

Project Development Phase

Model Performance Testing

Date	29 June 2025
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Project Name	Smart Sorting : Transfer Learning For Identifying Rotten Fruits And Vegetables

Model Performance Testing:

S.NO.	Parameter	Values
1.	Model Summary	MobileNetV2 (Transfer Learning), with added layers: - GlobalAveragePooling2D - Batch Normalization - Dense(256, Relu) - Dropout(0.4) - Dense(128, Relu) - Dropout(0.3) - Output: Dense(4, soft max)
2.	Accuracy	Training Accuracy – 75% Validation Accuracy -72%
3.	Fine Tuning Result	Validation Accuracy -Validation Accuracy after tuning: 72.25% (same as base)

Screenshots:

The screenshots are given below

	1280)		
Conv_1_bn (BatchNormalizatio...	(None, 7, 7, 1280)	5,120	Conv_1[0][0]
out_relu (ReLU)	(None, 7, 7, 1280)	0	Conv_1_bn[0][0]
global_average_pooling2d (GlobalAveragePool...	(None, 1280)	0	out_relu[0][0]
batch_normalization (BatchNormalizatio...	(None, 1280)	5,120	global_average_p...
dense_5 (Dense)	(None, 256)	327,936	batch_normalizat...
dropout_3 (Dropout)	(None, 256)	0	dense_5[0][0]
dense_6 (Dense)	(None, 128)	32,896	dropout_3[0][0]
dropout_4 (Dropout)	(None, 128)	0	dense_6[0][0]
dense_7 (Dense)	(None, 4)	516	dropout_4[0][0]
Total params: 2,624,452 (10.01 MB) Trainable params: 363,908 (1.39 MB) Non-trainable params: 2,260,544 (8.62 MB)			

Epoch 25/30

51/51 ————— 0s 2s/step - accuracy: 0.9793 - loss: 0.0425

Epoch 25: val_accuracy did not improve from 0.73250

51/51 ————— 142s 2s/step - accuracy: 0.9794 - loss: 0.0424 - val_accuracy: 0.7225 - val_loss: 1.9970

Epoch 26/30

51/51 ————— 0s 2s/step - accuracy: 0.9897 - loss: 0.0294

Epoch 26: val_accuracy did not improve from 0.73250

51/51 ————— 109s 2s/step - accuracy: 0.9897 - loss: 0.0295 - val_accuracy: 0.7225 - val_loss: 2.1223

Epoch 27/30

51/51 ————— 0s 2s/step - accuracy: 0.9867 - loss: 0.0333

Epoch 27: val_accuracy did not improve from 0.73250

51/51 ————— 140s 2s/step - accuracy: 0.9868 - loss: 0.0332 - val_accuracy: 0.7200 - val_loss: 2.0702

Epoch 28/30

51/51 ————— 0s 2s/step - accuracy: 0.9843 - loss: 0.0395

Epoch 28: val_accuracy did not improve from 0.73250

51/51 ————— 109s 2s/step - accuracy: 0.9844 - loss: 0.0394 - val_accuracy: 0.7150 - val_loss: 2.1686

Epoch 29/30

51/51 ————— 0s 2s/step - accuracy: 0.9887 - loss: 0.0390

Epoch 29: val_accuracy did not improve from 0.73250

51/51 ————— 128s 3s/step - accuracy: 0.9888 - loss: 0.0389 - val_accuracy: 0.7125 - val_loss: 2.2191

Epoch 30/30

51/51 ————— 0s 2s/step - accuracy: 0.9900 - loss: 0.0355

Epoch 30: val_accuracy did not improve from 0.73250

51/51 ————— 108s 2s/step - accuracy: 0.9900 - loss: 0.0355 - val_accuracy: 0.6950 - val_loss: 2.1674

```
[ ] best_model = tf.keras.models.load_model(os.path.join(PROJECT_PATH, 'healthy_vs_rotten_4class.h5'))
    loss, acc = best_model.evaluate(val_gen)
    print(f"Final Validation Accuracy: {acc * 100:.2f}%")
```

WARNING:absl:Compiled the loaded model, but the compiled metrics have yet to be built. `model.compile_metrics`

13/13 ————— 26s 2s/step - accuracy: 0.7124 - loss: 1.7133

Final Validation Accuracy: 72.25%

```
# STEP 10: Manually save the model
model.save(os.path.join(PROJECT_PATH, 'final_smart_sorting_model.h5'))
print("✅ Model saved as final_smart_sorting_model.h5")
```