# Model Optimization and Tuning Phase Report

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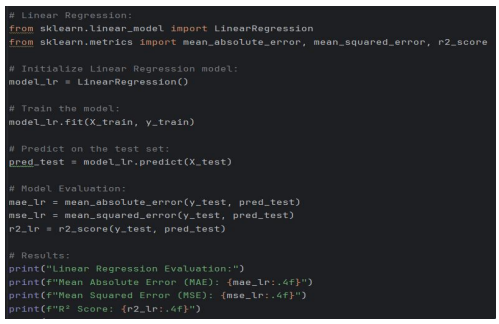
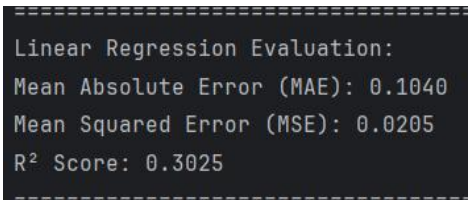
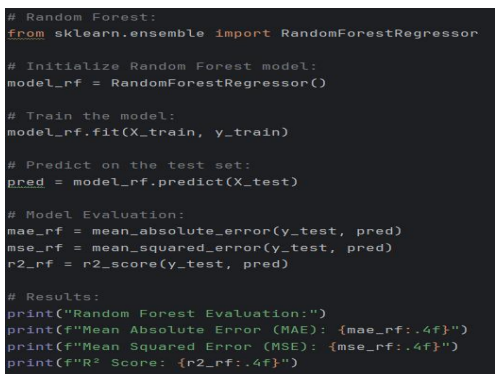
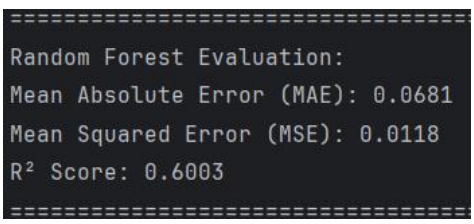
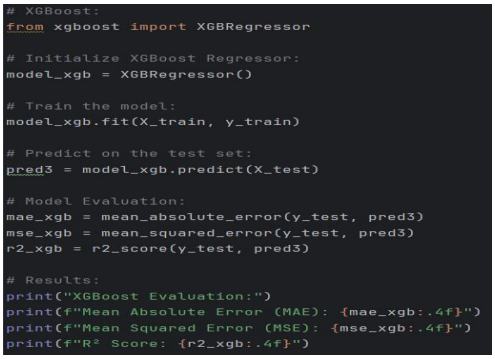
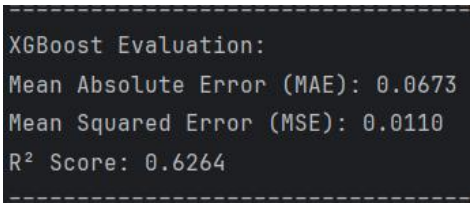
| Date | 25 June 2025 |
| Team ID | SWUID20250176209 |
| Project Title | Machine Learning Approach for Employee Performance Prediction |
| Maximum Marks | 10 Marks |

## Model Optimization and Tuning Phase

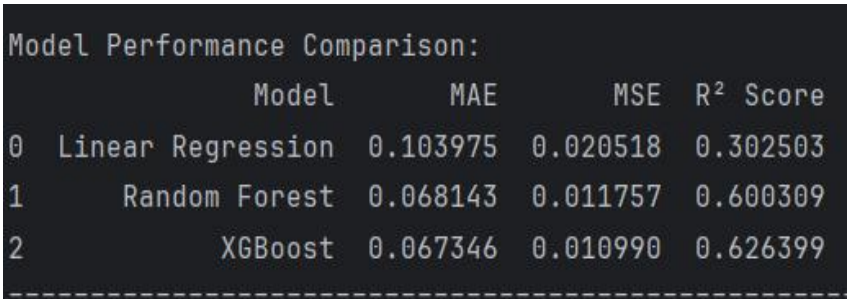
The Model Optimization and Tuning Phase involves refining machine learning models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

### Hyperparameter Tuning Documentation (6 Marks):

| Model | Tuned Hyperparameters | Optimal Values |
|---|---|---|
| Linear Regression |  |  |
| Random Forest |  |  |

| | | |
|---|---|---|
| XGBoost |  |  |

**Performance Metrics Comparison Report (2 Marks):**

| Model | Optimized Metric |
|---|---|
| **XGBoost** |  |

**Final Model Selection Justification (2 Marks):**

| Final Model | Reasoning |
|---|---|
| XGBoost | The **XGBoost Regressor** was selected as the final model due to its high **$R^2$ score of 0.62 (62%)**, low mean absolute error, and strong performance on imbalanced and noisy data. It handled both categorical and numerical features effectively and required minimal preprocessing. Its ability to capture complex, non-linear patterns in garment worker productivity made it a reliable and efficient choice that aligned well with the project's objectives. |