

## Model Development Phase Template

Date	15 July 2024
Team ID	SWTID1720437504
Project Title	Dog breed identification using transfer learning
Maximum Marks	10 Marks

### Initial Model Training Code (5 marks):

```

from tensorflow.keras.models import Sequential

from tensorflow.keras.layers import Dense, GlobalAveragePooling2D

from tensorflow.keras.applications import VGG19

# Load the VGG19 model without the top layers
base_model = VGG19(weights='imagenet', include_top=False, input_shape=(224, 224, 3))

# Create a new model
model = Sequential([

    base_model,

    GlobalAveragePooling2D(),

    Dense(1024, activation='relu'),

    Dense(num_classes, activation='softmax')

])

# Compile the model
model.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy'])

# Train the model
history = model.fit(train_generator, validation_data=validation_generator, epochs=10)

```

## Model Validation and Evaluation Report (5 marks):

```
WARNING:tensorflow:From C:\Users\sanch\AppData\Local\Programs\Python\Python311\Lib\site-packages\keras\src\losses.py:2976: The name tf.losses.sparse_softmax_cross_entropy is deprecated. Please use tf.compat.v1.losses.sparse_softmax_cross_entropy instead.

Number of classes: 93
WARNING:tensorflow:From C:\Users\sanch\AppData\Local\Programs\Python\Python311\Lib\site-packages\keras\src\backend.py:1398: The name tf.executing_eagerly_outside_functions is deprecated. Please use tf.compat.v1.executing_eagerly_outside_functions instead.

WARNING:tensorflow:From C:\Users\sanch\AppData\Local\Programs\Python\Python311\Lib\site-packages\keras\src\layers\normalization\batch_normalization.py:979: The name tf.nn.fused_batch_norm is deprecated. Please use tf.compat.v1.nn.fused_batch_norm instead.

WARNING:tensorflow:From C:\Users\sanch\AppData\Local\Programs\Python\Python311\Lib\site-packages\keras\src\optimizers\_init_.py:309: The name tf.train.Optimizer is deprecated. Please use tf.compat.v1.train.Optimizer instead.

Found 6391 images belonging to 93 classes.
Found 762 images belonging to 93 classes.
Epoch 1/10
WARNING:tensorflow:From C:\Users\sanch\AppData\Local\Programs\Python\Python311\Lib\site-packages\keras\src\utils\tf_utils.py:492: The name tf.ragged.RaggedTensorValue is deprecated. Please use tf.compat.v1.ragged.RaggedTensorValue instead.

WARNING:tensorflow:From C:\Users\sanch\AppData\Local\Programs\Python\Python311\Lib\site-packages\keras\src\engine\base_layer_utils.py:384: The name tf.executing_eagerly_outside_functions is deprecated. Please use tf.compat.v1.executing_eagerly_outside_functions instead.

200/200 [=====] - 786s 4s/step - loss: 4.5187 - accuracy: 0.0197 - val_loss: 4.5290 - val_accuracy: 0.0157
Epoch 2/10
200/200 [=====] - 713s 4s/step - loss: 4.1500 - accuracy: 0.0482 - val_loss: 5.3344 - val_accuracy: 0.0157
Epoch 3/10
200/200 [=====] - 819s 4s/step - loss: 3.7899 - accuracy: 0.0867 - val_loss: 7.1728 - val_accuracy: 0.0131
Epoch 4/10
200/200 [=====] - 5947s 30s/step - loss: 3.4998 - accuracy: 0.1260 - val_loss: 5.8555 - val_accuracy: 0.0236
Epoch 5/10
200/200 [=====] - 601s 3s/step - loss: 3.2332 - accuracy: 0.1673 - val_loss: 6.2387 - val_accuracy: 0.0420
Epoch 6/10
200/200 [=====] - 622s 3s/step - loss: 2.9866 - accuracy: 0.2162 - val_loss: 4.1636 - val_accuracy: 0.1129
Epoch 7/10
200/200 [=====] - 602s 3s/step - loss: 2.7551 - accuracy: 0.2643 - val_loss: 3.5114 - val_accuracy: 0.1640
Epoch 8/10
200/200 [=====] - 591s 3s/step - loss: 2.5473 - accuracy: 0.3001 - val_loss: 4.9887 - val_accuracy: 0.0853
Epoch 9/10
200/200 [=====] - 579s 3s/step - loss: 2.3591 - accuracy: 0.3517 - val_loss: 3.0875 - val_accuracy: 0.2270
Epoch 10/10
200/200 [=====] - 613s 3s/step - loss: 2.1318 - accuracy: 0.4043 - val_loss: 4.3384 - val_accuracy: 0.1391

C:\Users\sanch\AppData\Local\Programs\Python\Python311\Lib\site-packages\keras\src\engine\training.py:3103: UserWarning: You are saving your model as an HDF5 file via `model.save()`. This file format is considered legacy. We recommend using instead the native Keras format, e.g. `model.save('my_model.keras')`.
  saving_api.save_model(
```