Model Optimization and Tuning Phase Template

Date	2 Dec 2024
Team ID	TMID739650
Project Title	ADVANCED COVID-19 DETECTION FROM LUNG X-RAYS BY 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
Model 1	**Learning Rate (Adam optimizer)**: Controls the rate of weight updates. **Batch Size**: Number of samples per gradient update. **Epochs**: Number of full passes through the dataset. **Dropout Rate**: Fraction of input units to drop to prevent overfitting. (You can add the screenshot of the code where these are defined

```
Total params: 21,680,684 (82.71 MB)

Trainable params: 819,204 (3.13 MB)

Non-trainable params: 20,861,480 (79.58 MB)

Epoch 1/5
c:\Users\salla\anaconda3\Lib\site-packages\keras\src\trainers\data_adapters\py_dataset_adapter.py:122: UserWarning: Your `PyDataset` class should
  self._warn_if_super_not_called()
66/66 ──────────────── 435s 6s/step - accuracy: 0.4309 - loss: 8.0634 - val_accuracy: 0.7246 - val_loss: 3.3794
Epoch 2/5
66/66 ──────────────── 434s 7s/step - accuracy: 0.5994 - loss: 5.4423 - val_accuracy: 0.7363 - val_loss: 2.7332
Epoch 3/5
66/66 ──────────────── 425s 6s/step - accuracy: 0.6008 - loss: 4.9274 - val_accuracy: 0.6094 - val_loss: 5.0652
Epoch 4/5
66/66 ──────────────── 422s 6s/step - accuracy: 0.5970 - loss: 5.6146 - val_accuracy: 0.5352 - val_loss: 8.1931
Epoch 5/5
66/66 ──────────────── 413s 6s/step - accuracy: 0.5616 - loss: 5.6233 - val_accuracy: 0.6582 - val_loss: 4.5087
```

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Model 1	The Xception model was chosen as the final model due to its high accuracy and efficiency in handling image classification tasks. Its pre-trained weights on ImageNet provide a strong starting point, and the customized top layers help fine-tune it for COVID-19 detection, showing superior performance during training.