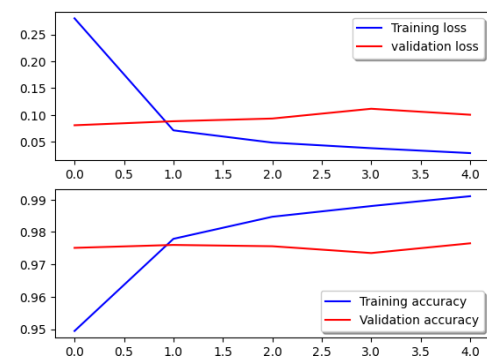
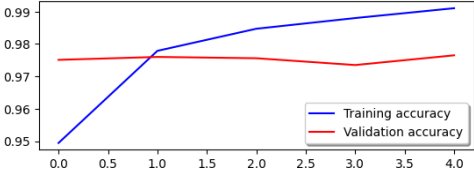


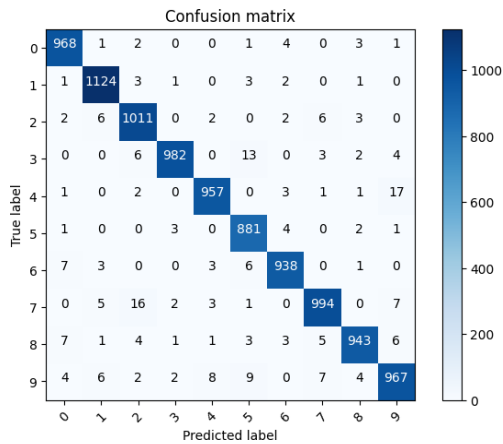
Project Development Phase Model Performance Test

Date	16 November 2022
Team ID	PNT2022TMID24522
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		<div>Model: "sequential"</div> <table><thead><tr><th>Layer (type)</th><th>Output Shape</th><th>Param #</th></tr></thead><tbody><tr><td>conv2d (Conv2D)</td><td>(None, 26, 26, 64)</td><td>640</td></tr><tr><td>conv2d_1 (Conv2D)</td><td>(None, 24, 24, 32)</td><td>18464</td></tr><tr><td>flatten (Flatten)</td><td>(None, 18432)</td><td>0</td></tr><tr><td>dense (Dense)</td><td>(None, 10)</td><td>184330</td></tr></tbody></table> <div>Total params: 203,434 Trainable params: 203,434 Non-trainable params: 0</div> <div>None</div>	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																					
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2.	Accuracy	Training Accuracy - 99% Validation Accuracy - 97%	<div><table><caption>Loss Metrics</caption><thead><tr><th>Epoch</th><th>Training loss</th><th>validation loss</th></tr></thead><tbody><tr><td>0.0</td><td>0.25</td><td>0.08</td></tr><tr><td>1.0</td><td>0.08</td><td>0.09</td></tr><tr><td>2.0</td><td>0.06</td><td>0.095</td></tr><tr><td>3.0</td><td>0.05</td><td>0.10</td></tr><tr><td>4.0</td><td>0.05</td><td>0.10</td></tr></tbody></table></div> <div><table><caption>Accuracy Metrics</caption><thead><tr><th>Epoch</th><th>Training accuracy</th><th>Validation accuracy</th></tr></thead><tbody><tr><td>0.0</td><td>0.95</td><td>0.975</td></tr><tr><td>1.0</td><td>0.98</td><td>0.975</td></tr><tr><td>2.0</td><td>0.985</td><td>0.975</td></tr><tr><td>3.0</td><td>0.99</td><td>0.975</td></tr><tr><td>4.0</td><td>0.99</td><td>0.975</td></tr></tbody></table></div>	Epoch	Training loss	validation loss	0.0	0.25	0.08	1.0	0.08	0.09	2.0	0.06	0.095	3.0	0.05	0.10	4.0	0.05	0.10	Epoch	Training accuracy	Validation accuracy	0.0	0.95	0.975	1.0	0.98	0.975	2.0	0.985	0.975	3.0	0.99	0.975	4.0	0.99	0.975
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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
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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>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>		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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