

## Model Development Phase Template

Date	03 July 2024
Team ID	SWTID1720085445
Project Name	Hydration Essentials: Classifying Water Bottle Images
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):

```
x_train, x_val, y_train, y_val = train_test_split(images, encoded_labels, test_size=0.2, random_state=42)

print(f"Shape of X_train: {x_train.shape}, Shape of X_val: {x_val.shape}")
print(f"Shape of y_train: {y_train.shape}, Shape of y_val: {y_val.shape}")
```

```
Shape of X_train: (388, 64, 64, 3), Shape of X_val: (98, 64, 64, 3)
Shape of y_train: (388, 3), Shape of y_val: (98, 3)
```

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

Model	Summary	Training and Validation Performance Metrics																														
Sequential	<table border="1"> <thead> <tr> <th>Layer (type)</th><th>Output Shape</th><th>Param #</th></tr> </thead> <tbody> <tr> <td>conv2d (Conv2D)</td><td>(None, 64, 64, 32)</td><td>896</td></tr> <tr> <td>max_pooling2d (MaxPooling2D)</td><td>(None, 32, 32, 32)</td><td>0</td></tr> <tr> <td>conv2d_1 (Conv2D)</td><td>(None, 256, 256, 64)</td><td>18,496</td></tr> <tr> <td>max_pooling2d_1 (MaxPooling2D)</td><td>(None, 128, 128, 64)</td><td>0</td></tr> <tr> <td>conv2d_2 (Conv2D)</td><td>(None, 128, 128, 128)</td><td>73,856</td></tr> <tr> <td>max_pooling2d_2 (MaxPooling2D)</td><td>(None, 64, 64, 128)</td><td>0</td></tr> <tr> <td>flatten (Flatten)</td><td>(None, 4096)</td><td>0</td></tr> <tr> <td>dense (Dense)</td><td>(None, 128)</td><td>529,952</td></tr> <tr> <td>dense_1 (Dense)</td><td>(None, 1)</td><td>128</td></tr> </tbody> </table>	Layer (type)	Output Shape	Param #	conv2d (Conv2D)	(None, 64, 64, 32)	896	max_pooling2d (MaxPooling2D)	(None, 32, 32, 32)	0	conv2d_1 (Conv2D)	(None, 256, 256, 64)	18,496	max_pooling2d_1 (MaxPooling2D)	(None, 128, 128, 64)	0	conv2d_2 (Conv2D)	(None, 128, 128, 128)	73,856	max_pooling2d_2 (MaxPooling2D)	(None, 64, 64, 128)	0	flatten (Flatten)	(None, 4096)	0	dense (Dense)	(None, 128)	529,952	dense_1 (Dense)	(None, 1)	128	<pre>model.fit(X_train, y_train,           epochs=20,           batch_size=32,           validation_data=(X_val, y_val))</pre> <pre>Epoch 11/20: 1s 80ms/step - accuracy: 0.7682 - loss: 0.4792 - val_accuracy: 0.7347 - val_loss: 0.6778 Epoch 12/20: 1s 80ms/step - accuracy: 0.8280 - loss: 0.4056 - val_accuracy: 0.7347 - val_loss: 0.6382 Epoch 13/20: ... Epoch 16/20: 1s 88ms/step - accuracy: 0.9421 - loss: 0.2158 - val_accuracy: 0.7653 - val_loss: 0.7017 Epoch 17/20: 1s 82ms/step - accuracy: 0.9701 - loss: 0.1786 - val_accuracy: 0.7653 - val_loss: 0.5926</pre>
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