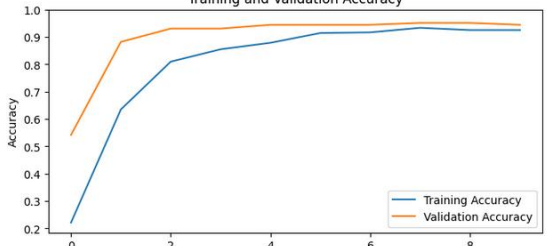
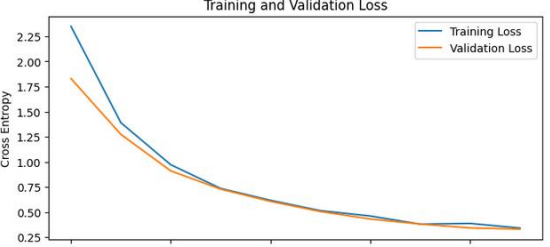
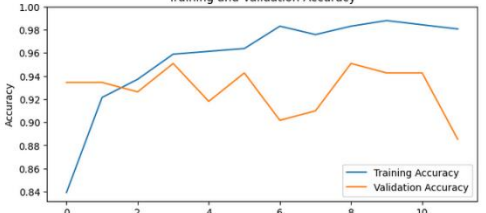


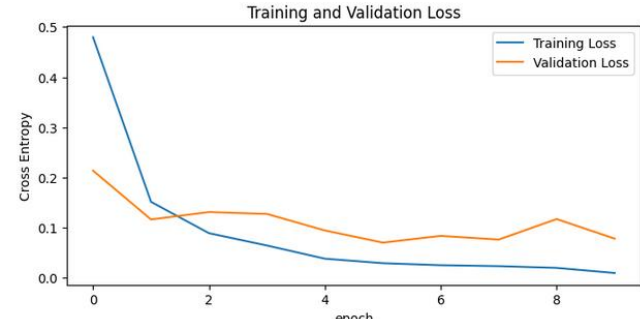

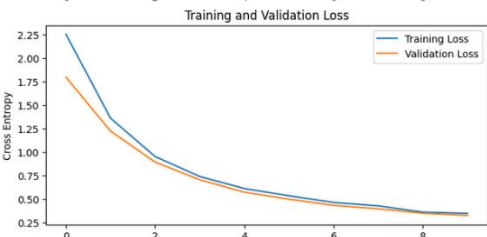


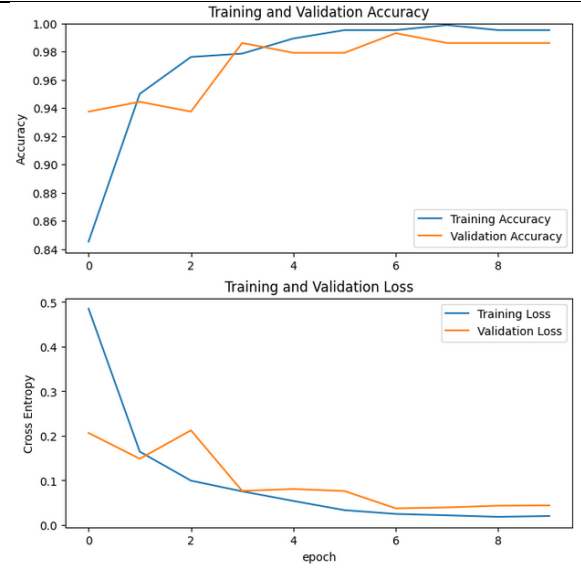
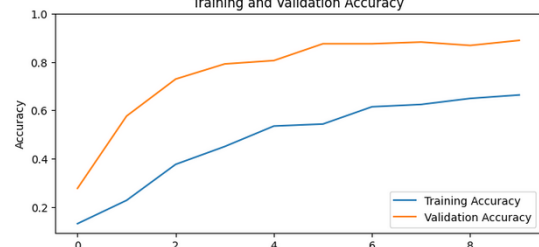
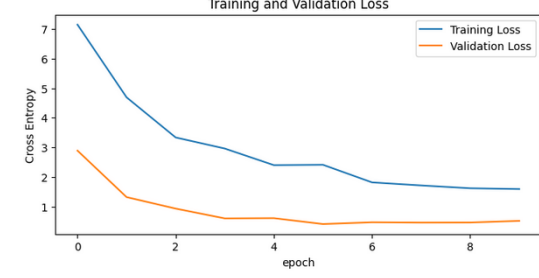
Assignment 3 Parameter History

Iteration	Parameters	Test/Train Accuracy	History Plot Graphs
1	<p>PREPROCESSING: <i>batch</i> = 32 <i>seed</i> = 1337 <i>flip</i> = "horizontal" <i>rotation</i> = 0.5 <i>zoom</i> = 0.1</p> <p>MODEL: <i>alpha_val</i> = 1.0 <i>include_top_val</i> = False <i>dropout_rate_val</i> = 0.2 <i>optimizer_val</i> = tf.keras.optimizers.Adam() <i>optimizer_val_tuning</i> = tf.keras.optimizers.Adam(1e-4) <i>global_average_layer_parameter</i> = tf.keras.layers.GlobalAveragePooling2D() <i>loss_val</i> = "sparse_categorical_crossentropy" <i>base_learning_rate</i> = 0.0001 <i>initial_epochs</i> = 10 <i>fine_tune_layers</i> = 30 <i>fine_tune_epochs</i> = 10</p>	<p>Training = False: Train Acc: 0.9251 Train Loss: 0.3416 Validation Acc: 0.9444 Validation Loss: 0.3313</p> <p>Training = True: Train Acc: 1.000 Train Loss: 0.9444 Validation Acc: 0.9444 Validation Loss: 0.9444</p> <p>Test: Test Acc: 0.9829 Test Loss: 0.0521</p>	<p>Training = False:</p> <p>Training and Validation Accuracy</p>  <p>Training and Validation Loss</p>  <p>Training=True:</p> <p>Training and Validation Accuracy</p>  <p>Training and Validation Loss</p> 


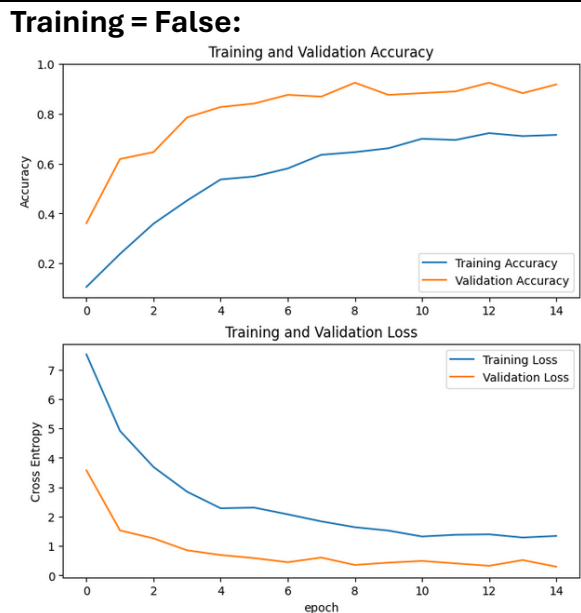
Assignment 3 Parameter History

			 
2	<p>PREPROCESSING: <i>batch</i> = 32 <i>seed</i> = 1337 <i>flip</i> = "horizontal" <i>rotation</i> = 0.5 <i>zoom</i> = 0.1</p> <p>MODEL: <i>alpha_val</i> = 1.0 <i>include_top_val</i> = False <i>dropout_rate_val</i> = 0.25 <i>optimizer_val</i> = tf.keras.optimizers.Adam() <i>optimizer_val_tuning</i> = tf.keras.optimizers.Adam(1e-4)</p>	<p>Training = False: Train Acc: 0.9203 Train Loss: 0.3460 Validation Acc: 0.9375 Validation Loss: 0.3242</p> <p>Training = True: Train Acc: 0.9952 Train Loss: 0.0200 Validation Acc: 0.9861 Validation Loss: 0.0437</p> <p>Test: Test Acc: 0.9881 Test Loss: 0.0449</p>	<p>Training = False:</p>   <p>Training=True:</p>

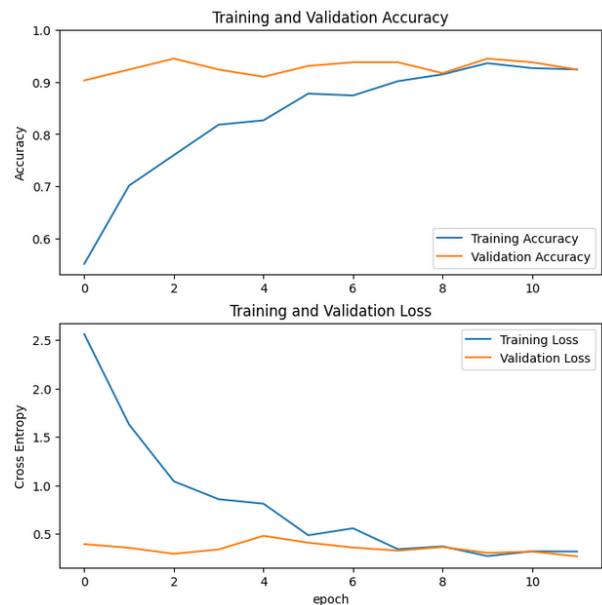
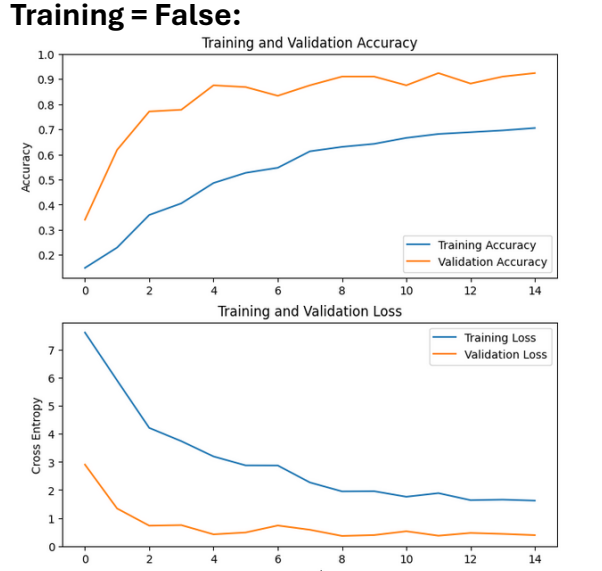
Assignment 3 Parameter History

	<p><i>global_average_layer_parameter</i> = tf.keras.layers.GlobalAveragePooling2D() <i>loss_val</i> = "sparse_categorical_crossentropy" <i>base_learning_rate</i> = 0.0005 <i>initial_epochs</i> = 10 <i>fine_tune_layers</i> = 40 <i>fine_tune_epochs</i> = 10</p>		 <p>The first plot, 'Training and Validation Accuracy', shows training accuracy (blue line) rising from ~0.85 to ~0.99 and validation accuracy (orange line) rising from ~0.94 to ~0.98. The second plot, 'Training and Validation Loss', shows training loss (blue line) falling from ~0.48 to ~0.05 and validation loss (orange line) falling from ~0.21 to ~0.05.</p>
3	<p>PREPROCESSING: <i>batch</i> = 32 <i>seed</i> = 1337 <i>flip</i> = "horizontal" <i>rotation</i> = 0.8 <i>zoom</i> = 0.5</p> <p>MODEL: <i>alpha_val</i> = 1.0 <i>include_top_val</i> = False <i>dropout_rate_val</i> = 0.25 <i>optimizer_val</i> = tf.keras.optimizers.Adam() <i>optimizer_val_tuning</i> = tf.keras.optimizers.Adam(1e-4) <i>global_average_layer_parameter</i> = tf.keras.layers.GlobalMaxPooling2D()</p>	<p>Training = False: Train Acc: 0.6635 Train Loss: 1.5923 Validation Acc: 0.8889 Validation Loss: 0.5169</p> <p>Training = True: Train Acc: 0.9417 Train Loss: 0.2009 Validation Acc: 0.9514 Validation Loss: 0.2407</p> <p>Test: Test Acc: Test Loss:</p>	<p>Training = False:</p>  <p>The third plot, 'Training and Validation Accuracy', shows training accuracy (blue line) rising from ~0.15 to ~0.65 and validation accuracy (orange line) rising from ~0.3 to ~0.85. The fourth plot, 'Training and Validation Loss', shows training loss (blue line) falling from ~7.5 to ~1.5 and validation loss (orange line) falling from ~3 to ~0.5.</p> <p>Training=True:</p>  <p>The fifth plot, 'Training and Validation Accuracy', shows training accuracy (blue line) rising from ~0.15 to ~0.65 and validation accuracy (orange line) rising from ~0.3 to ~0.85. The sixth plot, 'Training and Validation Loss', shows training loss (blue line) falling from ~7.5 to ~1.5 and validation loss (orange line) falling from ~3 to ~0.5.</p>

Assignment 3 Parameter History

	loss_val = "sparse_categorical_crossentropy" base_learning_rate = 0.001 initial_epochs = 10 fine_tune_layers = 50 fine_tune_epochs = 15		 <p>The first plot shows Training Accuracy (blue line) and Validation Accuracy (orange line) over 14 epochs. Training accuracy starts at 0.5 and rises to approximately 0.95. Validation accuracy starts at approximately 0.92 and remains relatively stable, ending at approximately 0.95. The second plot shows Training Loss (blue line) and Validation Loss (orange line) over 14 epochs. Training loss starts at 3.0 and decreases to approximately 0.3. Validation loss starts at approximately 0.4 and decreases to approximately 0.3.</p>
4	PREPROCESSING: batch = 32 seed = 1337 flip = "horizontal" rotation = 0.8 zoom = 0.5 MODEL: alpha_val = 1.0 include_top_val = False dropout_rate_val = 0.25 optimizer_val = tf.keras.optimizers.Adam() optimizer_val_tuning = tf.keras.optimizers.Adam(1e-4) global_average_layer_parameter = tf.keras.layers.GlobalMaxPooling2D()	Training = False: Train Acc: 0.7146 Train Loss: 1.3420 Validation Acc: 0.9167 Validation Loss: 0.2968 Training = True: Train Acc: 0.9239 Train Loss: 0.3158 Validation Acc: 0.9236 Validation Loss: 0.2660 Test: Test Acc: 0.9261 Test Loss: 0.3809	Training = False:  <p>The first plot shows Training Accuracy (blue line) and Validation Accuracy (orange line) over 14 epochs. Training accuracy starts at 0.1 and rises to approximately 0.7. Validation accuracy starts at approximately 0.35 and rises to approximately 0.9. The second plot shows Training Loss (blue line) and Validation Loss (orange line) over 14 epochs. Training loss starts at 7.0 and decreases to approximately 1.5. Validation loss starts at approximately 3.5 and decreases to approximately 0.5.</p> <p>Training=True:</p>

Assignment 3 Parameter History

	loss_val = "sparse_categorical_crossentropy" base_learning_rate = 0.001 initial_epochs = 15 fine_tune_layers = 75 fine_tune_epochs = 12		 <p>The first plot, titled 'Training and Validation Accuracy', shows Training Accuracy (blue line) increasing from approximately 0.55 to 0.95, and Validation Accuracy (orange line) increasing from approximately 0.9 to 0.95 over 11 epochs. The second plot, titled 'Training and Validation Loss', shows Training Loss (blue line) decreasing from approximately 2.5 to 0.3, and Validation Loss (orange line) decreasing from approximately 0.4 to 0.3 over 11 epochs.</p>
5	PREPROCESSING: batch = 32 seed = 1337 flip = "vertical" rotation = 0.8 zoom = 0.5 MODEL: alpha_val = 1 include_top_val = False dropout_rate_val = 0.35 optimizer_val = tf.keras.optimizers.Adam() optimizer_val_tuning = tf.keras.optimizers.Adam(1e-5)	Training = False: Train Acc: 0.7051 Train Loss: 1.6204 Validation Acc: 0.9236 Validation Loss: 0.3886 Training = True: Train Acc: 0.6266 Train Loss: 2.1800 Validation Acc: 0.9236 Validation Loss: 0.3919 Test: Test Acc: 0.9629 Test Loss: 0.2663	 <p>The third plot, titled 'Training and Validation Accuracy', shows Training Accuracy (blue line) increasing from approximately 0.15 to 0.7, and Validation Accuracy (orange line) increasing from approximately 0.35 to 0.95 over 14 epochs. The fourth plot, titled 'Training and Validation Loss', shows Training Loss (blue line) decreasing from approximately 7.5 to 1.8, and Validation Loss (orange line) decreasing from approximately 3.0 to 0.5 over 14 epochs.</p>

Assignment 3 Parameter History

	<p><i>global_average_layer_parameter</i> = tf.keras.layers.GlobalMaxPooling2D() <i>loss_val</i> = "sparse_categorical_crossentropy" <i>base_learning_rate</i> = 0.001 <i>initial_epochs</i> = 15 <i>fine_tune_layers</i> = 75 <i>fine_tune_epochs</i> = 12</p>		<p>Training=True:</p> <p>Training and Validation Accuracy</p> <p>Training and Validation Loss</p>
6	<p>PREPROCESSING: <i>batch</i> = 30 <i>seed</i> = 1337 <i>flip</i> = "vertical" <i>rotation</i> = 0.8 <i>zoom</i> = 0.5</p> <p>MODEL: <i>alpha_val</i> = 1 <i>include_top_val</i> = False <i>dropout_rate_val</i> = 0.30 <i>optimizer_val</i> = tf.keras.optimizers.AdamW() <i>optimizer_val_tuning</i> = tf.keras.optimizers.AdamW(1e-4)</p>	<p>Training = False: Train Acc: 0.9045 Train Loss: 0.3633 Validation Acc: 0.9262 Validation Loss: 0.3386</p> <p>Training = True: Train Acc: 0.9807 Train Loss: 0.0624 Validation Acc: 0.8852 Validation Loss: 0.4223</p> <p>Test: Test Acc: 0.9367 Test Loss: 0.1942</p>	<p>Training = False:</p> <p>Training and Validation Accuracy</p> <p>Training and Validation Loss</p>

Assignment 3 Parameter History

```
global_average_layer_parameter =  
tf.keras.layers.GlobalAveragePooling2D()  
loss_val =  
"sparse_categorical_crossentropy"  
base_learning_rate = 0.001  
initial_epochs = 15  
fine_tune_layers = 75  
fine_tune_epochs = 12
```

Training=True: