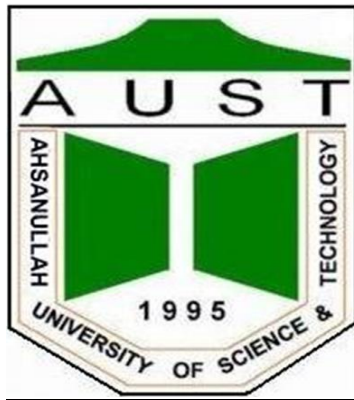


AHSANULLAH UNIVERSITY OF SCIENCE & TECHNOLOGY



Department of Computer Science & Engineering

Course No: CSE 4238

Course Name: Soft Computing Lab

Section: C Lab Group: C1

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Submitted to:

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Submitted By:

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Reports Generation

1. Make necessary tables to show the comparison between two experiments for the first dataset and discuss them.

Answer:

For Dataset A,

	Experiment 1	Experiment 2				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
1 st Hidden Layer	ReLU	ELU	ELU	ReLU	SELU	PReLU
2 nd Hidden Layer	ReLU	ELU	ELU	ELU	SELU	PReLU
3 rd Hidden Layer	ReLU	ELU	ELU	ReLU	SELU	PReLU
4 th Hidden Layer	ReLU	ELU	ELU	ELU	SELU	PReLU
5 th Hidden Layer	ReLU	ELU	ELU	ReLU	SELU	PReLU
6 th Hidden Layer	ReLU	ELU	ELU	ELU	SELU	PReLU
Optimizer	SGD	SGD	ASGD	SGD	SGD	SGD
Acc(1000)	75.1586	83.1769	88.8607	68.9926	12.4588	25.7803
Acc(2000)	80.3096	83.1261	87.389	66.4045	14.8693	38.6958
Acc(3000)	81.629	76.884	89.5458	57.8533	14.3618	12.4334
Acc(4000)	82.035	78.914	89.8249	69.6016	47.932	26.9728
Acc(5000)	76.7825	81.2738	88.7338	71.6062	54.9353	36.6658
Acc(6000)	83.8873	64.2984	85.2068	78.711	50.2157	54.0472
Acc(8000)	83.1261	85.2829	89.4951	77.696	53.7173	59.8325
Acc(10000)	84.9784	50.1142	88.5308	78.914	60.2639	61.7102
Acc(12000)	83.5828	81.5022	89.2159	80.2081	27.4042	60.3416
Acc(14000)	84.0396	84.1918	83.5321	79.0662	62.5983	75.7929
Acc(16000)	80.2842	87.0591	87.9218	82.847	78.8379	66.4552
Acc(18000)	88.2517	81.2484	83.5067	60.8729	79.2692	75.9959
Acc(19000)	86.3486	88.5055	89.2413	83.6843	77.087	76.7825
Acc(19500)	87.5666	87.8457	90.51	83.5067	78.0513	79.5991
Acc(20000)	81.629	84.3187	90.3832	87.3129	73.2809	82.3649
Loss	0.0724	0.0843	0.0947	0.3373	0.5037	0.6417

From above table, we can easily show that Model 3 gives maximum accuracy which is **90.3832%**. In that model we used 'ELU' as activation function in each layer and 'ASGD' as optimizer. We got the value of Loss is **0.0947** which is second best, first was the Model 1 which is **0.0724**.

2. Show the Loss vs Iteration graph.

Answer:

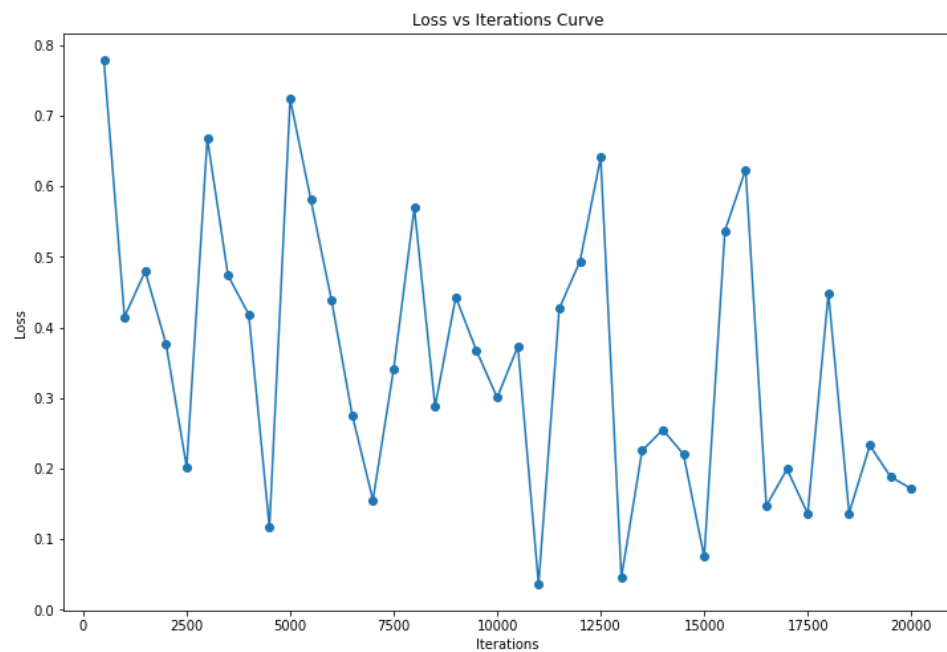


Figure 2.1: Loss vs iteration graph of Model 1 (Experiment 1)

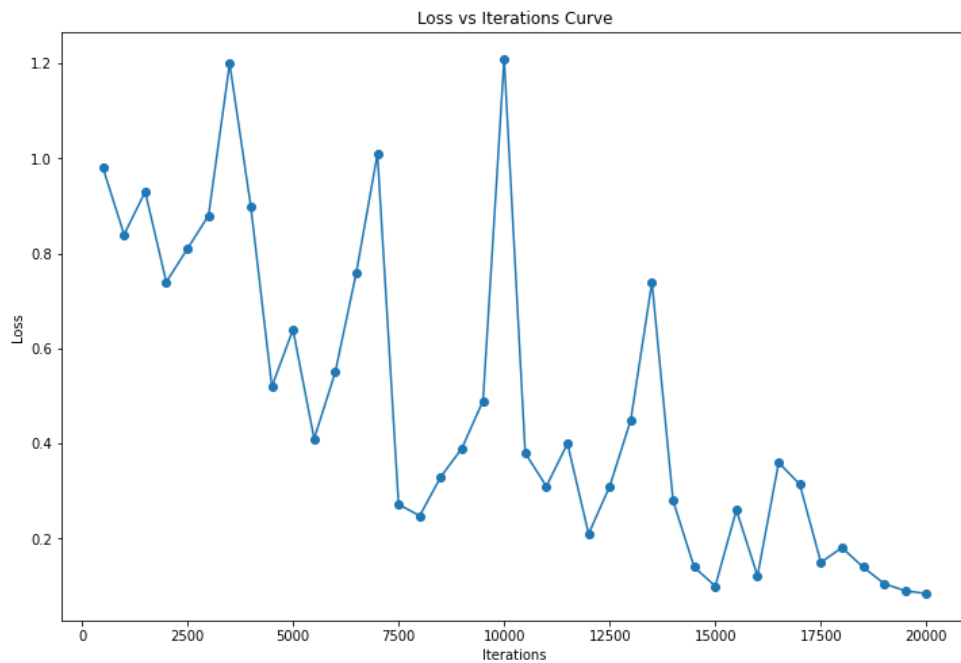


Figure 2.2: Loss vs iteration graph of Model 2 (Experiment 2)

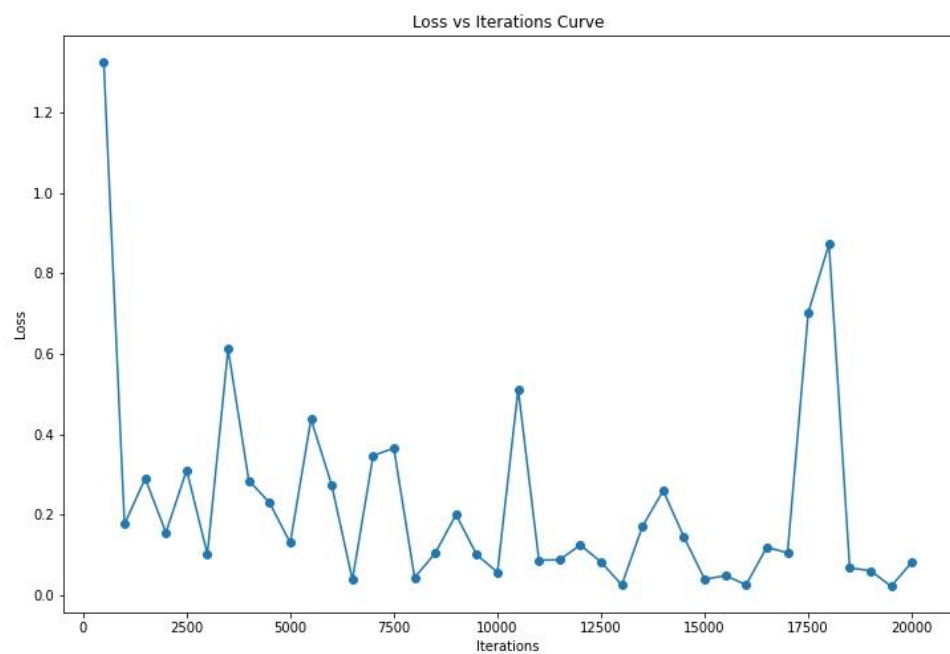


Figure 2.3: Loss vs iteration graph of Model 3 (Experiment 2)

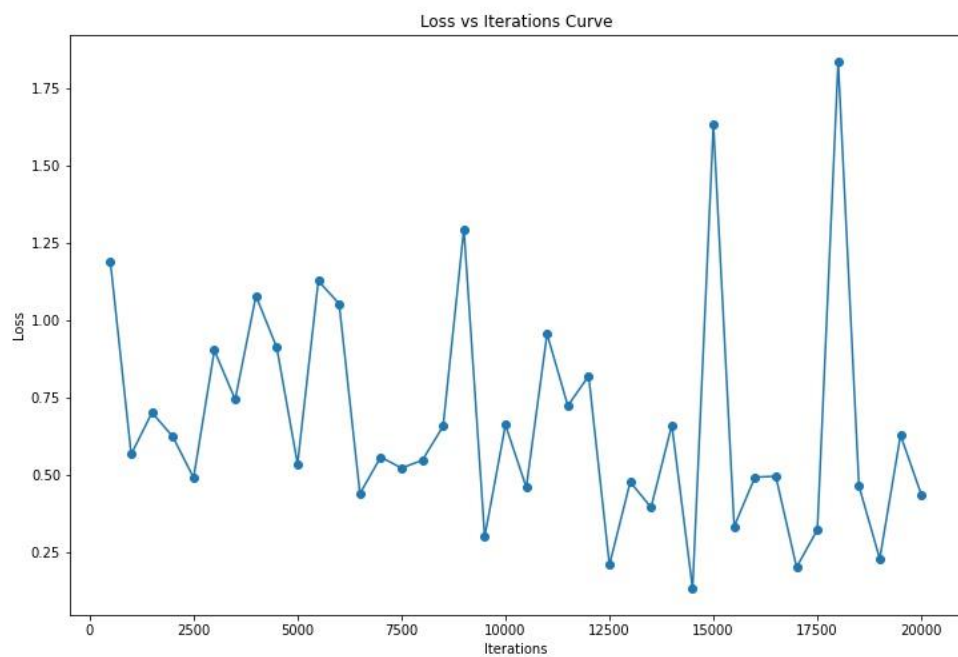


Figure 2.4: Loss vs iteration graph of Model 4 (Experiment 2)

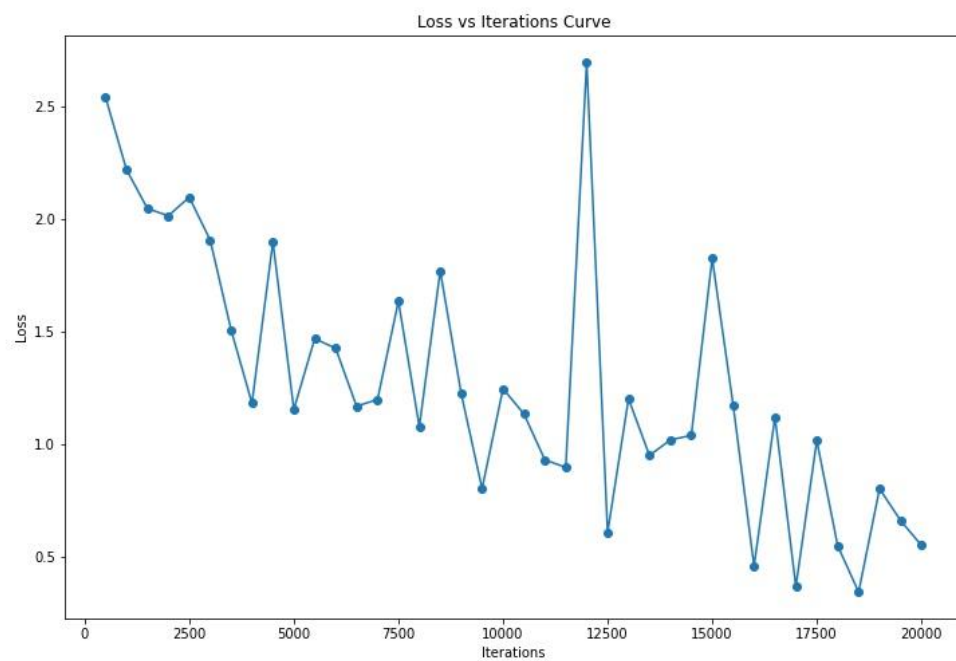


Figure 2.5: Loss vs iteration graph of Model 5 (Experiment 2)

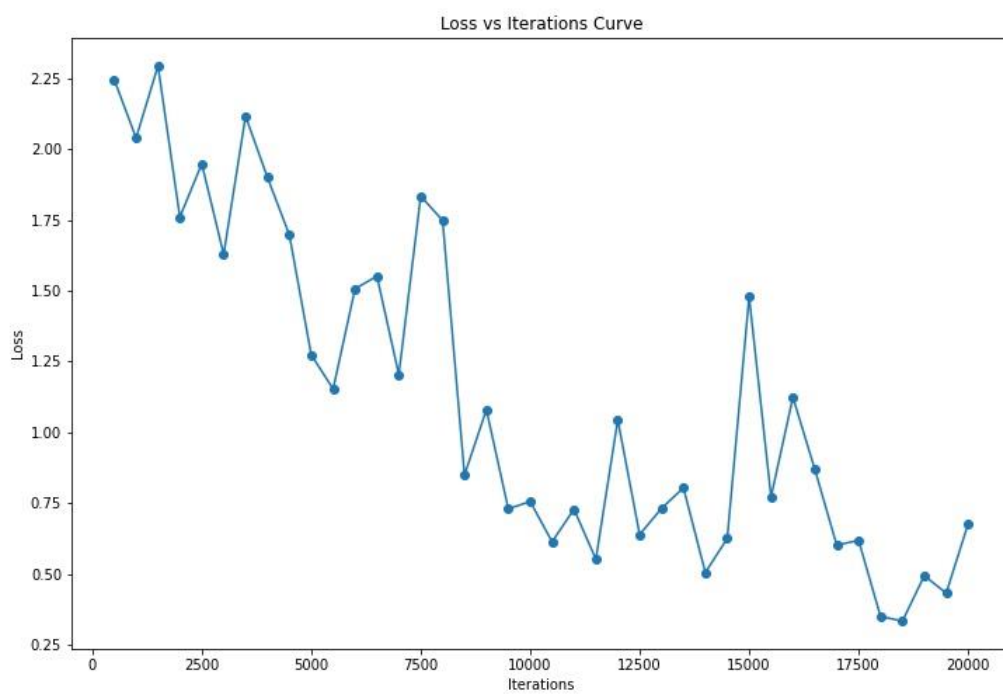


Figure 2.6: Loss vs iteration graph of Model 6 (Experiment 2)

2. Make a comparison of the results between the first dataset and second dataset by tables/graph/charts. Then discuss the results of those if they vary. Discuss the reasons behind them.

Answer:

	Model 1		Model 2		Model 3	
	Dataset A	Dataset 2	Dataset A	Dataset 2	Dataset A	Dataset 2
1 st Hidden Layer	ReLU	ReLU	ELU	ELU	ELU	ELU
2 nd Hidden Layer	ReLU	ReLU	ELU	ELU	ELU	ELU
3 rd Hidden Layer	ReLU	ReLU	ELU	ELU	ELU	ELU
4 th Hidden Layer	ReLU	ReLU	ELU	ELU	ELU	ELU
5 th Hidden Layer	ReLU	ReLU	ELU	ELU	ELU	ELU
6 th Hidden Layer	ReLU	ReLU	ELU	ELU	ELU	ELU
Optimizer	SGD	SGD	SGD	SGD	ASGD	ASGD
Acc(1000)	75.1586	88.41	83.1769	86.42	88.8607	87.02
Acc(2000)	80.3096	87.34	83.1261	87.03	87.389	87.78
Acc(3000)	81.629	89	76.884	85.77	89.5458	87.81
Acc(4000)	82.035	89.28	78.914	86.96	89.8249	87.15
Acc(5000)	76.7825	88.88	81.2738	87.15	88.7338	87.92
Acc(6000)	83.8873	88.69	64.2984	87.11	85.2068	88.21
Acc(8000)	83.1261	89.02	85.2829	87.1	89.4951	87.83
Acc(10000)	84.9784	89.02	50.1142	87.38	88.5308	85.99
Acc(12000)	83.5828	87.44	81.5022	88.04	89.2159	88.04
Acc(14000)	84.0396	88.77	84.1918	87.12	83.5321	88.59
Acc(16000)	80.2842	88.23	87.0591	87.45	87.9218	88.17
Acc(18000)	88.2517	88.84	81.2484	88.23	83.5067	88.83
Acc(19000)	86.3486	88.98	88.5055	88.31	89.2413	88.5
Acc(19500)	87.5666	88.43	87.8457	88.53	90.51	88.54
Acc(20000)	81.629	89.8	84.3187	88	90.3832	88.49
Loss	0.0724	0.1008	0.0843	0.1788	0.0947	0.219

Accuracy values are shown for two different datasets of 3 different model. For model 1, we can see the final accuracy value of Dataset A and Dataset 2 is **81.629%** and **89.8%** respectively. There is some difference between their accuracy at 20000th iterations but their loss values are almost similar (0.0724 and 0.1008). If we take 10 example images and make prediction then we can see that Dataset A gives 8/10 accurate predictions and Dataset 2 gives 7/10 accurate predictions (Results are shown in code).

Again, for Model 2 and Model 3, results are shown in above table for both datasets. There is a little difference in accuracy but loss value is quite far between 2 datasets. Dataset 2 has larger loss than dataset A. There is a reason behind it. We know that Dataset 2 has 28x28 pixels in each image where Dataset A has 180x180 pixels in each image. That means Dataset A has more features with respect to Dataset 2. When we build model, we get different input dimension for 2 different datasets. More features will build the model more precisely. That's why Dataset A has given lower loss for every model.

2. Upload your code in Github and share the link in your report.

Github Link

1. [170104116_exp_01.ipynb](#) – This file contains the model of experiment 1 and evaluation of dataset 2.
2. [170104116_exp_02_1.ipynb](#) – Experimenting to increase the accuracy by changing activation function.
3. [170104116_exp_02_2.ipynb](#) – Experimenting to increase the accuracy by using different activations functions in different hidden layers.
4. [170104116_exp_02_3.ipynb](#) – Experimenting to increase the accuracy by changing hyperparameters such as batch size, number of nodes in hidden layers.
5. [Experiment 2 Results.csv](#) – Contains the summary of all modification made in experiment 2
6. [Experiment 2 Results_03.csv](#) – Contains the summary of all modification made in '170104116_exp_02_3.ipynb' file.