

# **Software Requirement Specification (SRS)**

**Project Title:** HR Analytics - Predict Employee Attrition

## **1. Introduction**

Employee attrition poses significant challenges to organizations, impacting productivity, recruitment costs, and operational efficiency. This project leverages data analytics and machine learning to analyze historical HR data, identify key drivers of employee resignation, and predict the likelihood of future attrition. The insights from this analysis will aid HR teams in developing proactive retention strategies.

## **2. Abstract**

The HR Analytics – Predict Employee Attrition project utilizes Python for data cleaning, EDA (Exploratory Data Analysis), and predictive modeling, combined with Power BI for visualization and reporting. Machine learning models, such as Logistic Regression and Decision Trees, are implemented to predict employee attrition, while SHAP (SHapley Additive exPlanations) is applied for interpretability. The final deliverables include an interactive dashboard, performance metrics of the model, and actionable recommendations for attrition prevention.

## **3. Tools Used**

- Python Libraries: Pandas, NumPy, Matplotlib, Seaborn, Scikit-learn, SHAP
- Visualization Tool: Microsoft Power BI
- IDE/Notebook: Jupyter Notebook / VS Code
- File Formats: CSV for dataset, PDF for final report

## 4. Steps Involved in Building the Project

### Step 1: Data Collection & Cleaning

- Import and inspect HR dataset.
- Handle missing values, duplicates, and outliers.

### Step 2: Exploratory Data Analysis (EDA)

- Analyze attrition trends department-wise, by salary bands, promotions, and job satisfaction.
- Generate visualizations to understand patterns.

### Step 3: Model Building

- Split data into training and testing sets.
- Train models using Logistic Regression and Decision Tree Classifier.
- Evaluate models using accuracy score, precision, recall, and confusion matrix.

### Step 4: Explainability with SHAP

- Perform SHAP analysis to highlight features contributing to attrition predictions.

### Step 5: Visualization in Power BI

- Build interactive dashboards showing:
  - Attrition by department, salary, promotion history, and tenure.
  - Key insights and risk predictions.

### Step 6: Reporting

- Summarize model performance and insights.
- Provide PDF report with prevention strategies for high-risk groups.

## 5. Conclusion

The HR Analytics project combines data-driven insights and machine learning to predict employee attrition effectively. By understanding key attrition drivers such as salary bands, lack of promotions, or low job satisfaction, organizations can make informed decisions to improve retention. This approach ensures proactive workforce management, reducing turnover costs and improving employee satisfaction.