CNN From Scratch

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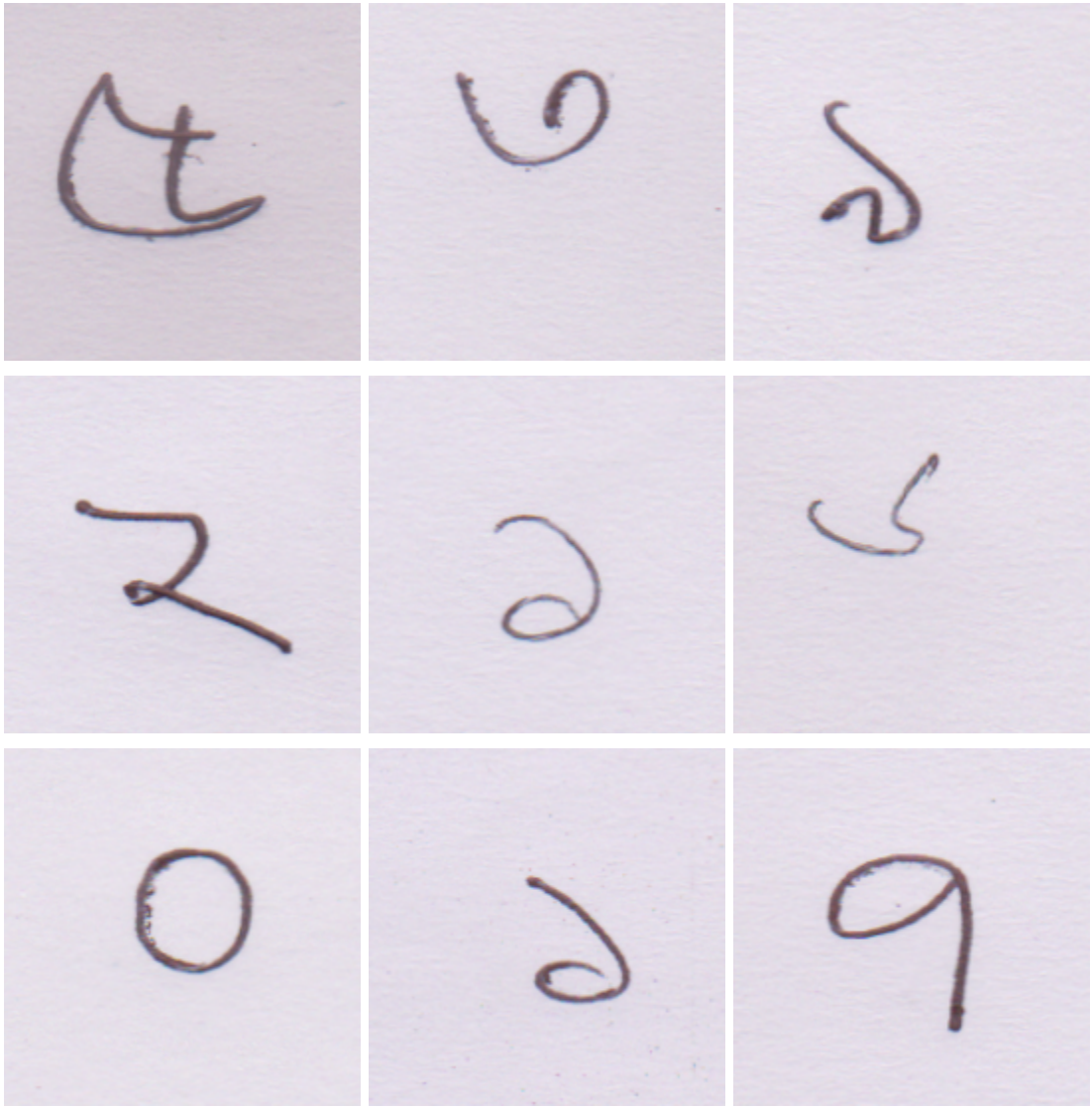
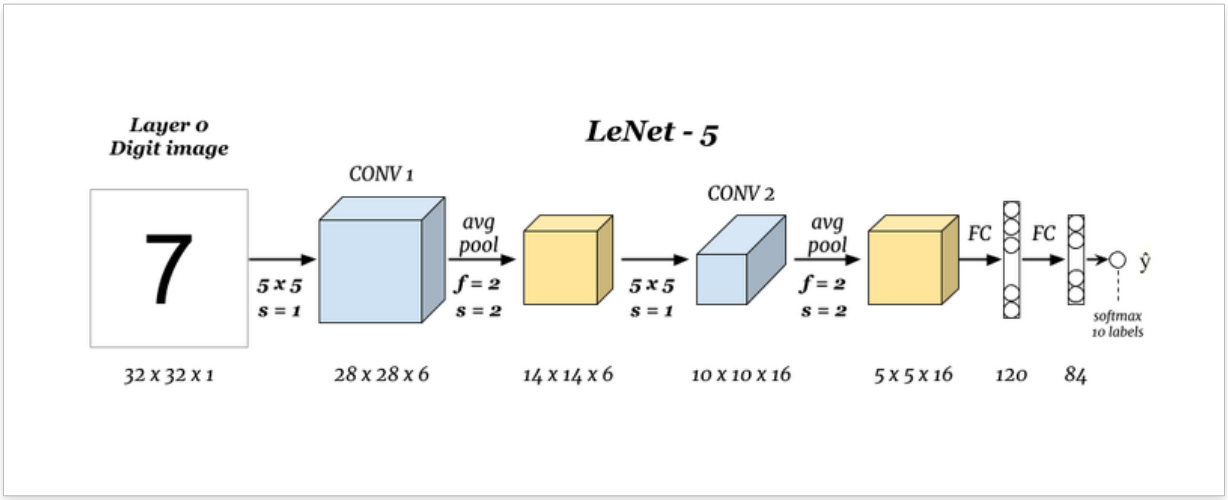
Task : Bangla Digit Recognition

Dataset : I have used NumtaDB dataset from kaggle.Find it here



Model Architecture : LeNet-5



HyperParameters :

- Batch size : 32
- Learning Rate : 0.01
- No of Epochs : 20

The model was trained on the images from 3 directories: *training-a , training-b , training-c*
After 20 epochs , 90% validation accuracy was achieved

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100%|
Epoch: 20, : Loss: 0.1990176829255521 Accuracy: 0.9005076142131979, F1: 0.9014719015344586
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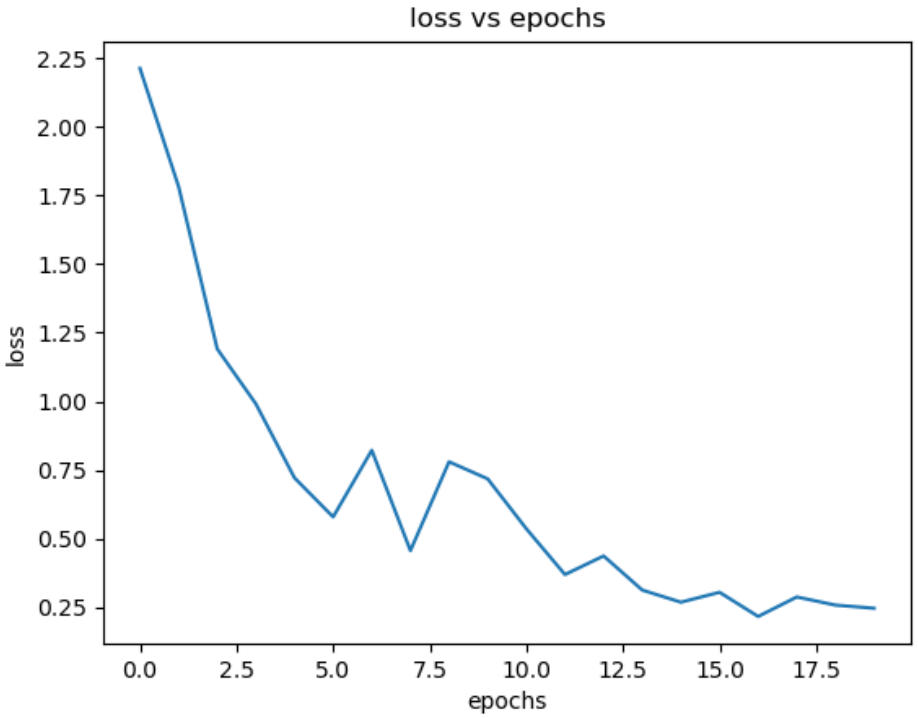
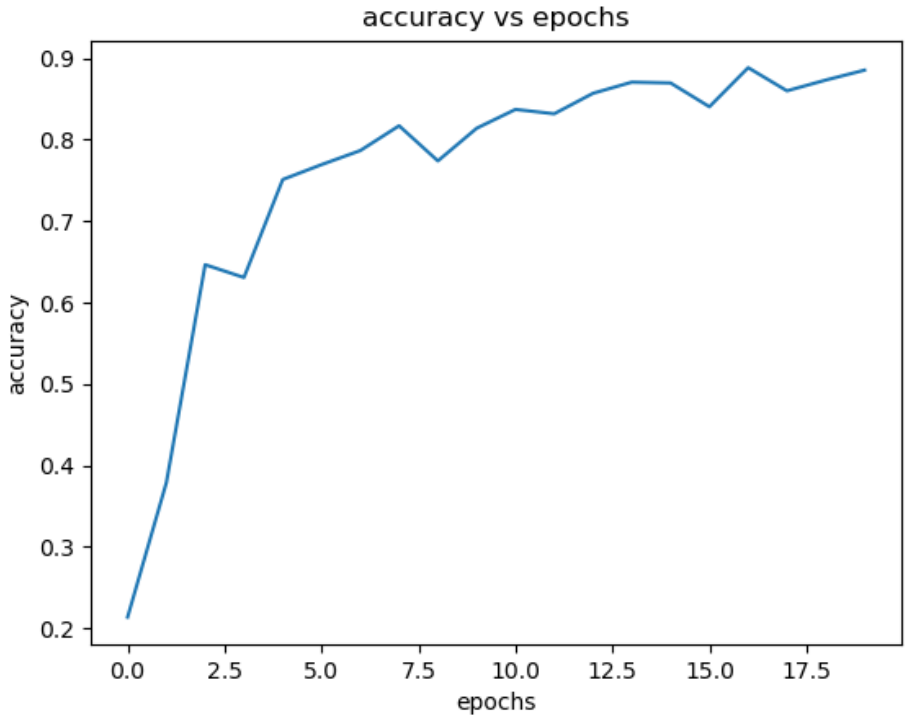
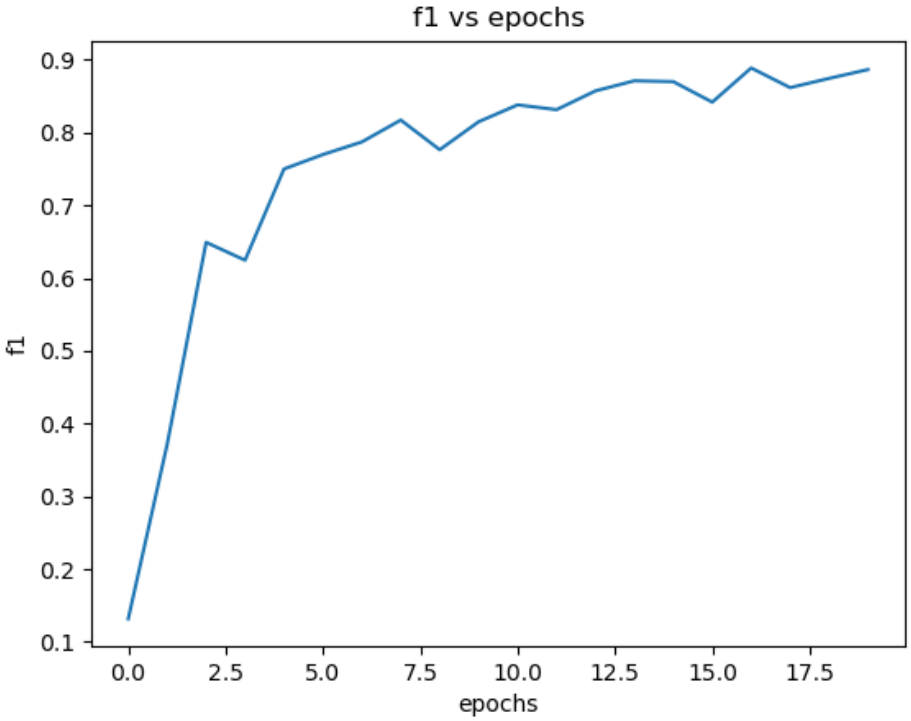
Graphs:

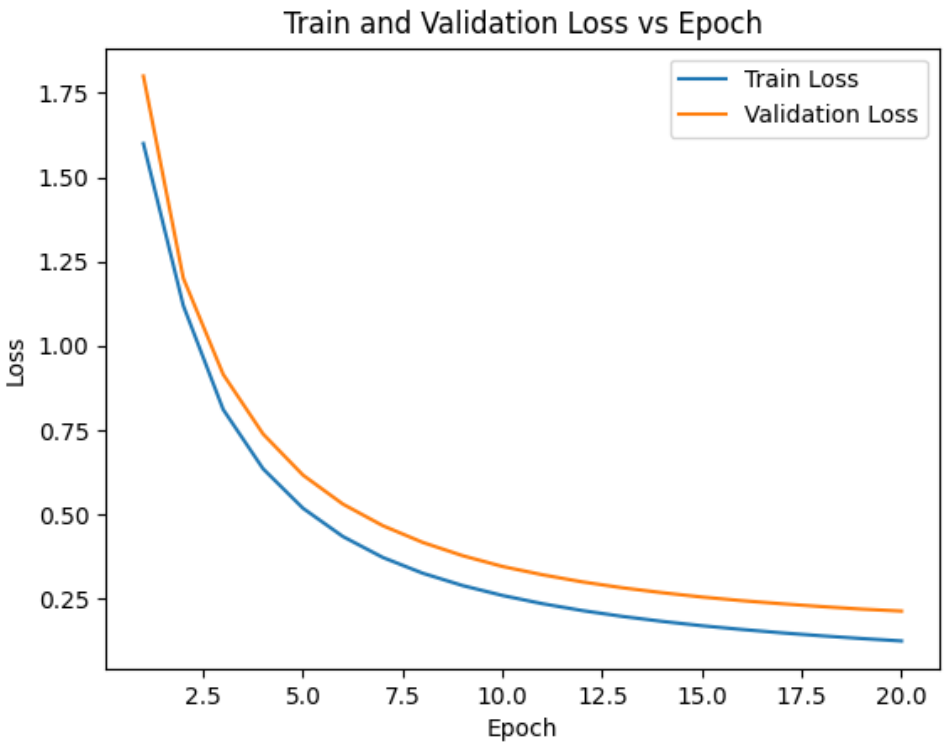

loss vs epochs
loss
epochs
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5

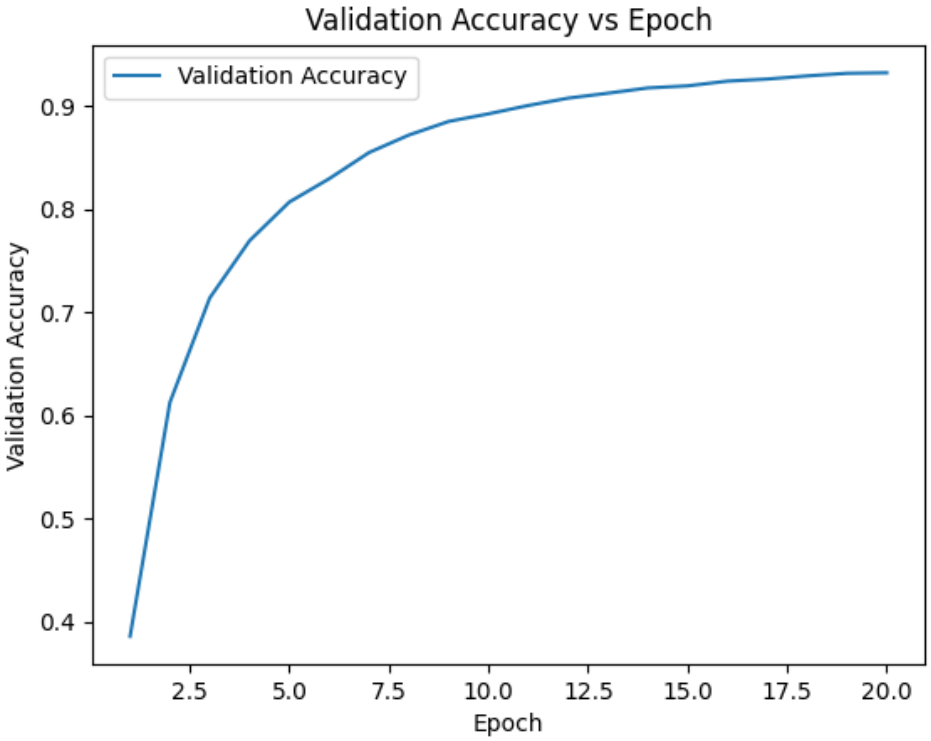

accuracy vs epochs
accuracy
epochs
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5

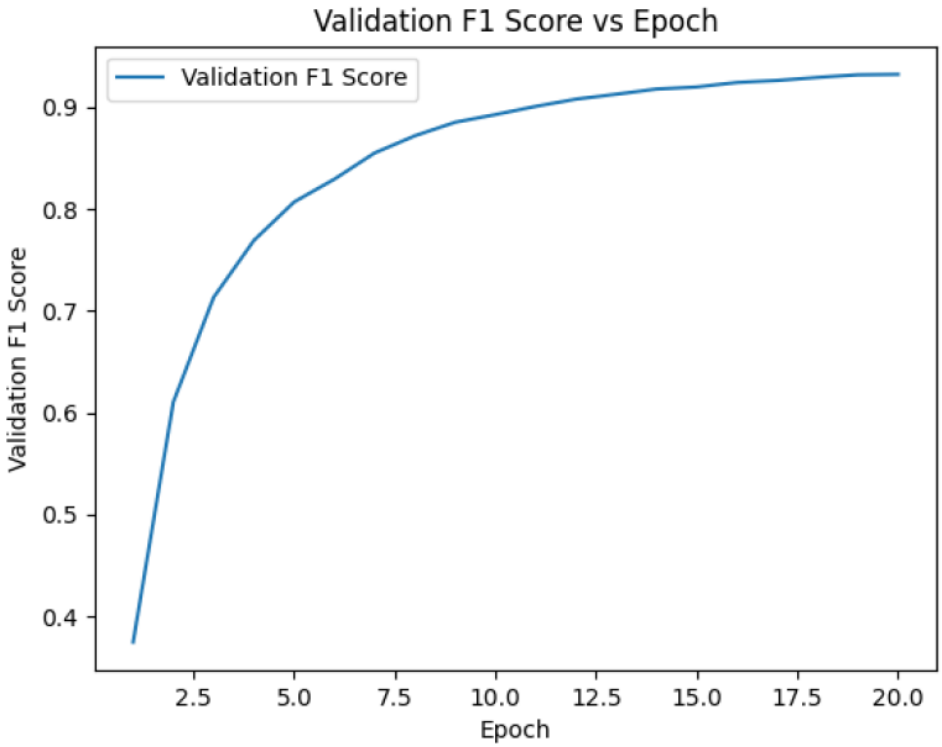

f1 vs epochs
f1
epochs
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5

HyperParameters :

- Batch size : 32
- Learning Rate : 0.001
- No of Epochs : 20




Validation Accuracy vs Epoch
Validation Accuracy
Validation Accuracy
Epoch
0.4
0.5
0.6
0.7
0.8
0.9
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0


Validation F1 Score vs Epoch
Validation F1 Score
Validation F1 Score
Epoch
0.4
0.5
0.6
0.7
0.8
0.9
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

Performance On Test dataset

The model was tested on the images of directory *training-d*

Classification Report:

	precision	recall	f1-score	support
0	0.76	0.89	0.82	1107
1	0.71	0.83	0.77	1107
2	0.72	0.92	0.81	1107
3	0.78	0.76	0.77	1107
4	0.92	0.47	0.62	1107
5	0.90	0.39	0.54	1107
6	0.90	0.56	0.69	1068
7	0.86	0.91	0.88	1075
8	0.62	0.98	0.76	1086
9	0.65	0.80	0.72	1037
accuracy			0.75	10908
macro avg	0.78	0.75	0.74	10908
weighted avg	0.78	0.75	0.74	10908

Confusion Matrix