



## Model Optimization and Tuning Phase Template

Date	15 March 2024
Team ID	Advait Mahesh Shinde
Project Title	Human Resource Management: Predicting Employee Promotions Using Machine Learning
Maximum Marks	10 Marks

## 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.

Hyperparameter Tuning Documentation (6 Marks):

Model	Tuned Hyperparameters	Optimal Values
Decision Tree		
	<pre># Function to train and evaluate a Decision Tree model with hyperparameter tuning def decisionTree(X_train, X_test, y_train, y_test):     # Define the parameter grid     param_grid = {         'max_depth': [None, 10, 20, 30, 40, 50],         'min_samples_split': [2, 10, 20],         'min_samples_leaf': [1, 5, 10],         'criterion': ['gini', 'entropy']     } }</pre>	Best Parameters found by GridSearchO1: { 'criterion': 'entropy', 'max depth': 40, 'min samples_leaf': 1, 'min_samples_split': 2}
		Accuracy: 0.94

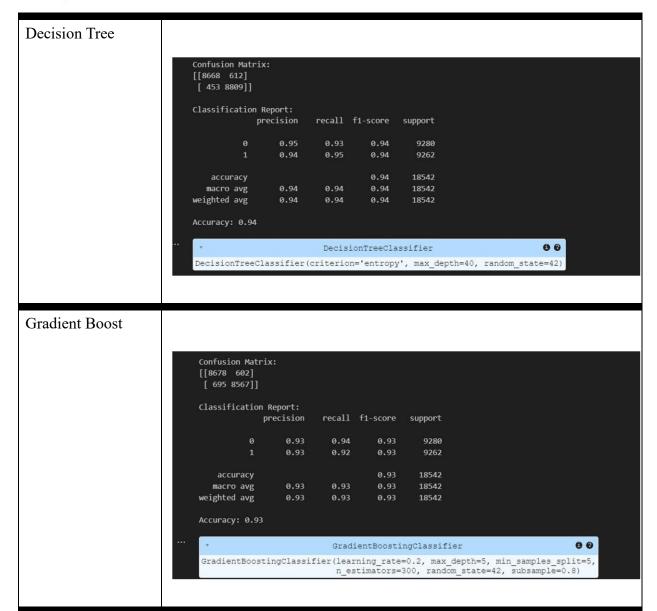






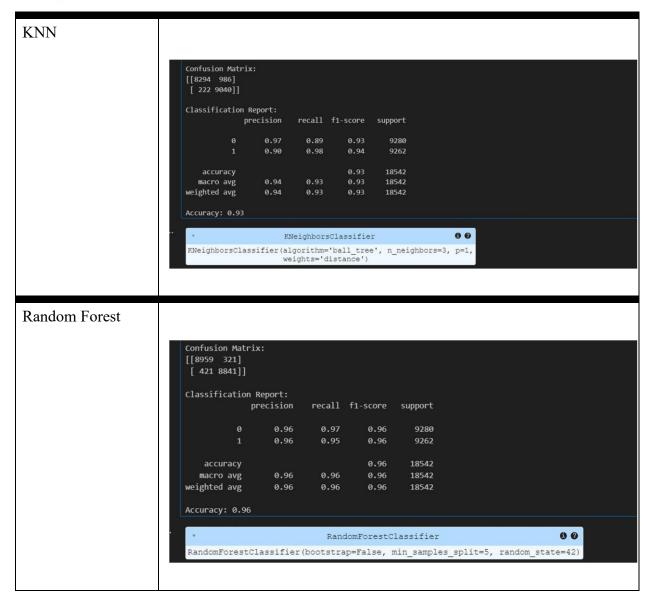












Final Model Selection Justification (2 Marks):

Final Model	Reasoning





I chose the Random Forest model as the final model for predicting employee promotions due to its superior accuracy (96%) compared to other models like Decision Tree, KNN, and Gradient Boosting. Random Forest is robust, handles overfitting well, and provides insights into feature importance. It captures complex, non-linear relationships within the data and is scalable for large datasets. Additionally, hyperparameter tuning further optimized its performance, making it a reliable and efficient choice for this task

Random Forest