

# Performance and Final Submission Phase

## Model Performance Test

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|---|
| Date: 5-11-2023                                       |
| Team ID: Team-592965                                  |
| Project Name: Ship Classification using Deep Learning |
| Maximum Marks: 10 Marks                               |

### Model Performance Testing:

| S.No | Parameter                             | Values   | Screenshot  |
|------|---------------------------------------|--|---|
| 1.   | Model Summary                         | Total Params: 22171429<br>Trainable Params: 368645<br>Non-Trainable Params: 21802784 | <pre> inception_model.summary()  Model: "model_5" Layer (type)                 Output Shape              Param #   Connected to ----- input_8 (InputLayer)         [(None, 248, 248, 3)]     0         [] conv2d_470 (Conv2D)          (None, 123, 123, 32)     864        ['input_8[0][0]'] batch_normalization_472 (B (None, 123, 123, 32)     96         ['conv2d_470[0][0]'] atchNormalization) activation_470 (Activation)   (None, 123, 123, 32)     0          ['batch_normalization_472[0][0]'] ) conv2d_471 (Conv2D)          (None, 121, 121, 32)     9216       ['activation_470[0][0]'] batch_normalization_473 (B (None, 121, 121, 32)     96         ['conv2d_471[0][0]'] atchNormalization) activation_471 (Activation)   (None, 121, 121, 32)     0          ['batch_normalization_473[0][0]'] ) conv2d_472 (Conv2D)          (None, 121, 121, 64)     18432      ['activation_471[0][0]'] batch_normalization_474 (B (None, 121, 121, 64)     192        ['conv2d_472[0][0]'] atchNormalization) ... Total params: 22171429 (84.58 MB) Trainable params: 368645 (1.41 MB) Non-trainable params: 21802784 (83.17 MB) </pre>   |
| 2.   | Accuracy                              | Training Accuracy – 95.58<br>Validation Accuracy – 87.67                             | <pre> Epoch 1/12 79/79 [=====] - 129s 2s/step - loss: 0.6129 - accuracy: 0.7721 - val_loss: 0.4604 - val_accuracy: 0.8303 Epoch 2/12 79/79 [=====] - 93s 1s/step - loss: 0.3578 - accuracy: 0.8641 - val_loss: 0.4555 - val_accuracy: 0.8375 Epoch 3/12 79/79 [=====] - 94s 1s/step - loss: 0.2976 - accuracy: 0.8865 - val_loss: 0.4156 - val_accuracy: 0.8455 Epoch 4/12 79/79 [=====] - 91s 1s/step - loss: 0.2582 - accuracy: 0.9061 - val_loss: 0.4036 - val_accuracy: 0.8599 Epoch 5/12 79/79 [=====] - 91s 1s/step - loss: 0.2063 - accuracy: 0.9214 - val_loss: 0.3943 - val_accuracy: 0.8711 Epoch 6/12 79/79 [=====] - 89s 1s/step - loss: 0.2037 - accuracy: 0.9220 - val_loss: 0.3858 - val_accuracy: 0.8543 Epoch 7/12 79/79 [=====] - 88s 1s/step - loss: 0.1865 - accuracy: 0.9310 - val_loss: 0.3691 - val_accuracy: 0.8599 Epoch 8/12 79/79 [=====] - 88s 1s/step - loss: 0.1832 - accuracy: 0.9296 - val_loss: 0.3900 - val_accuracy: 0.8591 Epoch 9/12 79/79 [=====] - 90s 1s/step - loss: 0.1733 - accuracy: 0.9312 - val_loss: 0.3661 - val_accuracy: 0.8687 Epoch 10/12 79/79 [=====] - 88s 1s/step - loss: 0.1441 - accuracy: 0.9466 - val_loss: 0.3616 - val_accuracy: 0.8671 Epoch 11/12 79/79 [=====] - 91s 1s/step - loss: 0.1296 - accuracy: 0.9538 - val_loss: 0.3457 - val_accuracy: 0.8735 Epoch 12/12 79/79 [=====] - 90s 1s/step - loss: 0.1232 - accuracy: 0.9558 - val_loss: 0.3623 - val_accuracy: 0.8767  &lt;keras.src.callbacks.History at 0x7a41cd0a03a0&gt; </pre> |
| 3.   | Confidence Score (Yolo Projects only) | Class Detected – NA<br>Confidence Score - NA   | Not Applicable  |

## Screenshots

### Model Summary

```
inception_model.summary()
```

Model: "model\_5"

| Layer (type)                                 | Output Shape          | Param # | Connected to                      |
|--|-----------------------|---------|-----------------------------------|
| input_8 (InputLayer)                         | [(None, 248, 248, 3)] | 0       | []                                |
| conv2d_470 (Conv2D)                          | (None, 123, 123, 32)  | 864     | ['input_8[0][0]']                 |
| batch_normalization_472 (BatchNormalization) | (None, 123, 123, 32)  | 96      | ['conv2d_470[0][0]']              |
| activation_470 (Activation)                  | (None, 123, 123, 32)  | 0       | ['batch_normalization_472[0][0]'] |
| conv2d_471 (Conv2D)                          | (None, 121, 121, 32)  | 9216    | ['activation_470[0][0]']          |
| batch_normalization_473 (BatchNormalization) | (None, 121, 121, 32)  | 96      | ['conv2d_471[0][0]']              |
| activation_471 (Activation)                  | (None, 121, 121, 32)  | 0       | ['batch_normalization_473[0][0]'] |
| conv2d_472 (Conv2D)                          | (None, 121, 121, 64)  | 18432   | ['activation_471[0][0]']          |
| batch_normalization_474 (BatchNormalization) | (None, 121, 121, 64)  | 192     | ['conv2d_472[0][0]']              |
| ...  |                       |         |                                   |
| Total params: 22171429 (84.58 MB)            |                       |         |                                   |
| Trainable params: 368645 (1.41 MB)           |                       |         |                                   |
| Non-trainable params: 21802784 (83.17 MB)    |                       |         |                                   |

### Accuracy

```
# Train the model
inception_model.fit(train_batch, validation_data=valid_batch, verbose=1, epochs=12, callbacks=[callback])
```

```
Epoch 1/12
79/79 [=====] - 129s 2s/step - loss: 0.6129 - accuracy: 0.7721 - val_loss: 0.4604 - val_accuracy: 0.8303
Epoch 2/12
79/79 [=====] - 93s 1s/step - loss: 0.3578 - accuracy: 0.8641 - val_loss: 0.4555 - val_accuracy: 0.8375
Epoch 3/12
79/79 [=====] - 94s 1s/step - loss: 0.2976 - accuracy: 0.8865 - val_loss: 0.4156 - val_accuracy: 0.8455
Epoch 4/12
79/79 [=====] - 91s 1s/step - loss: 0.2582 - accuracy: 0.9061 - val_loss: 0.4036 - val_accuracy: 0.8599
Epoch 5/12
79/79 [=====] - 91s 1s/step - loss: 0.2063 - accuracy: 0.9214 - val_loss: 0.3943 - val_accuracy: 0.8711
Epoch 6/12
79/79 [=====] - 89s 1s/step - loss: 0.2037 - accuracy: 0.9220 - val_loss: 0.3858 - val_accuracy: 0.8543
Epoch 7/12
79/79 [=====] - 88s 1s/step - loss: 0.1865 - accuracy: 0.9310 - val_loss: 0.3691 - val_accuracy: 0.8599
Epoch 8/12
79/79 [=====] - 88s 1s/step - loss: 0.1832 - accuracy: 0.9296 - val_loss: 0.3900 - val_accuracy: 0.8591
Epoch 9/12
79/79 [=====] - 90s 1s/step - loss: 0.1733 - accuracy: 0.9312 - val_loss: 0.3661 - val_accuracy: 0.8687
Epoch 10/12
79/79 [=====] - 88s 1s/step - loss: 0.1441 - accuracy: 0.9466 - val_loss: 0.3616 - val_accuracy: 0.8671
Epoch 11/12
79/79 [=====] - 91s 1s/step - loss: 0.1296 - accuracy: 0.9538 - val_loss: 0.3457 - val_accuracy: 0.8735
Epoch 12/12
79/79 [=====] - 90s 1s/step - loss: 0.1232 - accuracy: 0.9558 - val_loss: 0.3623 - val_accuracy: 0.8767
```

<keras.src.callbacks.History at 0x7a41cd0a03a0>