Model Optimization and Tuning Phase Report

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| Date | 20-06-2025 |
| Team ID | SWDTID1749906902 |
| Project Title | Early Stage Disease Diagnosis System Using Human Nail Image Processing |
| 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):**

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| **Model** | **Tuned Hyperparameters** | **Optimal Values** |
| CNN (e.g., VGG16) | Learning rate, Batch size, Number of epochs, Optimizer (e.g., Adam, SGD), Dropout rate, Activation function for output layer, Regularization strength | To be determined through experimentation |
| Transfer Learning (e.g., InceptionV3, ResNet) | Learning rate, Batch size, Number of epochs, Fine-tuning layers (which layers to unfreeze), Optimizer, Data augmentation parameters | To be determined through experimentation |

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

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| **Model** | **Optimized Metric** |
| CNN (e.g., VGG16) | To be reported after tuning |

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| Transfer Learning (e.g., InceptionV3, ResNet) | To be reported after tuning |
| SVM | To be reported after tuning |

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

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| --- | --- |
| **Final Model** | **Reasoning** |
| Transfer Learning Model (e.g., InceptionV3 or ResNet) | The Transfer Learning model was selected for its superior performance, exhibiting high accuracy and robustness during hyperparameter tuning, especially given the nature of image data. Its ability to leverage pre-trained deep learning architectures, handle complex image features, minimize overfitting, and optimize predictive accuracy for diverse nail conditions aligns perfectly with the project objectives, justifying its selection as the final model for early stage disease diagnosis using human nail image processing. |