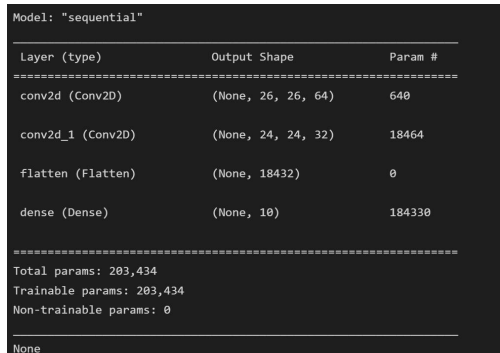
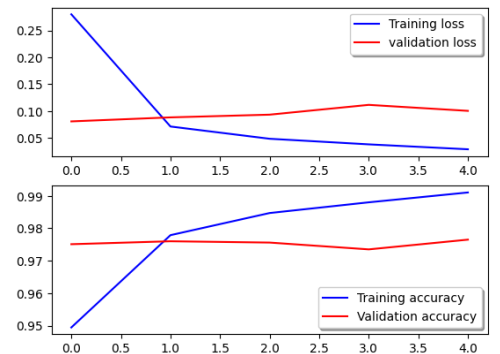


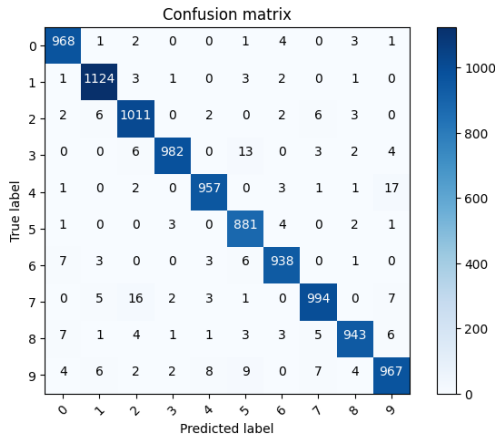
## Project Development Phase Model Performance Test

Date	18 November 2022
Team ID	PNT2022TMID31213
Project Name	Project - A Novel Method For Handwritten Digit Recognition System.
Maximum Marks	10 Marks

### Model Performance Testing:

Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Values	Screenshot
1.	Model Summary		 <pre> Model: "sequential" ----- Layer (type)                Output Shape         Param # ----- conv2d (Conv2D)              (None, 26, 26, 64)   640 conv2d_1 (Conv2D)            (None, 24, 24, 32)   18464 flatten (Flatten)            (None, 18432)         0 dense (Dense)                (None, 10)           184330 ----- Total params: 203,434 Trainable params: 203,434 Non-trainable params: 0 None </pre>
2.	Accuracy	<p>Training Accuracy - 99%</p> <p>Validation Accuracy - 97%</p>	 <p>The top graph displays training loss (blue line) and validation loss (red line) over 4 epochs. Training loss starts at approximately 0.25 and decreases to about 0.03. Validation loss starts at approximately 0.08 and increases slightly to about 0.10.</p> <p>The bottom graph displays training accuracy (blue line) and validation accuracy (red line) over 4 epochs. Training accuracy starts at approximately 0.95 and increases to about 0.99. Validation accuracy starts at approximately 0.975 and decreases slightly to about 0.97.</p>

3.	Confusion Matrix	<div><p>Confusion matrix</p><table><caption>Confusion matrix</caption><tr><th>True label \ Predicted label</th><th>0</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th></tr><tr><th>0</th><td>968</td><td>1</td><td>2</td><td>0</td><td>0</td><td>1</td><td>4</td><td>0</td><td>3</td><td>1</td></tr><tr><th>1</th><td>1</td><td>1124</td><td>3</td><td>1</td><td>0</td><td>3</td><td>2</td><td>0</td><td>1</td><td>0</td></tr><tr><th>2</th><td>2</td><td>6</td><td>1011</td><td>0</td><td>2</td><td>0</td><td>2</td><td>6</td><td>3</td><td>0</td></tr><tr><th>3</th><td>0</td><td>0</td><td>6</td><td>982</td><td>0</td><td>13</td><td>0</td><td>3</td><td>2</td><td>4</td></tr><tr><th>4</th><td>1</td><td>0</td><td>2</td><td>0</td><td>957</td><td>0</td><td>3</td><td>1</td><td>1</td><td>17</td></tr><tr><th>5</th><td>1</td><td>0</td><td>0</td><td>3</td><td>0</td><td>881</td><td>4</td><td>0</td><td>2</td><td>1</td></tr><tr><th>6</th><td>7</td><td>3</td><td>0</td><td>0</td><td>3</td><td>6</td><td>938</td><td>0</td><td>1</td><td>0</td></tr><tr><th>7</th><td>0</td><td>5</td><td>16</td><td>2</td><td>3</td><td>1</td><td>0</td><td>994</td><td>0</td><td>7</td></tr><tr><th>8</th><td>7</td><td>1</td><td>4</td><td>1</td><td>1</td><td>3</td><td>3</td><td>5</td><td>943</td><td>6</td></tr><tr><th>9</th><td>4</td><td>6</td><td>2</td><td>2</td><td>8</td><td>9</td><td>0</td><td>7</td><td>4</td><td>967</td></tr></table></div>	True label \ Predicted label	0	1	2	3	4	5	6	7	8	9	0	968	1	2	0	0	1	4	0	3	1	1	1	1124	3	1	0	3	2	0	1	0	2	2	6	1011	0	2	0	2	6	3	0	3	0	0	6	982	0	13	0	3	2	4	4	1	0	2	0	957	0	3	1	1	17	5	1	0	0	3	0	881	4	0	2	1	6	7	3	0	0	3	6	938	0	1	0	7	0	5	16	2	3	1	0	994	0	7	8	7	1	4	1	1	3	3	5	943	6	9	4	6	2	2	8	9	0	7	4	967
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4.	Classification Report	<div><table><tr><th></th><th>precision</th><th>recall</th><th>f1-score</th><th>support</th></tr><tr><td>0</td><td>0.98</td><td>0.99</td><td>0.98</td><td>980</td></tr><tr><td>1</td><td>0.98</td><td>0.99</td><td>0.99</td><td>1135</td></tr><tr><td>2</td><td>0.97</td><td>0.98</td><td>0.97</td><td>1032</td></tr><tr><td>3</td><td>0.99</td><td>0.97</td><td>0.98</td><td>1010</td></tr><tr><td>4</td><td>0.98</td><td>0.97</td><td>0.98</td><td>982</td></tr><tr><td>5</td><td>0.96</td><td>0.99</td><td>0.97</td><td>892</td></tr><tr><td>6</td><td>0.98</td><td>0.98</td><td>0.98</td><td>958</td></tr><tr><td>7</td><td>0.98</td><td>0.97</td><td>0.97</td><td>1028</td></tr><tr><td>8</td><td>0.98</td><td>0.97</td><td>0.98</td><td>974</td></tr><tr><td>9</td><td>0.96</td><td>0.96</td><td>0.96</td><td>1009</td></tr><tr><td>accuracy</td><td></td><td></td><td>0.98</td><td>10000</td></tr><tr><td>macro avg</td><td>0.98</td><td>0.98</td><td>0.98</td><td>10000</td></tr><tr><td>weighted avg</td><td>0.98</td><td>0.98</td><td>0.98</td><td>10000</td></tr></table></div>		precision	recall	f1-score	support	0	0.98	0.99	0.98	980	1	0.98	0.99	0.99	1135	2	0.97	0.98	0.97	1032	3	0.99	0.97	0.98	1010	4	0.98	0.97	0.98	982	5	0.96	0.99	0.97	892	6	0.98	0.98	0.98	958	7	0.98	0.97	0.97	1028	8	0.98	0.97	0.98	974	9	0.96	0.96	0.96	1009	accuracy			0.98	10000	macro avg	0.98	0.98	0.98	10000	weighted avg	0.98	0.98	0.98	10000																																																			
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