Model Development Phase Template

Date	10 Feb 2026
Project Title	Greenclassify: Deep Learning-Based Approach For Vegetable Image Classification

Initial Model Training Code, Model Validation and Evaluation Report

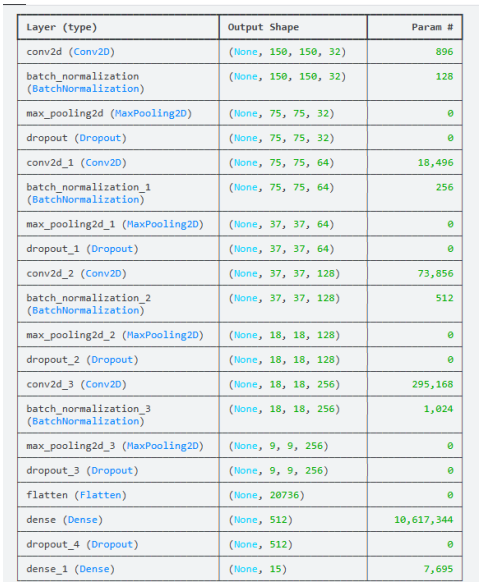
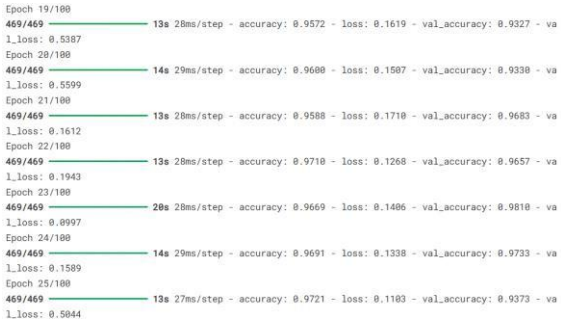
The initial model training code will be showcased in the future through a screenshot. The model validation and evaluation report will include a summary and training and validation performance metrics for multiple models, presented through respective screenshots.

Initial Model Training Code (5 marks):

```
import keras
early_stopping=keras.callbacks.EarlyStopping(patience=10)

hist=model.fit(train_ds,
               epochs=100,
                verbose=1,
                validation_data=validation_ds,
                callbacks=early_stopping
               )
```

Model Validation and Evaluation Report (5 marks):

Model	Summary	Training and Validation Performance Metrics
Custom CNN		

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 150, 150, 32)	896
batch_normalization (BatchNormalization)	(None, 150, 150, 32)	128
max_pooling2d (MaxPooling2D)	(None, 75, 75, 32)	0
dropout (Dropout)	(None, 75, 75, 32)	0
conv2d_1 (Conv2D)	(None, 75, 75, 64)	18,496
batch_normalization_1 (BatchNormalization)	(None, 75, 75, 64)	256
max_pooling2d_1 (MaxPooling2D)	(None, 37, 37, 64)	0
dropout_1 (Dropout)	(None, 37, 37, 64)	0
conv2d_2 (Conv2D)	(None, 37, 37, 128)	73,856
batch_normalization_2 (BatchNormalization)	(None, 37, 37, 128)	512
max_pooling2d_2 (MaxPooling2D)	(None, 18, 18, 128)	0
dropout_2 (Dropout)	(None, 18, 18, 128)	0
conv2d_3 (Conv2D)	(None, 18, 18, 256)	295,168
batch_normalization_3 (BatchNormalization)	(None, 18, 18, 256)	1,024
max_pooling2d_3 (MaxPooling2D)	(None, 9, 9, 256)	0
dropout_3 (Dropout)	(None, 9, 9, 256)	0
flatten (Flatten)	(None, 20736)	0
dense (Dense)	(None, 512)	10,617,344
dropout_4 (Dropout)	(None, 512)	0
dense_1 (Dense)	(None, 15)	7,695

```
Epoch 19/100
469/469 ━━━━━━━━━━━━━━━━━━━━ 13s 28ms/step - accuracy: 0.9572 - loss: 0.1619 - val_accuracy: 0.9327 - va
l_loss: 0.5387
Epoch 20/100
469/469 ━━━━━━━━━━━━━━━━━━━━ 14s 29ms/step - accuracy: 0.9600 - loss: 0.1507 - val_accuracy: 0.9330 - va
l_loss: 0.5599
Epoch 21/100
469/469 ━━━━━━━━━━━━━━━━━━━━ 13s 28ms/step - accuracy: 0.9588 - loss: 0.1710 - val_accuracy: 0.9683 - va
l_loss: 0.1612
Epoch 22/100
469/469 ━━━━━━━━━━━━━━━━━━━━ 13s 28ms/step - accuracy: 0.9710 - loss: 0.1268 - val_accuracy: 0.9657 - va
l_loss: 0.1943
Epoch 23/100
469/469 ━━━━━━━━━━━━━━━━━━━━ 20s 28ms/step - accuracy: 0.9669 - loss: 0.1406 - val_accuracy: 0.9810 - va
l_loss: 0.0997
Epoch 24/100
469/469 ━━━━━━━━━━━━━━━━━━━━ 14s 29ms/step - accuracy: 0.9691 - loss: 0.1338 - val_accuracy: 0.9733 - va
l_loss: 0.1589
Epoch 25/100
469/469 ━━━━━━━━━━━━━━━━━━━━ 13s 27ms/step - accuracy: 0.9721 - loss: 0.1103 - val_accuracy: 0.9373 - va
l_loss: 0.5044
```