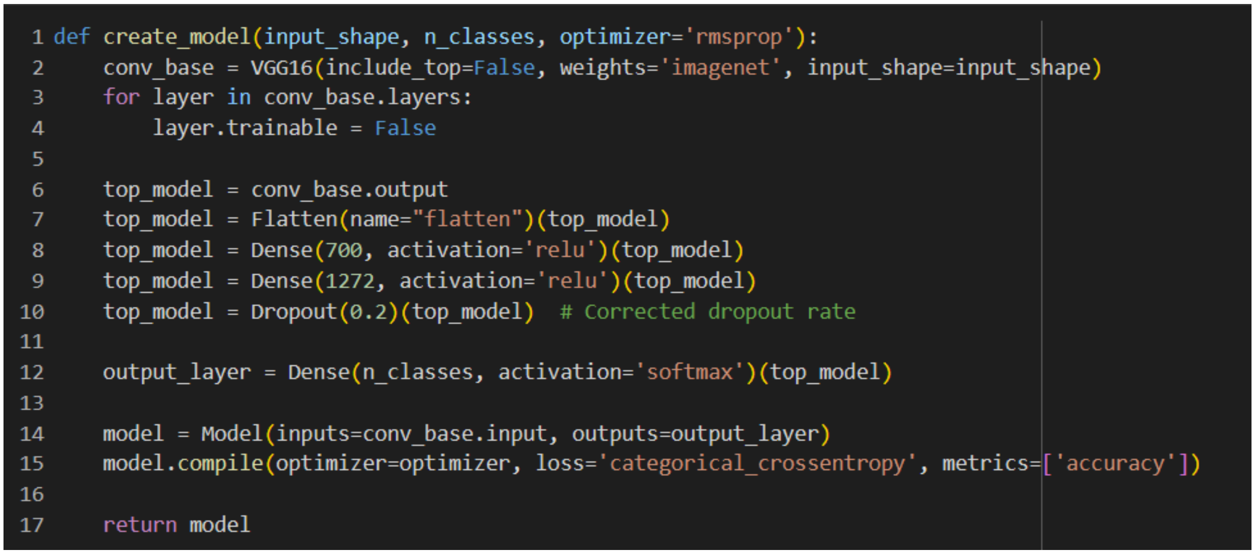
Model Development Phase Template

Date	15 April 2024
Team ID	Team-738165
Project Title	Neural Networks Ahoy: Cutting-edge Ship Classification for Maritime Mastery
Maximum Marks	10 Marks

Initial Model Training Code, Model Validation and Evaluation Report

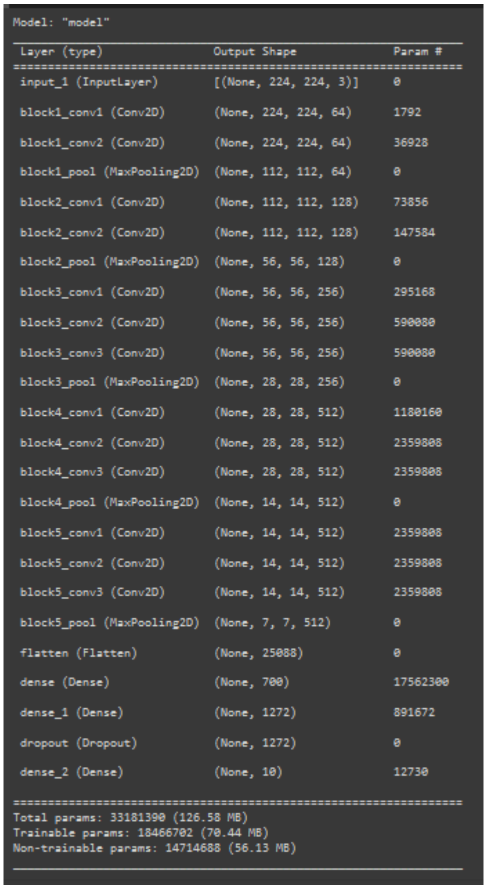
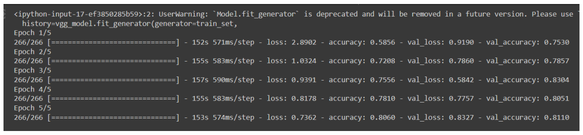
The initial model training code will be showcased in the future through a screenshot. The model validation and evaluation report will include a summary and training and validation performance metrics for multiple models, presented through respective screenshots.

Initial Model Training Code (5 marks):



```python
def create_model(input_shape, n_classes, optimizer='rmsprop'):
    conv_base = VGG16(include_top=False, weights='imagenet', input_shape=input_shape)
    for layer in conv_base.layers:
        layer.trainable = False

    top_model = conv_base.output
    top_model = Flatten(name="flatten")(top_model)
    top_model = Dense(700, activation='relu')(top_model)
    top_model = Dense(1272, activation='relu')(top_model)
    top_model = Dropout(0.2)(top_model)  # Corrected dropout rate

    output_layer = Dense(n_classes, activation='softmax')(top_model)

    model = Model(inputs=conv_base.input, outputs=output_layer)
    model.compile(optimizer=optimizer, loss='categorical_crossentropy', metrics=['accuracy'])

    return model
```

Model Validation and Evaluation Report (5 marks):

Model	Summary	Training and Validation Performance Metrics
Model 1		

```
Model: "model"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 input_1 (InputLayer)        [(None, 224, 224, 3)]     0

 block1_conv1 (Conv2D)       (None, 224, 224, 64)      1792

 block1_conv2 (Conv2D)       (None, 224, 224, 64)      36928

 block1_pool (MaxPooling2D)  (None, 112, 112, 64)      0

 block2_conv1 (Conv2D)       (None, 112, 112, 128)     73856

 block2_conv2 (Conv2D)       (None, 112, 112, 128)     147584

 block2_pool (MaxPooling2D)  (None, 56, 56, 128)       0

 block3_conv1 (Conv2D)       (None, 56, 56, 256)       295168

 block3_conv2 (Conv2D)       (None, 56, 56, 256)       590080

 block3_conv3 (Conv2D)       (None, 56, 56, 256)       590080

 block3_pool (MaxPooling2D)  (None, 28, 28, 256)       0

 block4_conv1 (Conv2D)       (None, 28, 28, 512)       1180160

 block4_conv2 (Conv2D)       (None, 28, 28, 512)       2359808

 block4_conv3 (Conv2D)       (None, 28, 28, 512)       2359808

 block4_pool (MaxPooling2D)  (None, 14, 14, 512)       0

 block5_conv1 (Conv2D)       (None, 14, 14, 512)       2359808

 block5_conv2 (Conv2D)       (None, 14, 14, 512)       2359808

 block5_conv3 (Conv2D)       (None, 14, 14, 512)       2359808

 block5_pool (MaxPooling2D)  (None, 7, 7, 512)         0

 flatten (Flatten)           (None, 25088)             0

 dense (Dense)               (None, 700)               17562300

 dense_1 (Dense)             (None, 1272)              891672

 dropout (Dropout)           (None, 1272)              0

 dense_2 (Dense)             (None, 10)                12730

=================================================================
Total params: 33181390 (126.58 MB)
Trainable params: 18466702 (70.44 MB)
Non-trainable params: 14714688 (56.13 MB)
_________________________________________________________________
```

```
<ipython-input-17-ef3850285b59>:2: UserWarning: `Model.fit_generator` is deprecated and will be removed in a future version. Please use
  history=vgg_model.fit_generator(generator=train_set,
Epoch 1/5
266/266 [==============================] - 152s 571ms/step - loss: 2.8902 - accuracy: 0.5856 - val_loss: 0.9190 - val_accuracy: 0.7530
Epoch 2/5
266/266 [==============================] - 155s 583ms/step - loss: 1.0324 - accuracy: 0.7208 - val_loss: 0.7860 - val_accuracy: 0.7857
Epoch 3/5
266/266 [==============================] - 157s 590ms/step - loss: 0.9391 - accuracy: 0.7556 - val_loss: 0.5842 - val_accuracy: 0.8304
Epoch 4/5
266/266 [==============================] - 155s 583ms/step - loss: 0.8178 - accuracy: 0.7810 - val_loss: 0.7757 - val_accuracy: 0.8051
Epoch 5/5
266/266 [==============================] - 153s 574ms/step - loss: 0.7362 - accuracy: 0.8060 - val_loss: 0.8327 - val_accuracy: 0.8110
```