Ahsanullah University of Science & Technology

Department of Computer Science & Engineering

CSE 4238
Soft Computing Lab

Assignment # 02

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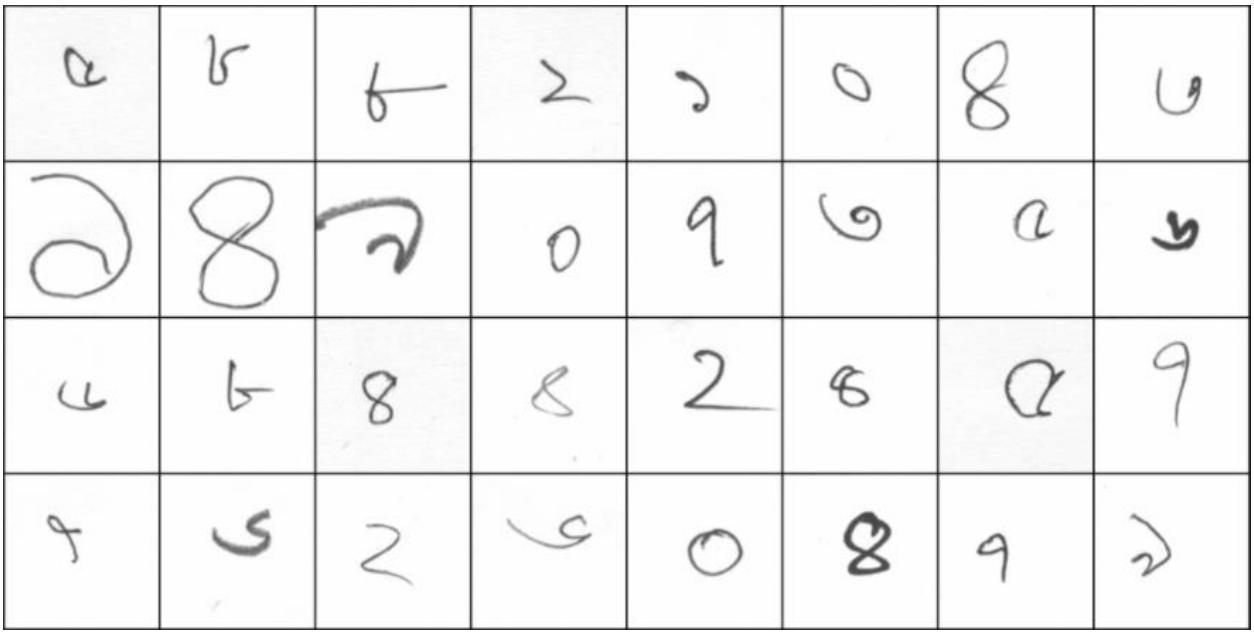
Dataset Analysis :

Introduction : Bangla Handwritten Digits
Name : Namta_DB
Origin : OngkoDB
Database Name : Training-C
Database Size : 24,298 Samples
Contributing Team : BUET_Backpropers



A snapshot from DataSet

Experiments' Setup

Experiment #1:

The setup of this experiment is based on the instructions given on the document. The aim of this experiment is to implement the task according to instructor's setup and process from previous Lab materials.

Trained & Tested on = Namta_DB Training-C Database
Train & Test Ration = 4:1
Training Samples = 19456
Testing Samples = 4864

Hyperparameters

Image Size = 28*28
batch_size = 32
input_dim = 784
number of hidden layers = 6
First Node = 200
Second Node = 200
Third Node = 200
Fourth Node = 200
Fifth Node = 200
Sixth Node = 200
output_dim = 10
num_epochs = 300
learning_rate = 0.01
optimizer = SGD

Experiment #2:

This setup is based on previous one. But here I have modified hyperparameters as it was mentioned to do in assignment. The aim was to improve accuracy from previous experiment.

Trained & Tested on = Namta_DB Training-C Database
Train & Test Ration = 4:1
Training Samples = 19456
Testing Samples = 4864

Hyperparameters

Image Size = 32*32
batch_size = 32
input_dim = 1024
number of hidden layers = 5
First Node = 2048
Second Node = 1024
Third Node = 512
Fourth Node = 256
Fifth Node = 128
output_dim = 10
num_epochs = 300
learning_rate = 0.1
optimizer = SGD

Basic Comparison Table

[*All the data generated from implementation*]

Basis	Experiment # 1	Experiment # 2
DataSet	Namta_DB	Namta_DB
Train / Test	19456 / 4864	19456 / 4864

Hyper Parameter Comparison Table

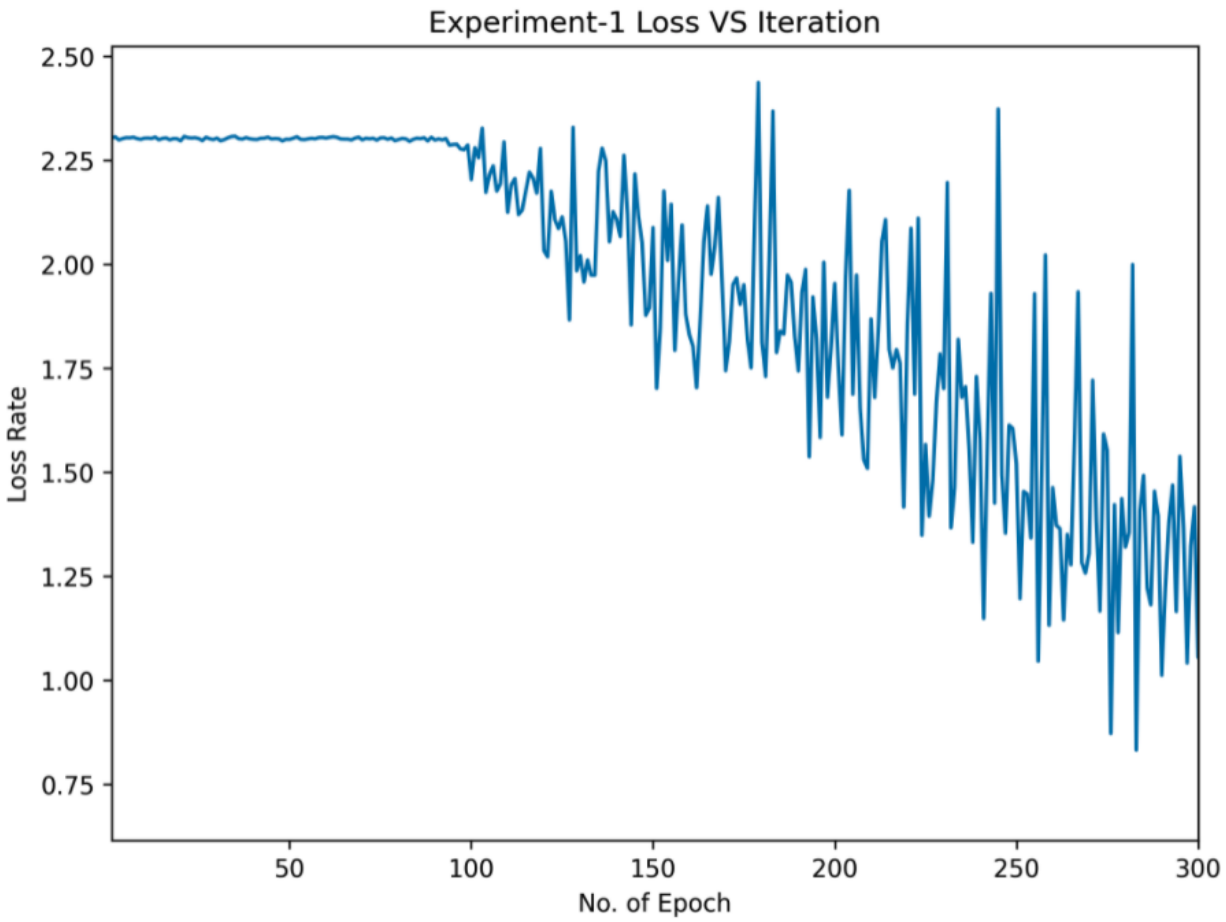
[*All the data generated from implementation*]

HyperParameters	Experiment # 1	Experiment # 2
Image Size	28	32
Batch Size	32	64
Input Dimension	784	1024
Output Dimension	10	10
Hidden Layers	6	5
Epochs	300	300
Learning Rate	0.01	0.1
Optimizer	SGD	SGD

Loss VS Iteration Graph

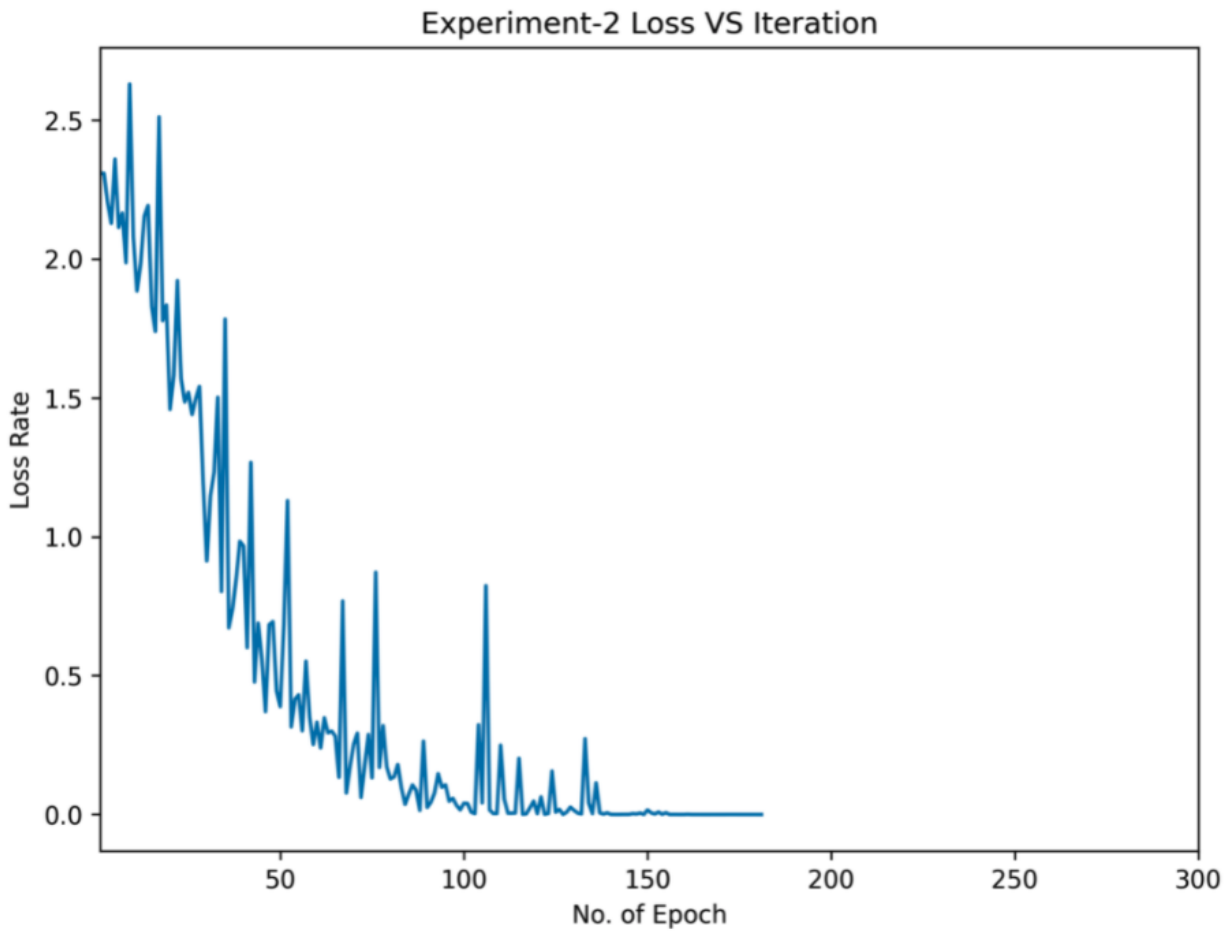
Experiment #1

Initial Loss [Epoch 1] = 2.2993695735931396
Final Loss [Epoch 300] = 1.072466254234314



Experiment #2

Initial Loss [Epoch 1] = 2.303194999694824
Final Loss [Epoch 300] = 0.00006057982682250 44



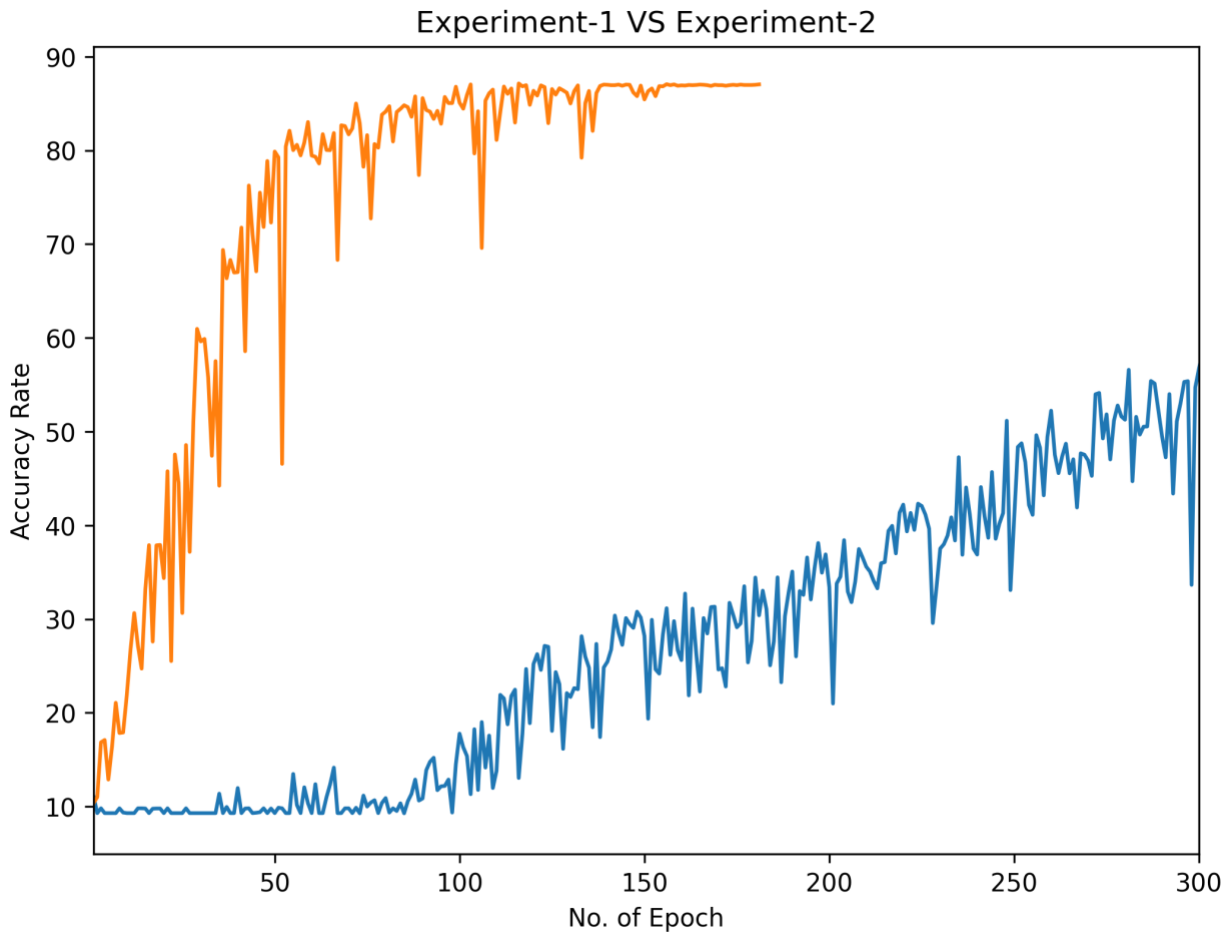
Experiment Result Analysis :

Accuracy :

Here is the final Verdict of our Experiment on Accuracy Metric,

Experiment #1 = 67.48%

Experiment #2 = 87.13%

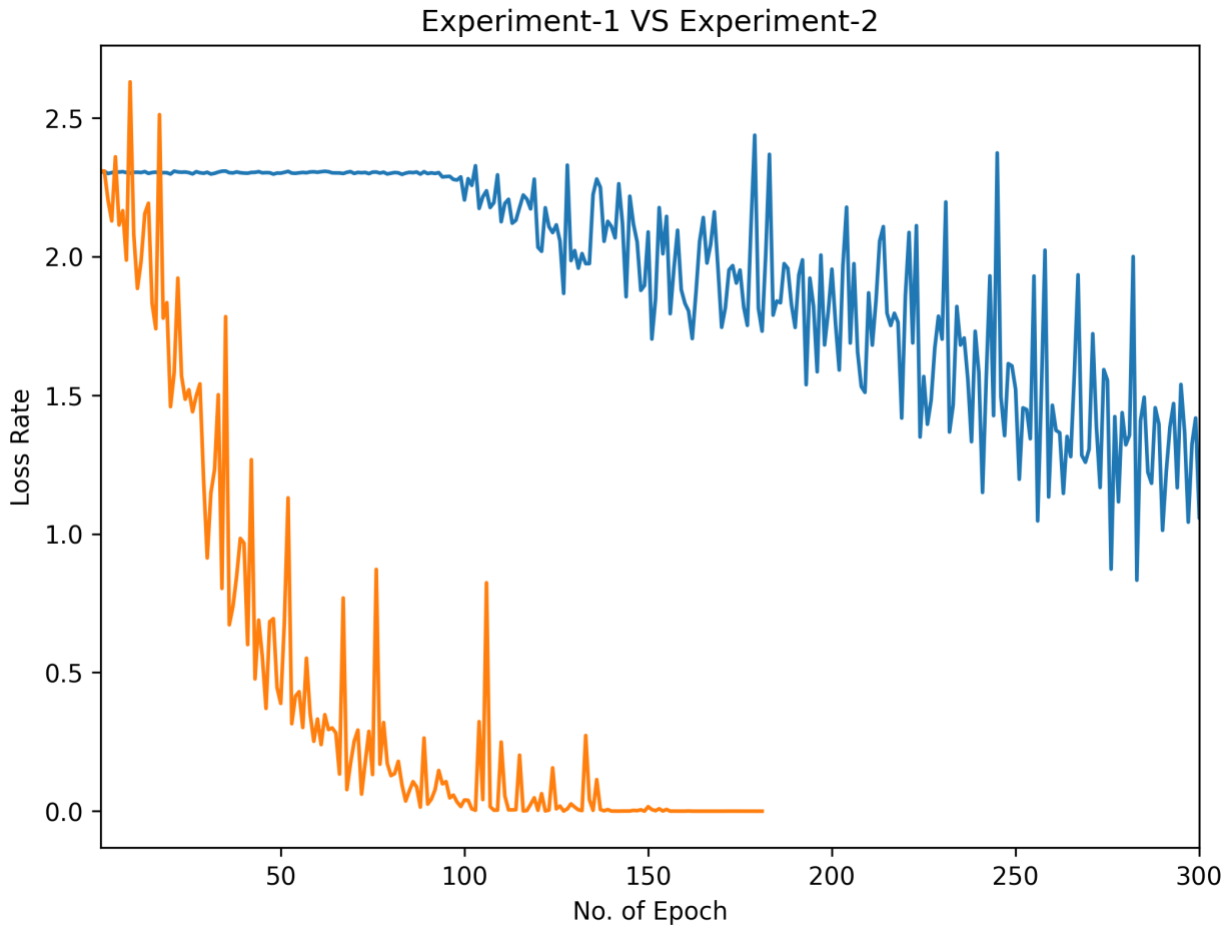


Loss Rates :

The Lowest possible loss value that could be generated is,

Experiment #1 = 9.28

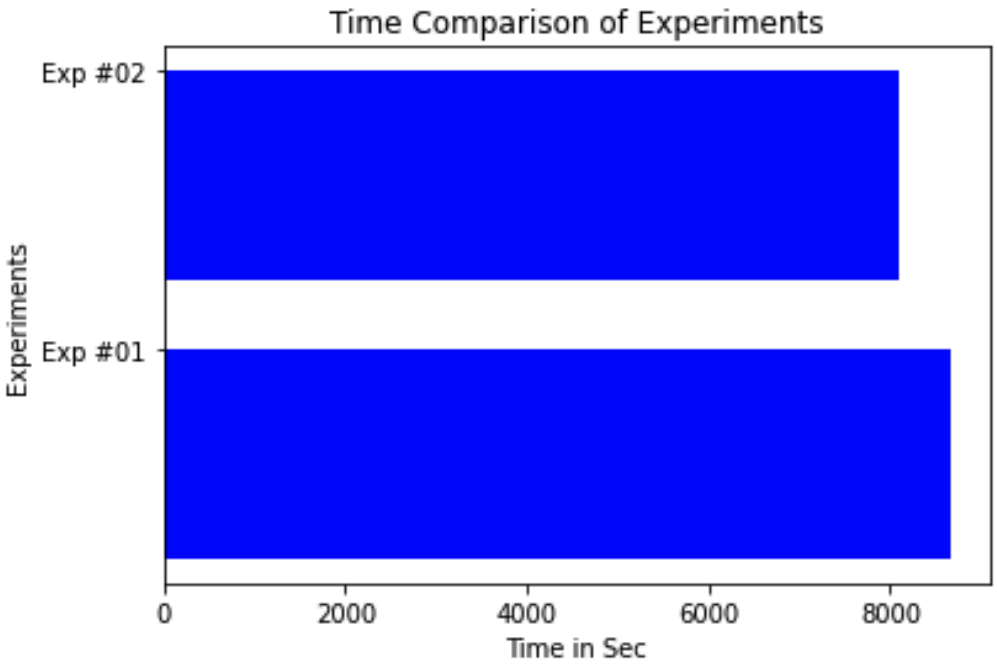
Experiment #2 = 0.000037



Time Comparisons

Experiment #1 = 8654.29 sec == 2h:24m:14s

Experiment #2 = 8088.36 sec == 2h:14m:48s



Conclution :

Finally the experiment has achieved better accuracy than previous. It could kept the goal line as mentioned in the instruction to achieve accuracy above 85%. Not only its accuracy got better but also it could reduce the run time 10 min!

Code → PyTorch Implementation