Model Optimization and Tuning Phase Template

Date	1 December 2024
Team ID	739846
Project Title	Garbage Classification Using Deep Learning
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 Base Model (VGG16)	Categorical Crossentropy, Metrics, Optimizer.
	`# Compile the model`
	`model.compile(loss='categorical_crossentropy', optimizer=Adam(learning_rate=0.0001), metrics=['accuracy'])`

Fine Tuning	Unfreezing Layers, Learning Rate, Number of Epochs.
	`# Unfreeze the last few layers of the base model for fine-tuning`
	`for layer in base_model.layers[-4:]:  # Adjust the number of layers to unfreeze`
	`    layer.trainable = True`
	`# Re-compile the model with a lower learning rate for fine-tuning`
	`model.compile(optimizer=Adam(learning_rate=1e-5), loss='categorical_crossentropy', metrics=['accuracy'])`
	`# Fine-tune the model`
	`fine_tune_epochs = 10`
	`total_epochs = initial_epochs + fine_tune_epochs`

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Fine Tuning	We have selected the Fine Tuning model for its accuracy which is greater than other models.