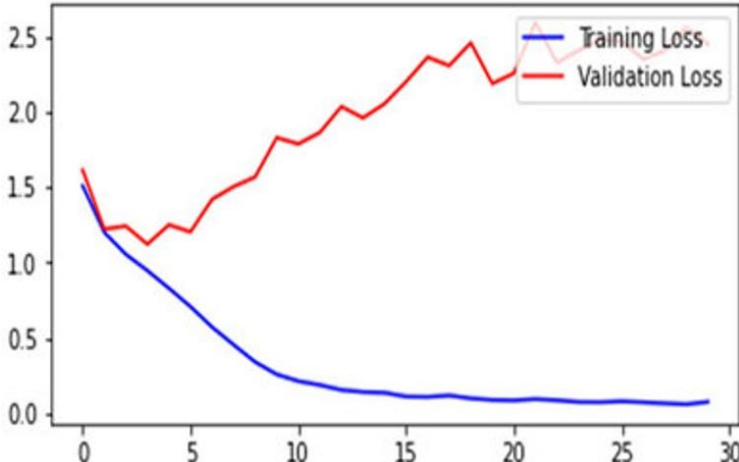
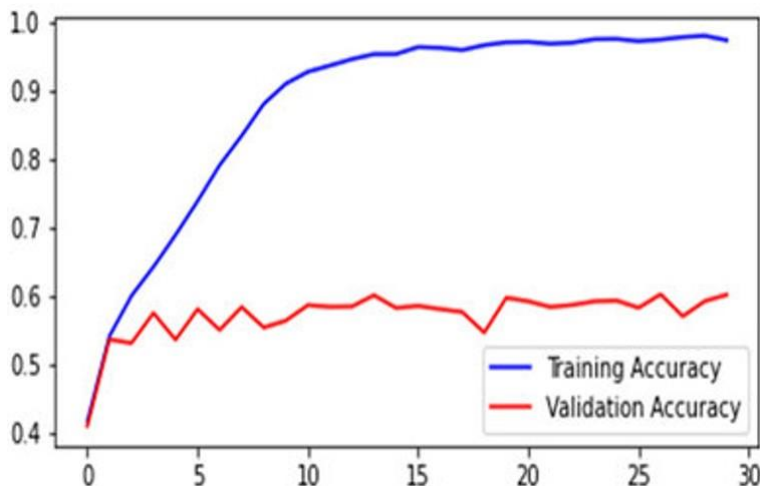
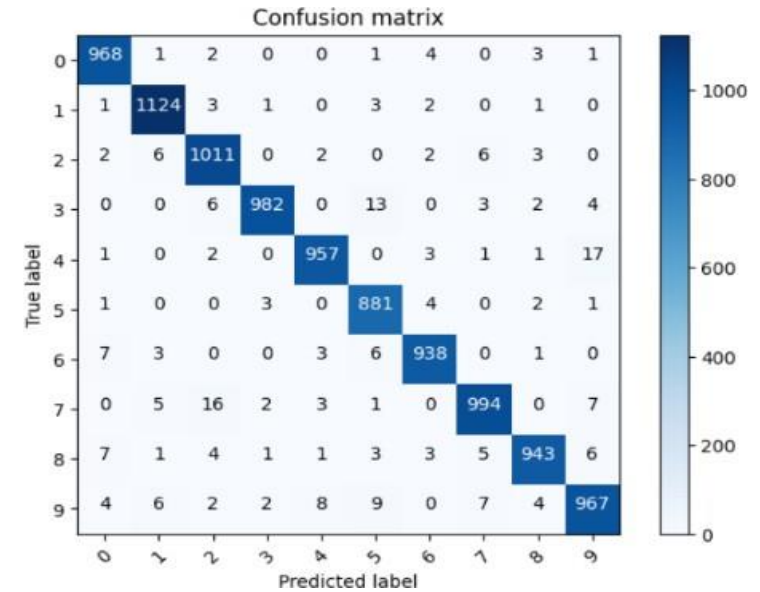


Project Development Phase Model Performance Test

Date	10 November 2022
Team ID	PNT2022TMID03792
Project Name	Project - A Novel Method For Handwritten Digit Recognition System.
Maximum Marks	10 Marks

Model Performance Testing:

S.No.	Parameter	Values	Screenshot																								
1.	Model Summary	-	<div><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</pre></div>																								
2.	Accuracy	Training Accuracy - 99% Validation Accuracy - 97%	 <table border="1"><caption>Approximate Loss Values from Graph</caption><thead><tr><th>Epoch</th><th>Training Loss</th><th>Validation Loss</th></tr></thead><tbody><tr><td>0</td><td>1.5</td><td>1.6</td></tr><tr><td>5</td><td>0.8</td><td>1.3</td></tr><tr><td>10</td><td>0.3</td><td>1.8</td></tr><tr><td>15</td><td>0.2</td><td>2.2</td></tr><tr><td>20</td><td>0.15</td><td>2.2</td></tr><tr><td>25</td><td>0.1</td><td>2.4</td></tr><tr><td>30</td><td>0.1</td><td>2.2</td></tr></tbody></table>	Epoch	Training Loss	Validation Loss	0	1.5	1.6	5	0.8	1.3	10	0.3	1.8	15	0.2	2.2	20	0.15	2.2	25	0.1	2.4	30	0.1	2.2
Epoch	Training Loss	Validation Loss																									
0	1.5	1.6																									
5	0.8	1.3																									
10	0.3	1.8																									
15	0.2	2.2																									
20	0.15	2.2																									
25	0.1	2.4																									
30	0.1	2.2																									

																																																																																																																												
3.	Confusion Matrix		<p>Confusion matrix</p>  <table><tr><th></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>		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
	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																																																																																																																		
4.	Classification Report		<table><tr><th></th><th>precision</th><th>recall</th><th>f1-score</th><th>support</th></tr><tr><td>0</td><td>1.00</td><td>0.97</td><td>0.98</td><td>980</td></tr><tr><td>1</td><td>0.99</td><td>0.99</td><td>0.99</td><td>1135</td></tr><tr><td>2</td><td>0.96</td><td>0.99</td><td>0.97</td><td>1032</td></tr><tr><td>3</td><td>0.97</td><td>1.00</td><td>0.98</td><td>1010</td></tr><tr><td>4</td><td>1.00</td><td>0.95</td><td>0.98</td><td>982</td></tr><tr><td>5</td><td>0.96</td><td>1.00</td><td>0.98</td><td>892</td></tr><tr><td>6</td><td>0.99</td><td>0.96</td><td>0.97</td><td>958</td></tr><tr><td>7</td><td>0.99</td><td>0.98</td><td>0.99</td><td>1028</td></tr><tr><td>8</td><td>0.99</td><td>0.99</td><td>0.99</td><td>974</td></tr><tr><td>9</td><td>0.97</td><td>0.99</td><td>0.98</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>		precision	recall	f1-score	support	0	1.00	0.97	0.98	980	1	0.99	0.99	0.99	1135	2	0.96	0.99	0.97	1032	3	0.97	1.00	0.98	1010	4	1.00	0.95	0.98	982	5	0.96	1.00	0.98	892	6	0.99	0.96	0.97	958	7	0.99	0.98	0.99	1028	8	0.99	0.99	0.99	974	9	0.97	0.99	0.98	1009	accuracy			0.98	10000	macro avg	0.98	0.98	0.98	10000	weighted avg	0.98	0.98	0.98	10000																																																			
	precision	recall	f1-score	support																																																																																																																								
0	1.00	0.97	0.98	980																																																																																																																								
1	0.99	0.99	0.99	1135																																																																																																																								
2	0.96	0.99	0.97	1032																																																																																																																								
3	0.97	1.00	0.98	1010																																																																																																																								
4	1.00	0.95	0.98	982																																																																																																																								
5	0.96	1.00	0.98	892																																																																																																																								
6	0.99	0.96	0.97	958																																																																																																																								
7	0.99	0.98	0.99	1028																																																																																																																								
8	0.99	0.99	0.99	974																																																																																																																								
9	0.97	0.99	0.98	1009																																																																																																																								
accuracy			0.98	10000																																																																																																																								
macro avg	0.98	0.98	0.98	10000																																																																																																																								
weighted avg	0.98	0.98	0.98	10000																																																																																																																								