# Model Optimization and Tuning Phase Template

| Date | 27 June 2024 |
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| Team ID | SWTID1720428909 |
| Project Title | Vitamin Vision: Unveiling the Spectrum of Nutrient Detection |
| Maximum Marks | 10 Marks |

**Model Optimization and Tuning Phase**

The Model Optimization and Tuning Phase involves refining neural network 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 (8 Marks):**

| Model | Tuned Hyperparameters |
|---|---|
| CNN-VGG19 | Hyperparam1: Earlystopping:<br><br> |

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

| Final Model | Reasoning |
|---|---|
| CNN-VGG19 | The choice of VGG19 as the final optimized model was driven by its superior performance and robustness in feature extraction and predictive accuracy. VGG19's architecture, with its 19 layers compared to VGG16's 16 layers, allows for a deeper and more detailed representation of features, which is crucial for handling complex datasets. This depth enables the model to capture intricate patterns and subtle nuances in the data, leading to improved accuracy and overall performance. <br><br> During the optimization and evaluation phase, VGG19 consistently demonstrated better results across various performance metrics, including accuracy, precision, recall, and F1-score. The additional layers in VGG19 provided enhanced generalization capabilities, effectively mitigating overfitting and improving the model's performance on unseen data. This robustness was a key factor in its selection, ensuring that the model could deliver reliable predictions in real-world applications. <br><br> Furthermore, VGG19's proven track record in numerous benchmarks and its widespread adoption in the research community reinforced its |

| | credibility and reliability. The trade-off between computational cost and performance was carefully considered, and the incremental benefits in predictive accuracy and feature extraction offered by VGG19 justified its selection over VGG16.

In summary, VGG19 was chosen as the final optimized model due to its superior feature extraction capabilities, robust performance across metrics, and proven reliability, ensuring both efficiency and accuracy in predictive tasks. |