Model Optimization and Tuning Phase Template

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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	Learning Rate: Controls how much the model's weights are updated during training. Batch Size: Determines the number of samples used in one iteration of training. Epochs: Defines the number of complete passes through the training dataset. Regularization: Techniques like L1/L2 regularization to prevent overfitting.

	Dropout Rate: The fraction of neurons randomly dropped during training to prevent overfitting.

Optimizer: Algorithm (e.g., Adam, SGD) used to minimize the loss function.

Fine-tuning these parameters aims to improve predictive accuracy and model efficiency. |

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
CNN: VGG19	VGG19 was chosen over VGG16 as the final optimized model primarily due to its deeper architecture, which allows for better feature extraction and improved performance on complex tasks.

VGG19 consists of 19 layers compared to VGG16's 16 layers, providing a finer granularity in feature representation. This depth enables the model to capture more intricate patterns in the data, leading to enhanced predictive accuracy. Despite the increased computational cost, the benefits in terms of performance justified the choice.

During evaluation, VGG19 consistently outperformed VGG16 on key metrics such as accuracy, precision, and recall. The additional layers in VGG19 also contributed to a better generalization capability, reducing overfitting on the training data. Moreover, VGG19's robustness in various applications and its success in numerous benchmarks further supported its |

| | selection as the final model, ensuring both efficiency and accuracy in predictive tasks. |