrition, helping organizations identify patterns that could guide retention strategies.

Distribution of Age with Attrition:

Distribution of Age with Attrition
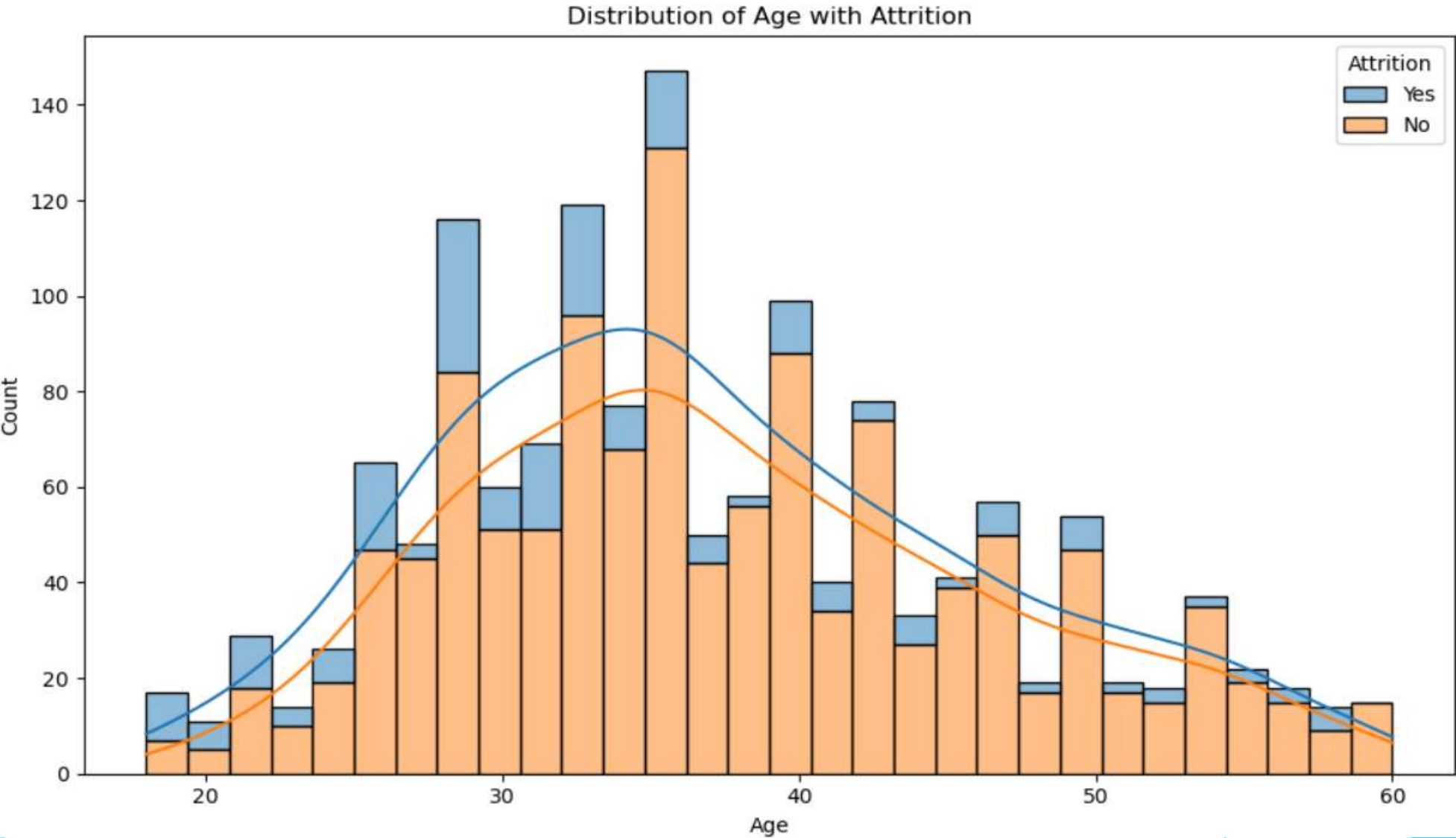
This histogram illustrates the distribution of employee ages in relation to attrition. Here's how it's organized:
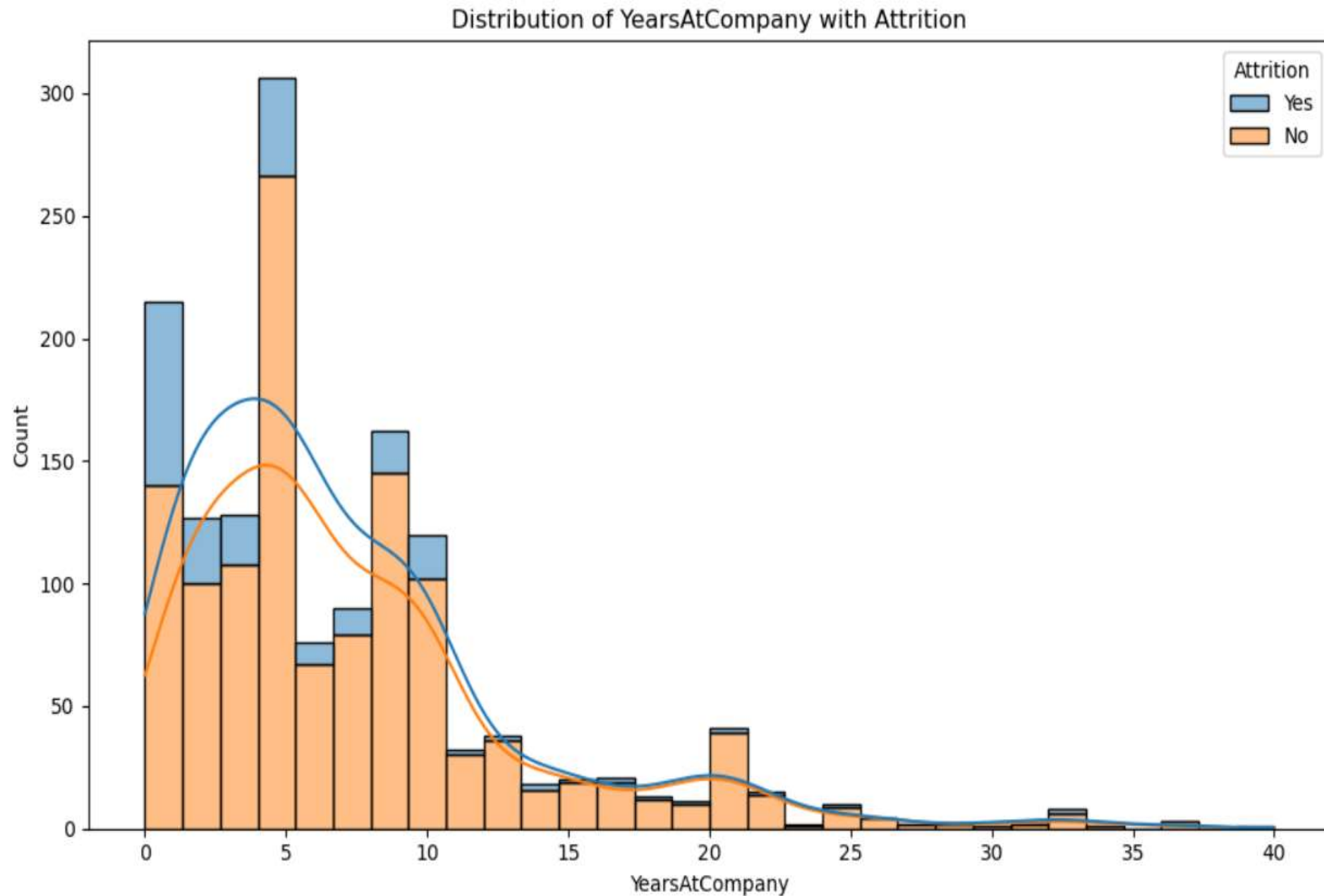
- **X-axis**: Represents employee ages, ranging from 20 to 60.

- **Y-axis**: Indicates the count of employees at each age.

- **Bars**: Stacked bars show the split between employees with attrition ("Yes" in blue) and without attrition ("No" in orange) for each age.

- **Density Lines**: Two lines represent the density trends of attrition ("Yes") and no attrition ("No") across age groups.

Key Observations:

- Younger employees (around 20-30 years) seem to have slightly higher attrition counts compared to other age groups.

- Older employees (50+) show minimal attrition, indicating higher stability in this age group.

- The distribution suggests that age may influence the likelihood of attrition, with mid-career employees (30-50 years) showing a balanced mix of retention and attrition.

This visualization helps highlight the relationship between age and attrition, providing a foundation for organizations to explore age-specific retention strategies.

Distribution of Years At Company with Attrition:

Distribution of YearsAtCompany with Attrition

This histogram shows the distribution of employees' tenure at a company and its impact on attrition.

- **X-axis**: Represents the number of years employees have been with the company, ranging from 0 to 40 years.

- **Y-axis**: Displays the count of employees for each tenure range.

The bars are divided into two categories:

- **Blue bars**: Represent employees who left the company (attrition: "Yes").

- **Orange bars**: Represent employees who stayed (attrition: "No").

Additionally, there are two density curves:

- **Blue curve**: Shows the trend of employees leaving across different tenures.

- **Orange curve**: Highlights the retention trend.

Observations:

- Most employees have a tenure of fewer than 10 years, with a peak at 0-5 years.

- Attrition is higher in the early years of tenure, as the blue curve peaks earlier than the orange curve.

Distribution of Monthly Income with Attrition:
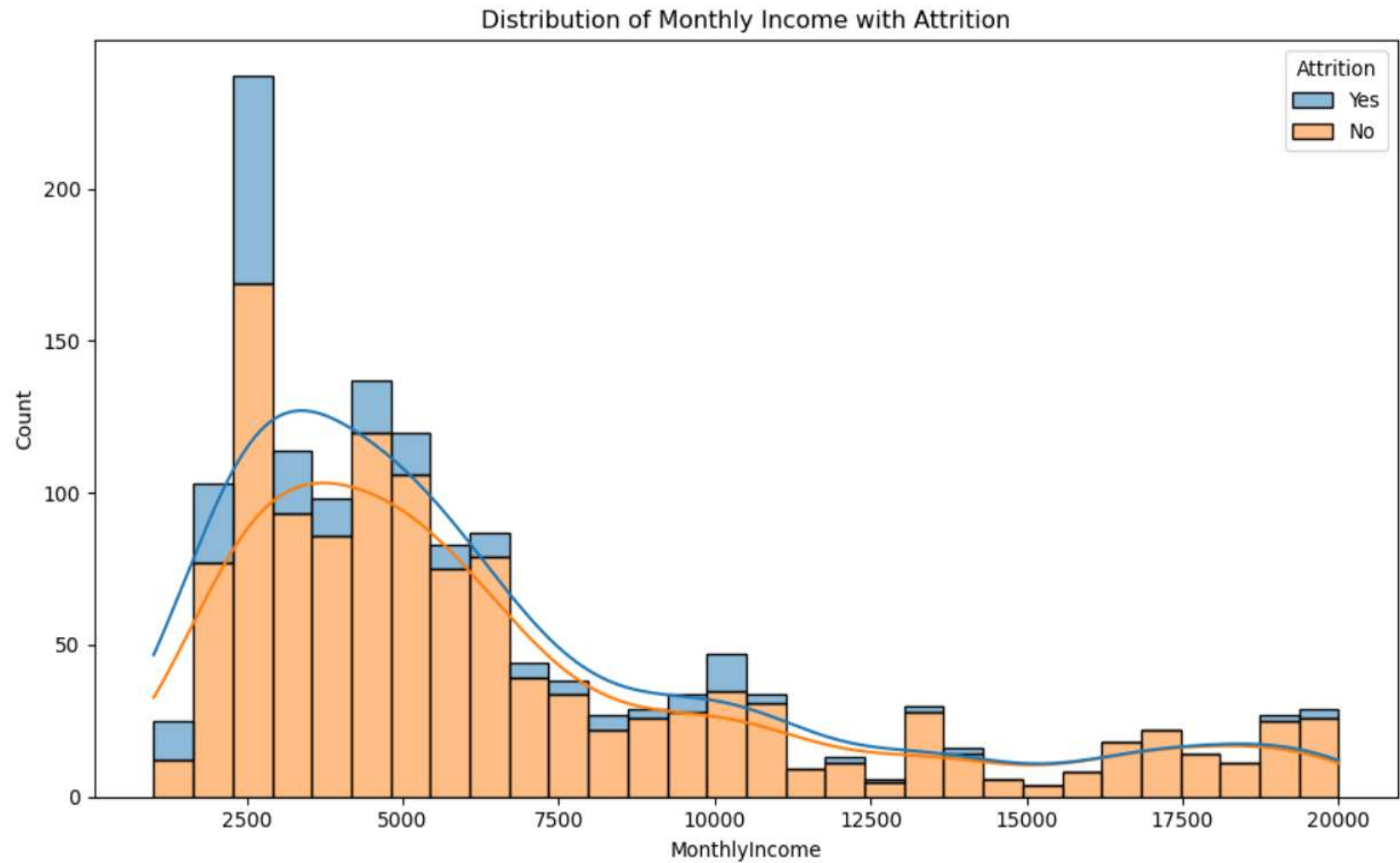
This histogram explores the connection between monthly income and employee attrition.

- **X-axis**: Displays monthly income levels, ranging from 0 to 20,000.

- **Y-axis**: Represents the number of employees in each income range.

- **Bars**: Two categories are shown—blue for employees who left (attrition: "Yes") and orange for those who stayed (attrition: "No").

- **Density curves**: Overlaid lines show the distribution trends for each category, with blue indicating attrition and orange indicating retention.

Key takeaway: Employees earning between 2,500 and 5,000 form the largest group, with higher retention in this range. This visualization suggests income as a potential factor influencing attrition trends.