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| Date | 20 June 2024 |
| ID | 739813 |
| Project Title | Optimizing Sleep Efficiency: Harnessing Machine Learning For Enhanced Restorative Rest |
| Maximum Marks | 10 Marks |

**Model Optimization and Tuning Phase Report**

**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.

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| **Model** | **Tuned Hyperparameters** | **Optimal Values** |
| LinearRegression |  |  |
| Decision Tree |  |  |

**Hyperparameter Tuning Documentation (6 Marks):**

|  |  |  |
| --- | --- | --- |
| RandomForestRegressor |  |  |

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

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| --- | --- |
| **Model** | **Optimized Metric** |
| LinearRegression | It’s not calculate to Optimized metric |

|  |  |
| --- | --- |
| Decision Tree | It’s not calculate Optimized metric |

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

|  |  |
| --- | --- |
| **Final Model** | **Reasoning** |
| RandomForestRegressor | The RandomForest model was selected for its superior performance, exhibiting high r2\_score during hyperparameter tuning. Its ability to handle complex relationships, minimize overfitting, and optimize predictive r2\_score aligns with project objectives, justifying its selection as the final model. |