Model Development Phase

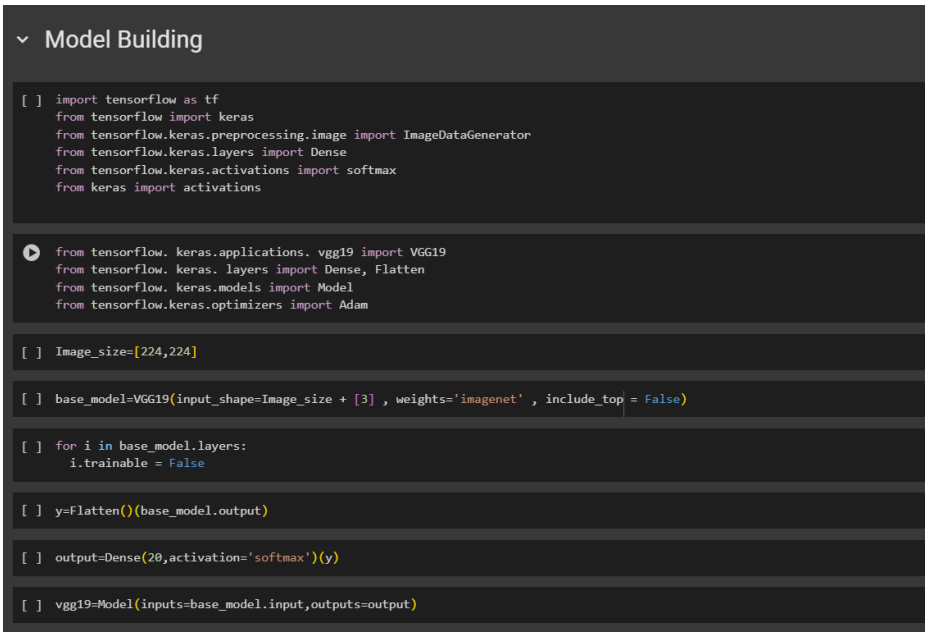
Date	20 June 2025
Team ID	SWTID1749826875
Project Title	Dog Breed Identification using Transfer Learning
Maximum Marks	10 Marks

Initial Model Training Code, Model Validation and Evaluation Report

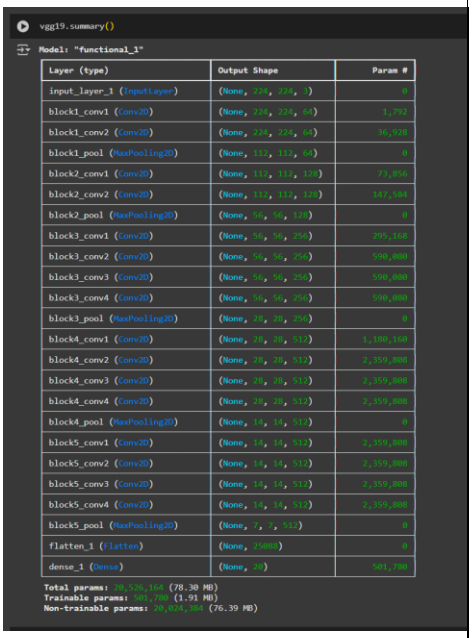
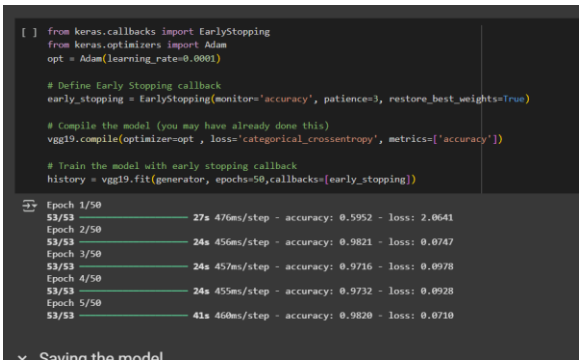
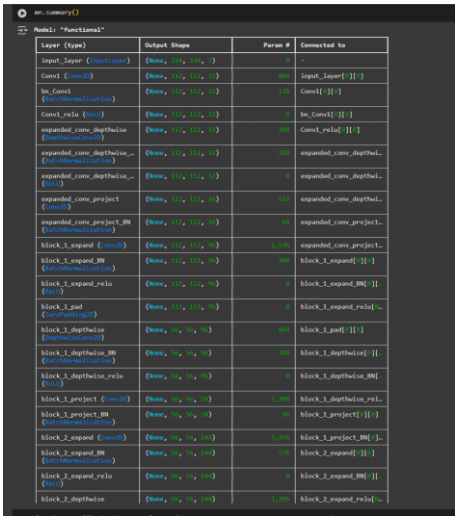
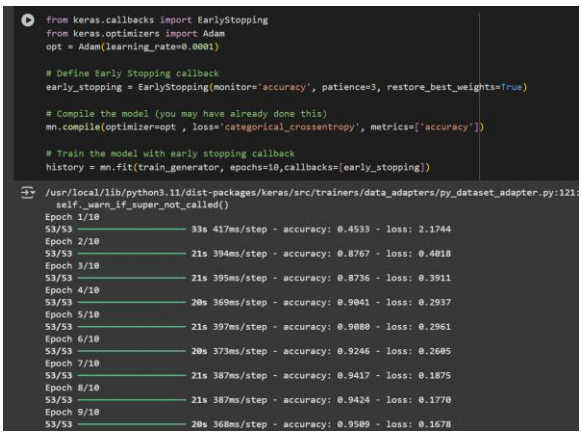
The initial model training code will be showcased in the future through a screenshot. The model validation and evaluation report will include a summary and training and validation performance metrics for multiple models, presented through respective screenshots.

Initial Model Training Code (5 marks):

Paste the screenshot of the model training code



Model Validation and Evaluation Report (5 marks):

Model	Summary	Training and Validation Performance Metrics
VGG19		
MobileNet V2		


```
from keras.callbacks import EarlyStopping
from keras.optimizers import Adam
opt = Adam(learning_rate=0.0001)

# Define Early Stopping callback
early_stopping = EarlyStopping(monitor='accuracy', patience=3, restore_best_weights=True)

# Compile the model (you may have already done this)
vgg19.compile(optimizer=opt , loss='categorical_crossentropy', metrics=['accuracy'])

# Train the model with early stopping callback
history = vgg19.fit(generator, epochs=50,callbacks=[early_stopping])
```

```
Epoch 1/50
53/53 ━━━━━━━━━━━━━━━━━━━━ 27s 476ms/step - accuracy: 0.5952 - loss: 2.0641
Epoch 2/50
53/53 ━━━━━━━━━━━━━━━━━━━━ 24s 456ms/step - accuracy: 0.9821 - loss: 0.0747
Epoch 3/50
53/53 ━━━━━━━━━━━━━━━━━━━━ 24s 457ms/step - accuracy: 0.9716 - loss: 0.0978
Epoch 4/50
53/53 ━━━━━━━━━━━━━━━━━━━━ 24s 455ms/step - accuracy: 0.9732 - loss: 0.0928
Epoch 5/50
53/53 ━━━━━━━━━━━━━━━━━━━━ 41s 460ms/step - accuracy: 0.9820 - loss: 0.0710
```

Saving the model

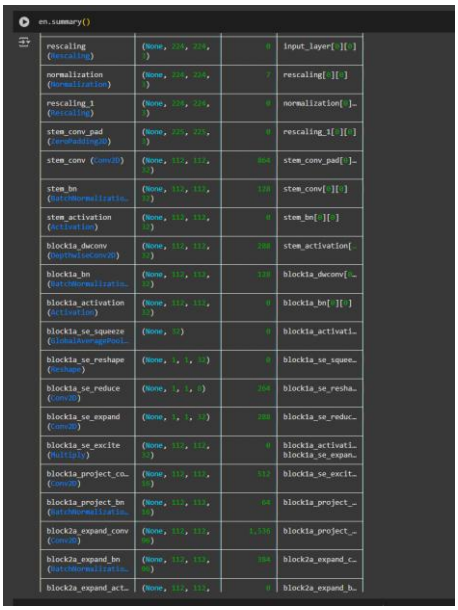
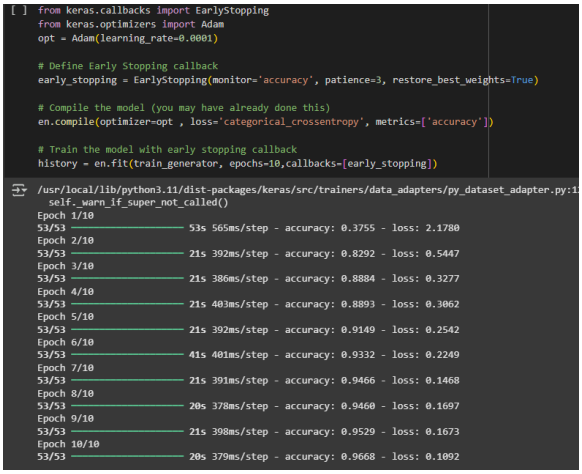

```
from keras.callbacks import EarlyStopping
from keras.optimizers import Adam
opt = Adam(learning_rate=0.0001)

# Define Early Stopping callback
early_stopping = EarlyStopping(monitor='accuracy', patience=3, restore_best_weights=True)

# Compile the model (you may have already done this)
mn.compile(optimizer=opt , loss='categorical_crossentropy', metrics=['accuracy'])

# Train the model with early stopping callback
history = mn.fit(train_generator, epochs=10,callbacks=[early_stopping])
```

```
/usr/local/lib/python3.11/dist-packages/keras/src/trainers/data_adapters/py_dataset_adapter.py:121
  self._warn_if_super_not_called()
Epoch 1/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 33s 417ms/step - accuracy: 0.4533 - loss: 2.1744
Epoch 2/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 21s 394ms/step - accuracy: 0.8767 - loss: 0.4018
Epoch 3/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 21s 395ms/step - accuracy: 0.8736 - loss: 0.3911
Epoch 4/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 20s 369ms/step - accuracy: 0.9041 - loss: 0.2937
Epoch 5/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 21s 397ms/step - accuracy: 0.9080 - loss: 0.2961
Epoch 6/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 20s 373ms/step - accuracy: 0.9246 - loss: 0.2605
Epoch 7/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 21s 387ms/step - accuracy: 0.9417 - loss: 0.1875
Epoch 8/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 21s 387ms/step - accuracy: 0.9424 - loss: 0.1770
Epoch 9/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 20s 368ms/step - accuracy: 0.9509 - loss: 0.1678
```

EfficientNet B0		


```
[ ] from keras.callbacks import EarlyStopping
    from keras.optimizers import Adam
    opt = Adam(learning_rate=0.0001)

    # Define Early Stopping callback
    early_stopping = EarlyStopping(monitor='accuracy', patience=3, restore_best_weights=True)

    # Compile the model (you may have already done this)
    en.compile(optimizer=opt , loss='categorical_crossentropy', metrics=['accuracy'])

    # Train the model with early stopping callback
    history = en.fit(train_generator, epochs=10,callbacks=[early_stopping])

/usr/local/lib/python3.11/dist-packages/keras/src/trainers/data_adapters/py_dataset_adapter.py:1
  self._warn_if_super_not_called()
Epoch 1/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 53s 565ms/step - accuracy: 0.3755 - loss: 2.1780
Epoch 2/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 21s 392ms/step - accuracy: 0.8292 - loss: 0.5447
Epoch 3/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 21s 386ms/step - accuracy: 0.8884 - loss: 0.3277
Epoch 4/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 21s 403ms/step - accuracy: 0.8893 - loss: 0.3062
Epoch 5/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 21s 392ms/step - accuracy: 0.9149 - loss: 0.2542
Epoch 6/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 41s 401ms/step - accuracy: 0.9332 - loss: 0.2249
Epoch 7/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 21s 391ms/step - accuracy: 0.9466 - loss: 0.1468
Epoch 8/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 20s 378ms/step - accuracy: 0.9460 - loss: 0.1697
Epoch 9/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 21s 398ms/step - accuracy: 0.9529 - loss: 0.1673
Epoch 10/10
53/53 ━━━━━━━━━━━━━━━━━━━━ 20s 379ms/step - accuracy: 0.9668 - loss: 0.1092
```