Model Optimization and Tuning Phase Template

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Team ID	SWTID1719937289
Project Title	WCE Curated Colon Disease 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, performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

Hyperparameter Tuning Documentation:

Model	Tuned Hyperparameters	Optimal values

VGG 16	Fully connected layers parameters:
	
	`# Load the VGG16 model without top layers`
	`vgg16_model = VGG16(weights='imagenet', include_top=False, input_shape=(224, 224, 3))`
	
	`# Freeze the VGG16 layers`
	`for layer in vgg16_model.layers:`
	`  layer.trainable = False`
	
	`# Create a new model`
	`x = vgg16_model.output`
	`x = GlobalAveragePooling2D()(x)  # or Flatten()`
	`x = Dense(256, activation='relu')(x)`
	`x = Dense(128, activation='relu')(x)`
	`x = Dense(64, activation='relu')(x)`
	`output = Dense(4, activation='softmax')(x)`
	
	`model = Model(inputs=vgg16_model.input, outputs=output)`
	
	`# Display the summary of the new model`
	`model.summary()`
	
	Learning process parameters:
	
	`[ ] model.compile(`
	`  optimizer='adam',`
	`  loss='categorical_crossentropy',`
	`  metrics=['accuracy']`
	`)`
		Accuracy and loss:
		
		`[17] loss, accuracy = model.evaluate(test_data, steps=len(test_data))`
		`print(f"Test Loss: {loss}")`
		`print(f"Test Accuracy: {accuracy}")`
		
		`25/25 9s 337ms/step - accuracy: 0.8288 - loss: 0.4570`
		`Test Loss: 0.4621967077255249`
		`Test Accuracy: 0.8187500238418579`

Performance metric report:

Model	Optimized metric
VGG 16	Classification Report: precision recall f1-score support 0_normal 0.89 1.00 0.94 200 1_ulcerative_colitis 0.81 0.54 0.65 200 2_polyps 0.63 0.78 0.69 200 3_esophagitis 0.98 0.96 0.97 200 accuracy 0.82 800 macro avg 0.83 0.82 0.81 800 weighted avg 0.83 0.82 0.81 800 Confusion Matrix: [[200 0 0 0] [6 108 85 1] [18 25 155 2] [1 0 7 192]]

Final Model Selection Justification:

Final Model	Reasoning
VGG 16	The VGG16 convolutional neural network (CNN) was selected for its impressive performance after thorough tuning of its settings. It excels at understanding complex patterns in data, avoiding overfitting, and delivering highly accurate predictions, perfectly aligning with the project's goals. This solidifies its choice as the best model for the task.