

# Human Resource Management: Predicting Employee Promotions Using Machine Learning

## Milestone 1: Project Initialization and Planning Phase

The project commences with defining the problem statement, proposing a solution, and planning the project. The objective is to develop a machine learning model that accurately predicts employee promotions.

### Activity 1: Define Problem Statement

The problem statement highlights the challenges faced by HR in identifying top performers for promotion. By implementing a machine learning model, HR can efficiently analyze employee data to identify individuals demonstrating exceptional capabilities and potential for advancement, streamlining the promotion process and ensuring deserving employees are recognized.

### Human Resource Management Problem Statement Report

### Activity 2: Project Proposal (Proposed Solution)

The project focuses on "Predicting Employee Promotions Using Machine Learning." This initiative aims to leverage advanced analytical techniques to forecast employee promotions accurately. By analysing a range of factors such as awards, KPIs, training history, age, departmental data, and educational qualifications, the project seeks to develop a robust predictive model.

### Human Resource Management Project Proposal Report

### Activity 3: Initial Project Planning

The Initial Project Planning phase for employee prediction involves defining key objectives, outlining scope, and identifying stakeholders critical to the predictive modelling process. This phase includes setting timelines, allocating necessary resources, and formulating an overarching project strategy.

### Human Resource Management Project Planning Report

## Milestone 2: Data Collection and Preprocessing Phase

The Data Collection and Preprocessing Phase involves executing a plan to gather relevant data from Kaggle, ensuring data quality through verification and addressing missing values. Preprocessing tasks include cleaning, encoding, and organizing the dataset for subsequent exploratory analysis and machine learning model development.

### Activity 1: Data Collection Plan, Raw Data Sources Identified, Data Quality Report

The dataset used for the Human Resource Management project on predicting employee promotions has been sourced from Kaggle. It includes comprehensive employee details and performance metrics. Data quality has been rigorously verified, with efforts made to address missing values and adhere to ethical guidelines, ensuring a robust foundation for predictive modelling.

## **Human Resource Management Data Collection Report**

### **Activity 2: Data Quality Report**

The dataset for "Human Resource Management: Predicting Employee Promotions" is sourced from Kaggle. It includes detailed employee information, performance metrics, and training data. Data quality is ensured through thorough verification, addressing missing values, and maintaining adherence to ethical guidelines, establishing a reliable foundation for predictive modelling.

## **Human Resource Management Data Quality Report**

### **Activity 3: Data Exploration and Preprocessing**

Data Exploration involves analysing the employee dataset to understand patterns, distributions, and outliers. Preprocessing includes handling missing values, scaling, and encoding categorical variables. These crucial steps enhance data quality, ensuring the reliability and effectiveness of subsequent analyses in the employee promotion prediction project.

## **Human Resource Management Data Exploration and Preprocessing Report**

### **Milestone 3: Model Development Phase**

The Model Development Phase entails crafting a predictive model for employee promotion prediction. It encompasses strategic feature selection, evaluating and selecting models (Random Forest, Decision Tree, KNN, XGB), initiating training with code, and rigorously validating and assessing model performance for informed decision-making in the promotion process.

### **Activity 1: Feature Selection Report**

The Feature Selection Report focuses on critical factors for predicting employee promotions. Performance ratings directly reflect job competence and readiness for higher responsibilities. Promotion history highlights past success and readiness for advancement. Tenure indicates loyalty and experience, while skills and certifications align with job requirements for higher roles. These factors ensure the model accurately identifies employees poised for promotion based on their proven performance, career progression, tenure, and relevant qualifications.

## **Human Resource Management Feature Selection Report**

### **Activity 2: Model Selection Report**

The Model Selection Report details the rationale behind choosing Random Forest, Decision Tree, KNN, and XGB models for employee promotion prediction. It considers each model's strengths in handling complex relationships, interpretability, adaptability, and overall predictive performance, ensuring an informed choice aligned with project objectives.

## **Human Resource Management Model Selection Report**

### **Activity 3: Initial Model Training Code, Model Validation and Evaluation Report**

The Initial Model Training Code employs selected algorithms on the employee dataset, setting the foundation for predictive modelling. The subsequent Model Validation and Evaluation Report rigorously assesses model performance, employing metrics like accuracy and precision to ensure reliability and effectiveness in predicting employee promotions.

## **Human Resource Management Model Development Phase Template**

### **Milestone 4: Model Optimization and Tuning Phase**

The Model Optimization and Tuning Phase involves refining machine learning models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

### **Activity 1: Hyperparameter Tuning Documentation**

The random forest model was selected for its superior performance, exhibiting high accuracy during hyperparameter tuning. Its ability to handle complex relationships, minimize overfitting, and optimize predictive accuracy aligns with project.

### **Milestone 5: Project File Submission and Documentation**

To complete the project file submission, please follow the guidelines outlined in the provided link. This will ensure that all necessary files are uploaded to Github in the correct format. Additionally, refer to the linked documentation for a comprehensive overview of the project's scope, objectives, and methodologies.

### **Milestone 6: Project Demonstration**

In the next module, Project Demonstration, participants will be required to create a video presentation showcasing their project. This will involve recording a screen share while providing a clear and concise explanation of the project's goals, methodologies, and outcomes. The presentation should demonstrate the project's execution, highlighting key features and functionalities. This milestone provides an opportunity for individuals to showcase their skills and knowledge in a practical and engaging way.