

Project Development Phase

Model Performance Test

Date	10 November 2022
Team ID	PNT2022TMID51948
Project Name	Project – Fertilizer Recommendation system for disease prediction
Maximum Marks	10 Marks

Model Performance Testing:

S.No.	Parameter	Values	Screenshot
1.	Model Summary	<p>Conv2D layers – 32 Features are extracted from the input image</p> <p>Relu – Rectified linear activation to fire up neurons</p> <p>Flatten layer- 4D Array is converted into 1D array.</p> <p>Dropout Layer – It makes some neurons to relax</p> <p>Softmax activation – For the multiclassification output</p>	<pre> Model: "sequential" Layer (type) Output Shape Param # ----- conv2d (Conv2D) (None, 252, 252, 32) 2432 max_pooling2d (MaxPooling2D) (None, 84, 84, 32) 0 conv2d_1 (Conv2D) (None, 82, 82, 32) 9248 max_pooling2d_1 (MaxPooling2D) (None, 41, 41, 32) 0 conv2d_2 (Conv2D) (None, 39, 39, 64) 18496 max_pooling2d_2 (MaxPooling2D) (None, 19, 19, 64) 0 flatten (Flatten) (None, 23104) 0 dense (Dense) (None, 512) 11829760 dropout (Dropout) (None, 512) 0 dense_1 (Dense) (None, 128) 65664 dense_2 (Dense) (None, 6) 774 Total params: 11,926,374 Trainable params: 11,926,374 Non-trainable params: 0 </pre>
2.	Accuracy	<p>Training Accuracy –</p> <p>i) Fruit dataset – 97.96%</p> <p>Validation Accuracy –</p> <p>i) Fruit dataset – 99.27%</p>	<p>i)Fruit Dataset</p> <pre> Found 5304 images belonging to 6 classes. /opt/conda/envs/Python-3.9/lib/python3.9/site-packages/keras/optimizer_v2/adam.py:105: UserWarning: The 'lr' argument is deprecated, use 'learning_rate' instead. /opt/conda/envs/Python-3.9/lib/python3.9/site-packages/keras/optimizer_v2/adam.py:105: UserWarning: The 'lr' argument is deprecated, use 'learning_rate' instead. /opt/conda/envs/Python-3.9/lib/python3.9/site-packages/keras/optimizer_v2/adam.py:105: UserWarning: The 'lr' argument is deprecated, use 'learning_rate' instead. /opt/conda/envs/Python-3.9/lib/python3.9/site-packages/keras/optimizer_v2/adam.py:105: UserWarning: The 'lr' argument is deprecated, use 'learning_rate' instead. /opt/conda/envs/Python-3.9/lib/python3.9/site-packages/keras/optimizer_v2/adam.py:105: UserWarning: The 'lr' argument is deprecated, use 'learning_rate' instead. /opt/conda/envs/Python-3.9/lib/python3.9/site-packages/keras/optimizer_v2/adam.py:105: UserWarning: The 'lr' argument is deprecated, use 'learning_rate' instead. /opt/conda/envs/Python-3.9/lib/python3.9/site-packages/keras/optimizer_v2/adam.py:105: UserWarning: The 'lr' argument is deprecated, use 'learning_rate' instead. /opt/conda/envs/Python-3.9/lib/python3.9/site-packages/keras/optimizer_v2/adam.py:105: UserWarning: The 'lr' argument is deprecated, use 'learning_rate' instead. /opt/conda/envs/Python-3.9/lib/python3.9/site-packages/keras/optimizer_v2/adam.py:105: UserWarning: The 'lr' argument is deprecated, use 'learning_rate' instead. /opt/conda/envs/Python-3.9/lib/python3.9/site-packages/keras/optimizer_v2/adam.py:105: UserWarning: The 'lr' argument is deprecated, use 'learning_rate' instead. Epoch 1/10 160/160 [=====] - 307s 2s/step - loss: 0.7843 - accuracy: 0.7881 - val_loss: 0.3770 - val_accuracy: 0.8536 Epoch 2/10 160/160 [=====] - 304s 2s/step - loss: 0.2932 - accuracy: 0.8967 - val_loss: 0.2068 - val_accuracy: 0.9256 Epoch 3/10 160/160 [=====] - 303s 2s/step - loss: 0.2222 - accuracy: 0.9215 - val_loss: 0.1991 - val_accuracy: 0.9384 Epoch 4/10 160/160 [=====] - 302s 2s/step - loss: 0.1730 - accuracy: 0.9408 - val_loss: 0.0838 - val_accuracy: 0.9712 Epoch 5/10 160/160 [=====] - 302s 2s/step - loss: 0.1519 - accuracy: 0.9406 - val_loss: 0.1207 - val_accuracy: 0.9593 Epoch 6/10 160/160 [=====] - 303s 2s/step - loss: 0.1692 - accuracy: 0.9404 - val_loss: 0.4358 - val_accuracy: 0.8687 Epoch 7/10 160/160 [=====] - 379s 2s/step - loss: 0.1622 - accuracy: 0.9436 - val_loss: 0.0665 - val_accuracy: 0.9709 Epoch 8/10 160/160 [=====] - 385s 2s/step - loss: 0.0992 - accuracy: 0.9671 - val_loss: 0.0662 - val_accuracy: 0.9784 Epoch 9/10 160/160 [=====] - 409s 2s/step - loss: 0.0681 - accuracy: 0.9793 - val_loss: 0.0378 - val_accuracy: 0.9857 Epoch 10/10 160/160 [=====] - 424s 3s/step - loss: 0.0558 - accuracy: 0.9796 - val_loss: 0.0274 - val_accuracy: 0.9927 </pre>

Training Accuracy –
ii)Vegetable dataset – 96.45%

Validation Accuracy –
ii)Vegetable dataset – 97.53%

ii)Vegetable Dataset

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Found 11386 images belonging to 9 classes.
/opt/conda/envs/Python-3.9/lib/python3.9/site-packages/keras/optimizer_v2/adam.py:105: UserWarning: The `lr` argument is deprecated, use `learning_rate` instead.
  super(Adam, self).__init__(name, **kwargs)
/tmp/uvuser/ipykernel_164/2339187767.py:8: UserWarning: `Model.fit_generator` is deprecated and will be removed in a future version. Please use `train_model_with_logits` instead.
  train_model.fit_generator(train_generator, epochs=nb_epoch, steps_per_epoch=train_generator.samples//batch_size, validation_data=validation_data)
Epoch 1/15
355/355 [=====] - 827s 2s/step - loss: 1.1056 - accuracy: 0.6867 - val_loss: 0.6786 - val_accuracy: 0.7526
Epoch 2/15
355/355 [=====] - 831s 2s/step - loss: 0.5690 - accuracy: 0.7962 - val_loss: 0.3576 - val_accuracy: 0.8799
Epoch 3/15
355/355 [=====] - 816s 2s/step - loss: 0.3926 - accuracy: 0.8592 - val_loss: 0.2456 - val_accuracy: 0.9158
Epoch 4/15
355/355 [=====] - 826s 2s/step - loss: 0.2871 - accuracy: 0.9010 - val_loss: 0.1648 - val_accuracy: 0.9422
Epoch 5/15
355/355 [=====] - 819s 2s/step - loss: 0.2500 - accuracy: 0.9096 - val_loss: 0.1616 - val_accuracy: 0.9449
Epoch 6/15
355/355 [=====] - 822s 2s/step - loss: 0.2112 - accuracy: 0.9261 - val_loss: 0.1219 - val_accuracy: 0.9561
Epoch 7/15
355/355 [=====] - 823s 2s/step - loss: 0.1871 - accuracy: 0.9331 - val_loss: 0.1383 - val_accuracy: 0.9522
Epoch 8/15
355/355 [=====] - 818s 2s/step - loss: 0.1576 - accuracy: 0.9468 - val_loss: 0.1178 - val_accuracy: 0.9625
Epoch 9/15
355/355 [=====] - 820s 2s/step - loss: 0.1425 - accuracy: 0.9519 - val_loss: 0.1510 - val_accuracy: 0.9465
Epoch 10/15
355/355 [=====] - 827s 2s/step - loss: 0.1402 - accuracy: 0.9521 - val_loss: 0.0983 - val_accuracy: 0.9682
Epoch 11/15
355/355 [=====] - 824s 2s/step - loss: 0.1249 - accuracy: 0.9571 - val_loss: 0.0610 - val_accuracy: 0.9790
Epoch 12/15
355/355 [=====] - 829s 2s/step - loss: 0.1120 - accuracy: 0.9610 - val_loss: 0.0873 - val_accuracy: 0.9685
Epoch 13/15
355/355 [=====] - 825s 2s/step - loss: 0.1061 - accuracy: 0.9641 - val_loss: 0.0683 - val_accuracy: 0.9763
Epoch 14/15
355/355 [=====] - 825s 2s/step - loss: 0.1175 - accuracy: 0.9597 - val_loss: 0.1141 - val_accuracy: 0.9572
Epoch 15/15
355/355 [=====] - 823s 2s/step - loss: 0.1045 - accuracy: 0.9645 - val_loss: 0.0750 - val_accuracy: 0.9753
```

1 # Save model