Model Optimization and Tuning Phase Template

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Team ID	SWTID1720084679
Project Title	CovidVision: Advanced COVID-19 Detection from Lung X-rays with 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
VGG16 Model	**epochs=2** o The number of times the entire training dataset is passed through the model. o More epochs can lead to better learning but also increase the risk of overfitting. **Batch Size=32** o The number of samples processed before the model is updated. o A batch size of 32 is a common choice that balances memory efficiency and training speed. 
Resnet Model	**epochs=2** o The number of times the entire training dataset is passed through the model. o More epochs can lead to better learning but also increase the risk of overfitting.

	Batch Size=32
	o The number of samples processed before the model is updated.
	o A batch size of 32 is a common choice that balances memory efficiency and training speed.
	`[ ] resnet50.compile(loss='categorical_crossentropy',optimizer='adam',metrics=['accuracy'])`
	`resnet50.fit(train,validation_data=test,epochs=2)`
	Epoch 1/2
	218/218 [==========] - 61s 259ms/step - loss: 0.0111 - accuracy: 0.9954 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
	Epoch 2/2
	218/218 [==========] - 53s 245ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
	<keras.src.callbacks.History at 0x7e06f0207be0>

Inception Model	**epochs=5**
	o The number of times the entire training dataset is passed through the model.
	o More epochs can lead to better learning but also increase the risk of overfitting.
	Batch Size=32
	o The number of samples processed before the model is updated.
	o A batch size of 32 is a common choice that balances memory efficiency and training speed.
	`[ ] InceptionV3.compile(loss='categorical_crossentropy',optimizer='adam',metrics=['accuracy'])`
	`InceptionV3.fit(train,validation_data=test,epochs=5)`
	Epoch 1/5
	218/218 [==========] - 146s 474ms/step - loss: 0.0053 - accuracy: 0.9983 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
	Epoch 2/5
	218/218 [==========] - 97s 445ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
	Epoch 3/5
	218/218 [==========] - 95s 436ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
	Epoch 4/5
	218/218 [==========] - 95s 433ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
	Epoch 5/5
	218/218 [==========] - 96s 439ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
	<keras.src.callbacks.History at 0x7e068665b5b0>

Xception Model	**epochs=2**
	o The number of times the entire training dataset is passed through the model.
	o More epochs can lead to better learning but also increase the risk of overfitting.
	Batch Size=32
	o The number of samples processed before the model is updated.
	o A batch size of 32 is a common choice that balances memory efficiency and training speed.
	`[ ] Xception.compile(loss='categorical_crossentropy',optimizer='adam',metrics=['accuracy'])`
	`[ ] Xception.fit(train,validation_data=test,epochs=2)`
	Epoch 1/2
	218/218 [==========] - 166s 611ms/step - loss: 0.0070 - accuracy: 0.9960 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
	Epoch 2/2
	218/218 [==========] - 119s 546ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 8.4370e-06 - val_accuracy: 1.0000
	<keras.src.callbacks.History at 0x7e067d7f93c0>

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Model 1 (or other)	Explanation of why this model was chosen as the final optimized model