FEATURES SELECTION / ENGINEERING:

1. **What were the most important features selected for analysis and why?**
    - **Age**: Younger or older employees could possess varied attrition behaviors.
    - **Length of Service:** Those employees who had very brief or extremely lengthy service periods had attrition patterns.
    - **Department & Job Role:** Attrition levels differed among different departments, which may have been the result of workload or company culture.
    - **Previous Year Rating:** Trends in performance appraisal have close correlation with decisions about retaining people.
    - **Average Training Score:** Low training scores could be a sign of disengagement or absence of development opportunities.
    - **Awards Won:** A surrogate for recognition and job satisfaction.
    - **Education and Recruitment Channel:** Assisted in capturing background and hiring source effects.

2. Did you make any important feature transformations?

    Feature Transformations Applied:

- **One-Hot Encoding**: Used for nominal features such as Department, Recruitment Channel, and Job Role to avoid giving unintended ordinal meaning.
- **Missing Value Handling**: Missing values in the Previous Year Rating were imputed using median values to preserve distribution.
- **Scaling**: Although tree-based models don't require it, numeric features were optionally scaled for consistency in testing other algorithms.

3. Correlation or interactions among the features selected and how it is considered?

- **Correlation Analysis**: A heatmap was used to identify highly correlated features. Most features had low-to-moderate correlation, so multicollinearity wasn't a major concern.

RESULTS, ANALYSIS AND INSIGHTS:

Interesting Relationships Found:

- Employees with mid-level ratings but no awards had a higher chance of leaving, possibly due to feeling undervalued despite decent performance.
- Recruitment Channel played a subtle but meaningful role—employees hired through referrals had higher retention rates, likely due to better job-fit or cultural alignment.
- High training scores without recognition (no awards) occasionally correlated with attrition, suggesting that skill-building alone may not be enough to retain talent—recognition matters too.

Most Important Technique Used:

- The Random Forest Classifier proved to be the most powerful and interpretable algorithm for this classification problem. It not only handled non-linear relationships well but also gave feature importance rankings, which were critical in extracting

business-relevant insights. Additionally, handling missing values and categorical encoding played a vital role in improving model performance.

Answers to Business Problems:

Who is likely to leave the company?

The model predicts attrition with a strong degree of accuracy, identifying employees with certain characteristics (e.g., low recognition, moderate ratings, specific job roles, shorter service length) as high-risk for exit.

What factors contribute to employee attrition?

Major contributors include lack of recognition (no awards), low performance ratings, low engagement in training, and job-role-specific stressors.

Can the company take preventive measures?

- Yes. By focusing on retention strategies for high-risk groups, like providing performance feedback, offering recognition, and reviewing internal job satisfaction per department, INX Future Inc can proactively reduce attrition.

Additional Business Insights:

- Customized Retention Plans: HR can create different retention strategies for employees based on department and job roles rather than using a one-size-fits-all approach.

- Recognition = Retention: Formal awards and acknowledgments significantly reduce attrition, especially for mid-performing employees.
- Watch New Joiners: Employees within their first few years of service need more attention, mentoring, and engagement programs to prevent early exits.
- Data-Driven Hiring: Referral-based hiring might be expanded, as those hires show better retention rates.