

Model Optimization and Tuning Phase Template

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| Date | 15 March 2024 |
| Team ID | 740139 |
| Project Title | Acoustic fire extinguishing 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 |
|---------------------|-----------------------|----------------|
| KNN | - | - |
| SVM | - | - |
| Naïve Bayes | - | - |
| Logistic Regression | - | - |
| Decision tree | - | - |
| Random forest | - | - |

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|-------------------|---|---|
| Gradient Boosting | - | - |
|-------------------|---|---|

Performance Metrics Comparison Report (2 Marks):

| Model | Baseline Metric | Optimized Metric |
|---------------------|-----------------|------------------|
| KNN | - | - |
| SVM | - | - |
| Naïve Bayes | - | - |
| Logistic Regression | - | - |
| Decision tree | - | - |
| Random forest | - | - |
| Gradient Boosting | - | - |

Final Model Selection Justification (2 Marks):

| Final Model | Reasoning |
|---------------|--|
| Random Forest | Random Forest is selected because it is robust, handles overfitting well, works with various data types, requires minimal tuning, and provides feature importance insights. for time series data, LSTM (Long Short-Term Memory) networks, a type of RNN, could also be highly effective. |