TOPICS IN PATTERN RECOGNITION ASSIGNMENT 2

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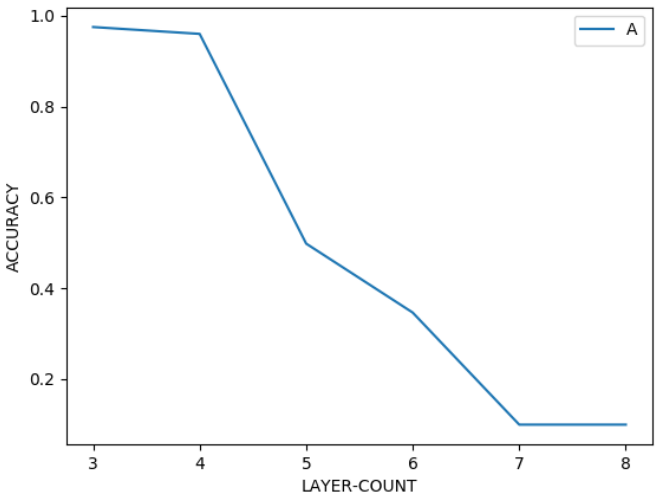
Python 3 has been used
Initialize parameters : its been done in the init function itself , which helps in initializing as soon as the object is created.
Implement forward propagation : a seperate function is build.
Implement backward propagation : a separation function is build.
Design the cost function : I have used cross entropy cost function instead of mse and is present along with the activation functions.
accuracies are represented either out of 100 or 1 .

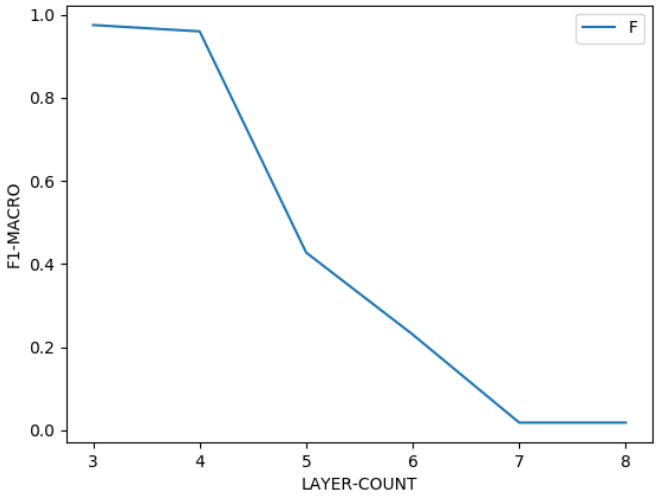
A sample Command for Cat-Dog :- python3 main.py –train-data Cat-Dog –test-data Cat-Dog d Cat-Dog a [40 30]

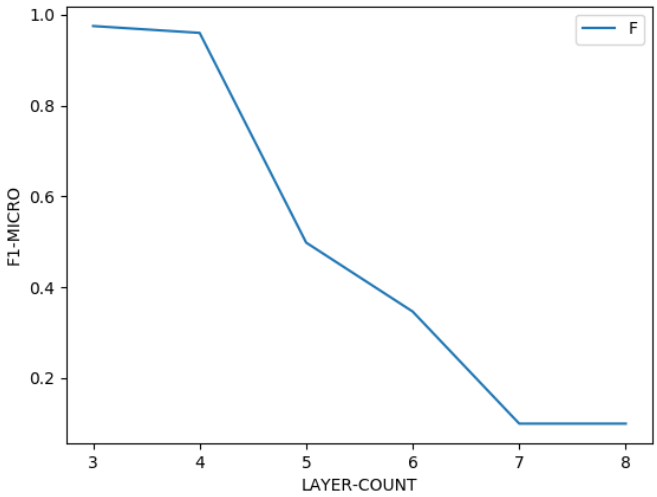
A sample Command for MNIST :- python3 main.py –train-data MNIST –test-data MNIST d MNIST a [40 30]

All the conclusions are clearly visible in the graphs presented.
Part 1:

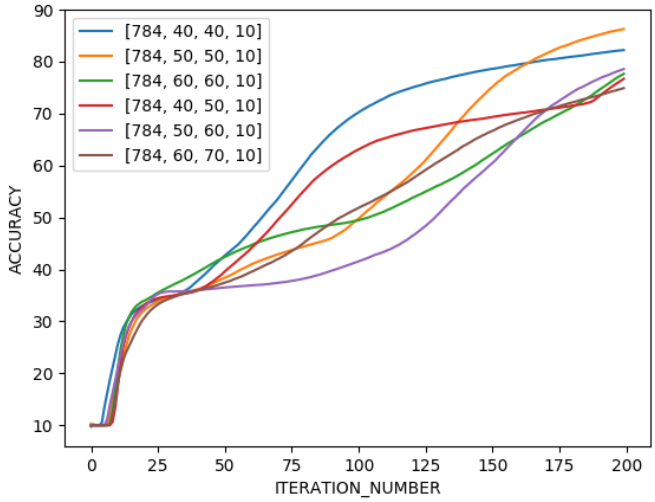
Task 1 plot :

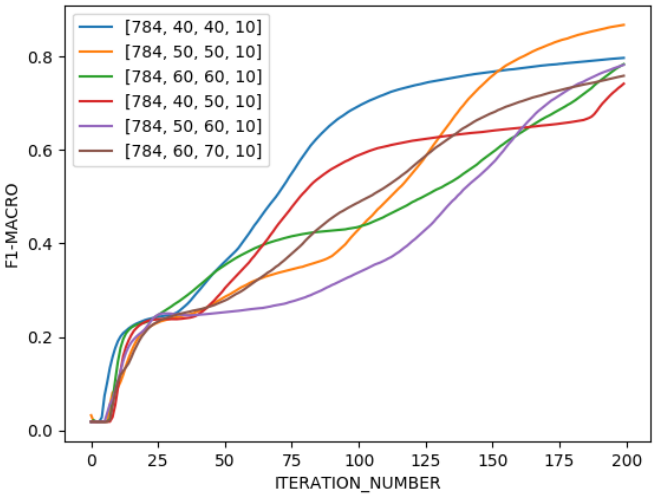


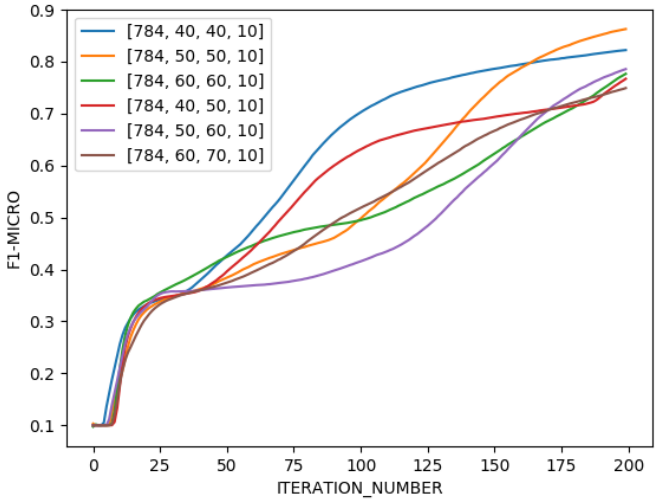

F
1.0
0.8
0.6
0.4
0.2
0.0
F1-MACRO
3
4
5
6
7
8
LAYER-COUNT


F
1.0
0.8
0.6
0.4
0.2
F1-MICRO
3
4
5
6
7
8
LAYER-COUNT

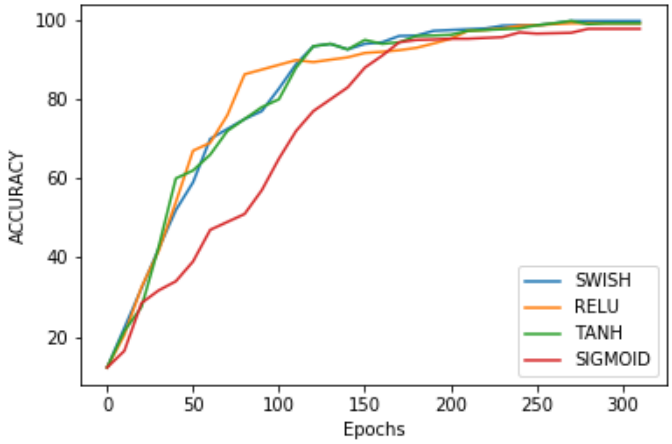
Task 2 plot :

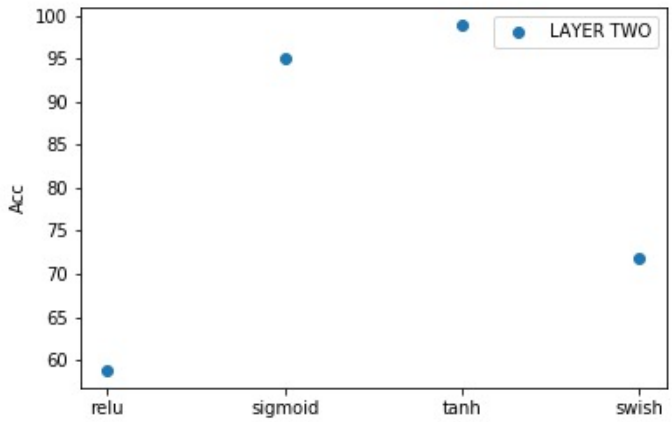

[784, 40, 40, 10]
[784, 50, 50, 10]
[784, 60, 60, 10]
[784, 40, 50, 10]
[784, 50, 60, 10]
[784, 60, 70, 10]
ACCURACY
ITERATION_NUMBER

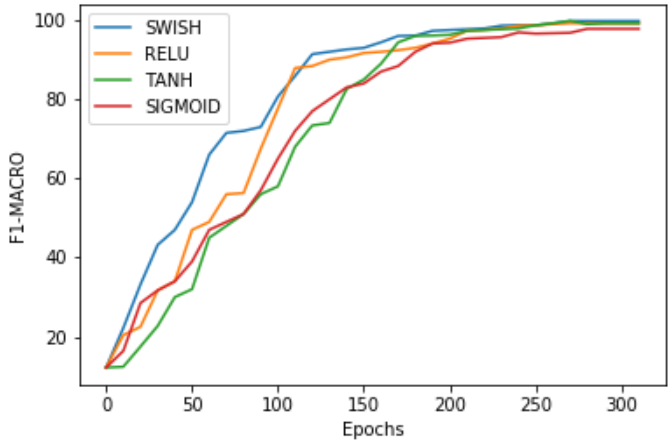

[784, 40, 40, 10]
[784, 50, 50, 10]
[784, 60, 60, 10]
[784, 40, 50, 10]
[784, 50, 60, 10]
[784, 60, 70, 10]
F1-MACRO
ITERATION_NUMBER

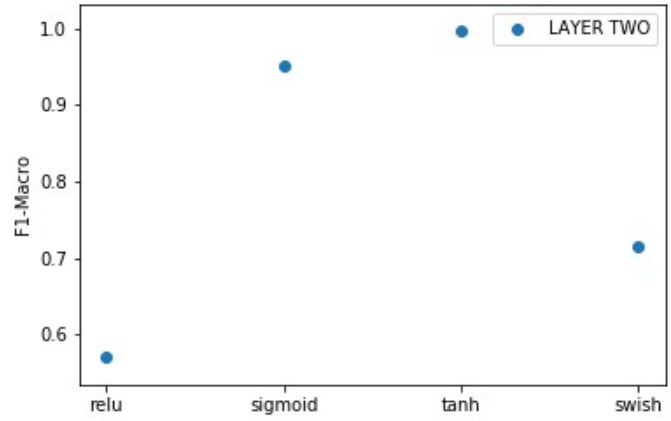

[784, 40, 40, 10]
[784, 50, 50, 10]
[784, 60, 60, 10]
[784, 40, 50, 10]
[784, 50, 60, 10]
[784, 60, 70, 10]
F1-MICRO
ITERATION_NUMBER

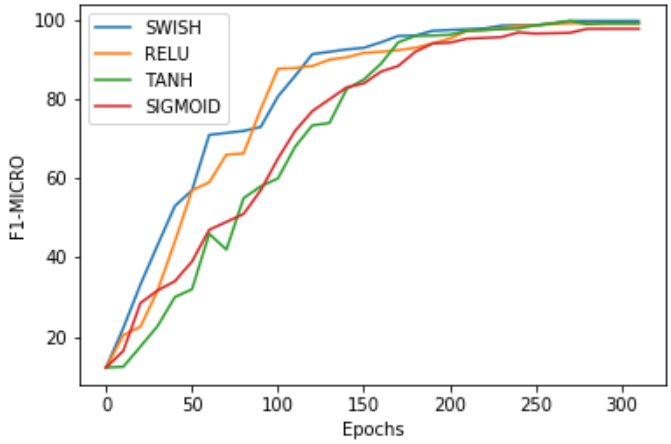
Task 3 plot :

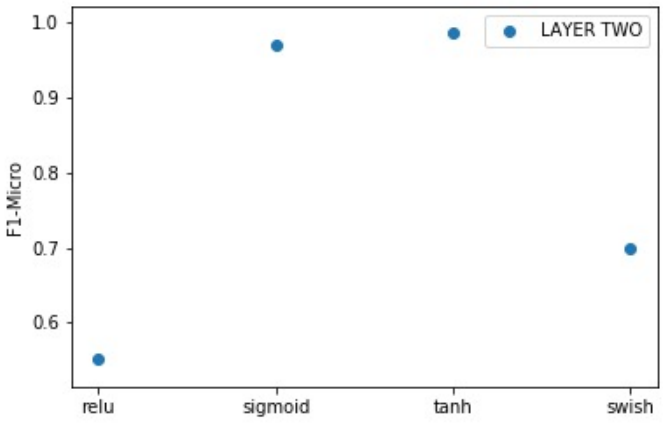

ACCURACY
Epochs
SWISH
RELU
TANH
SIGMOID


Acc
LAYER TWO
relu
sigmoid
tanh
swish

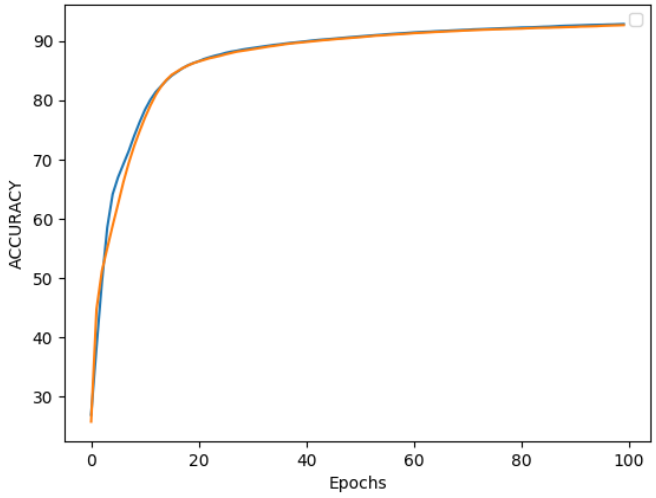

SWISH
RELU
TANH
SIGMOID
F1-MACRO
Epochs
100
80
60
40
20
0
50
100
150
200
250
300

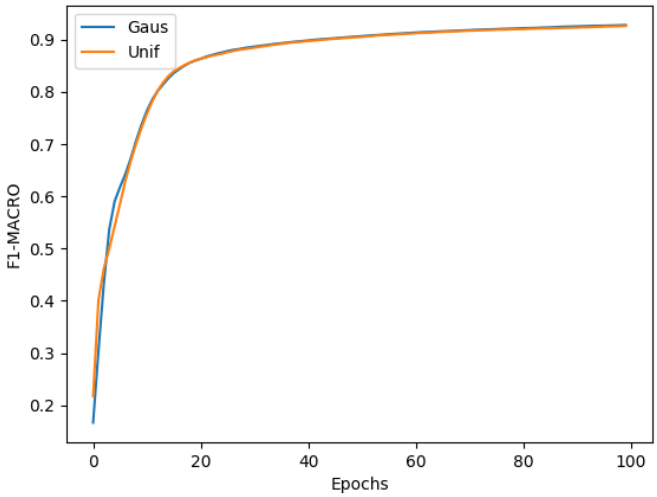

LAYER TWO
F1-Macro
1.0
0.9
0.8
0.7
0.6
relu
sigmoid
tanh
swish

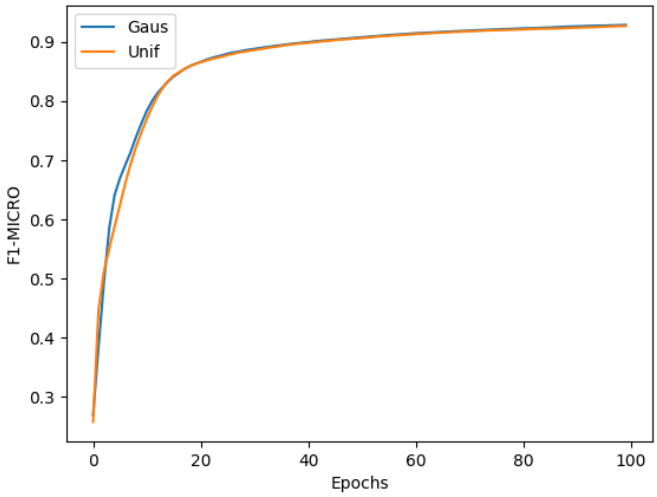

SWISH
RELU
TANH
SIGMOID
F1-MICRO
Epochs
100
80
60
40
20
0
50
100
150
200
250
300


LAYER TWO
F1-Micro
1.0
0.9
0.8
0.7
0.6
relu
sigmoid
tanh
swish

Task 4 plot :

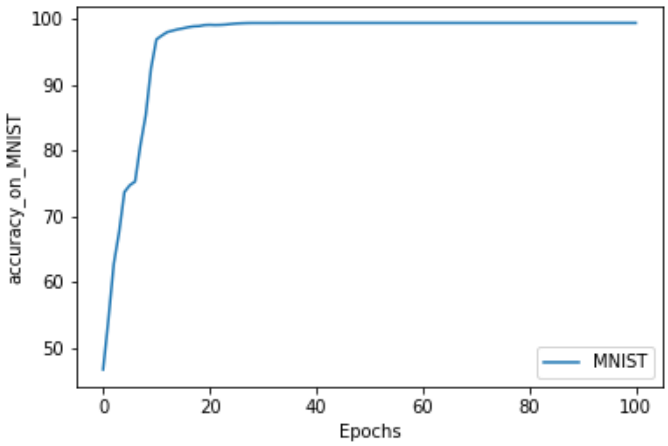

ACCURACY
90
80
70
60
50
40
30
0
20
40
60
80
100
Epochs



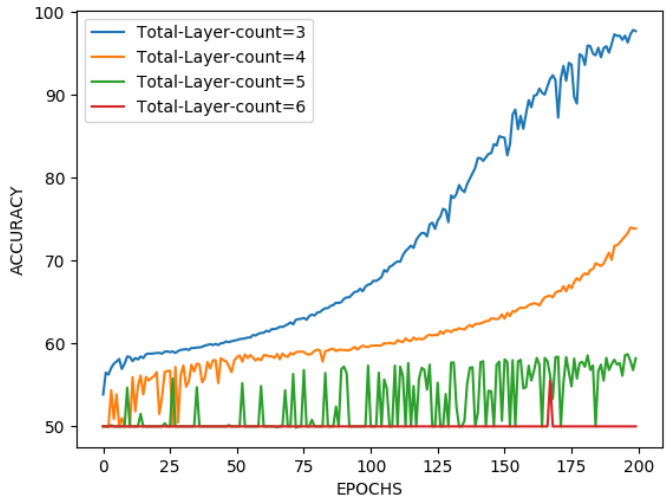


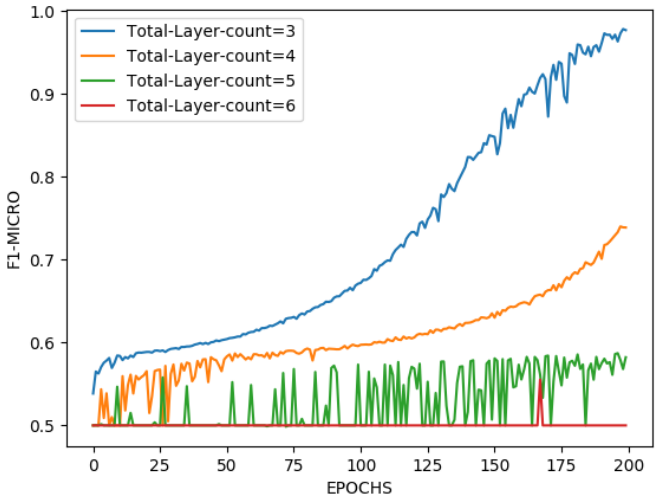
Task 5 :

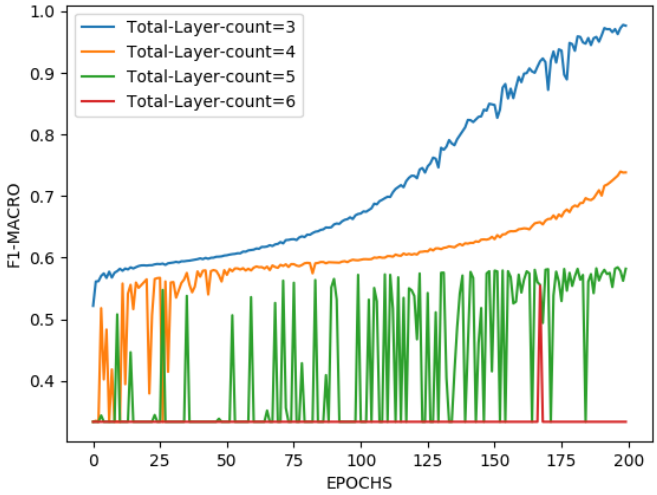
Code has been submitted in the separate file below is the plot corresponding to it:



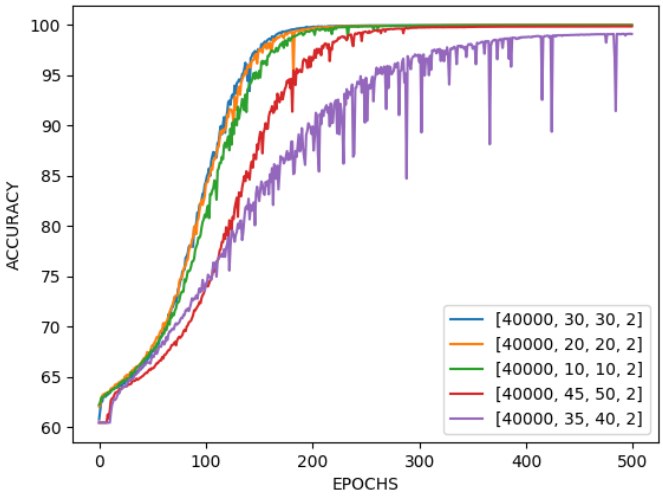
Part 2:
Task 1 plot :

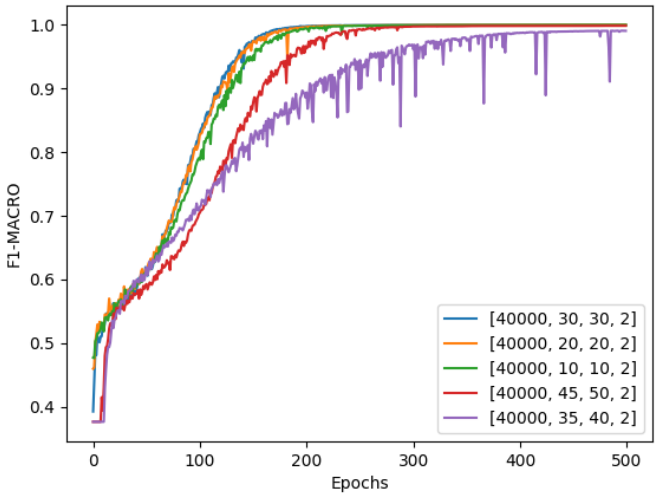


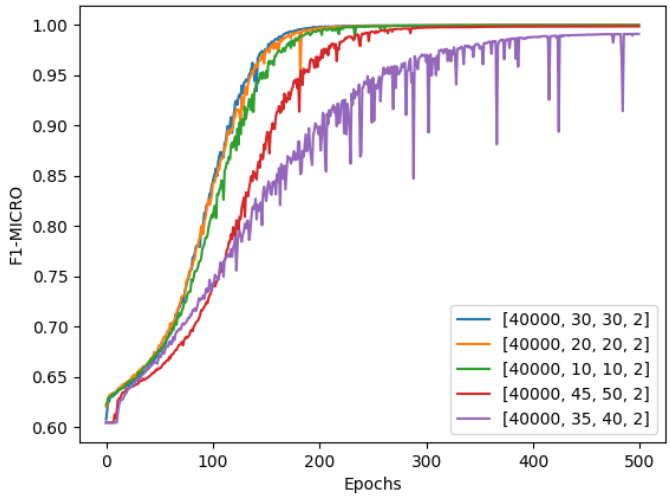

Total-Layer-count=3
Total-Layer-count=4
Total-Layer-count=5
Total-Layer-count=6
F1-MICRO
EPOCHS
1.0
0.9
0.8
0.7
0.6
0.5
0
25
50
75
100
125
150
175
200


Total-Layer-count=3
Total-Layer-count=4
Total-Layer-count=5
Total-Layer-count=6
F1-MACRO
EPOCHS
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0
25
50
75
100
125
150
175
200

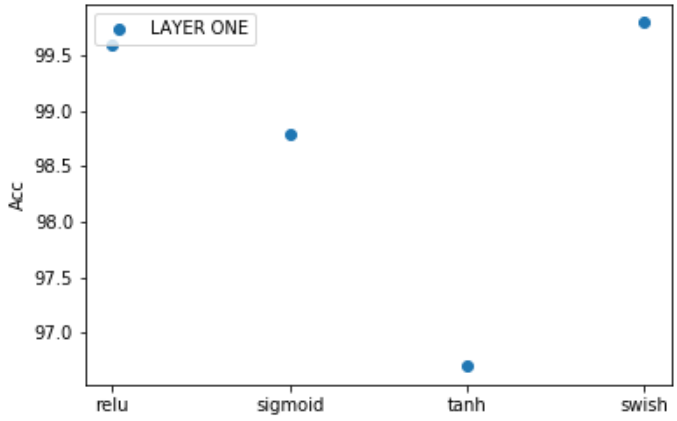
Task 2 plot :

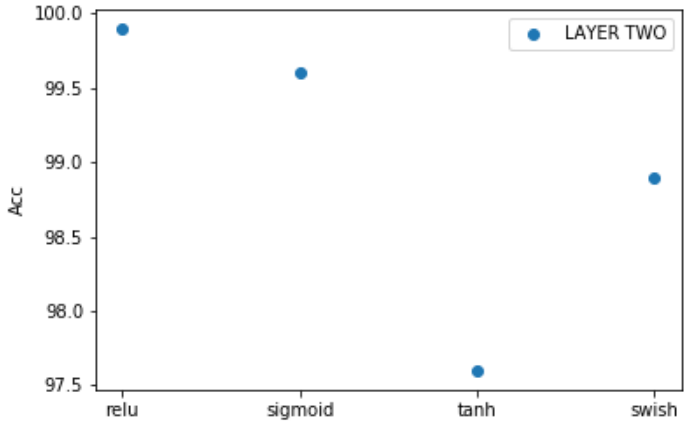

ACCURACY
EPOCHS
[40000, 30, 30, 2]
[40000, 20, 20, 2]
[40000, 10, 10, 2]
[40000, 45, 50, 2]
[40000, 35, 40, 2]

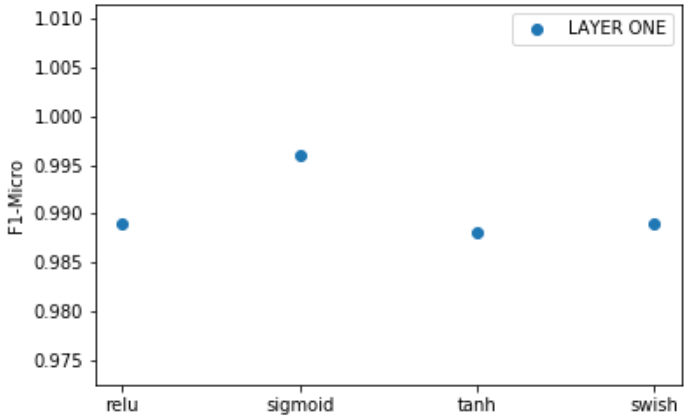

F1-MACRO
Epochs
[40000, 30, 30, 2]
[40000, 20, 20, 2]
[40000, 10, 10, 2]
[40000, 45, 50, 2]
[40000, 35, 40, 2]

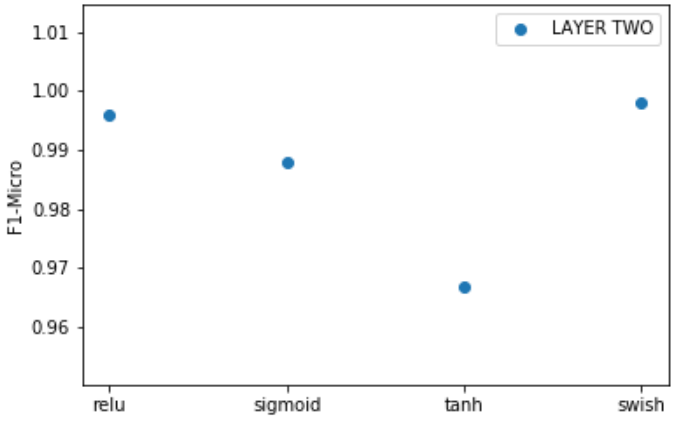

F1-MICRO
Epochs
[40000, 30, 30, 2]
[40000, 20, 20, 2]
[40000, 10, 10, 2]
[40000, 45, 50, 2]
[40000, 35, 40, 2]

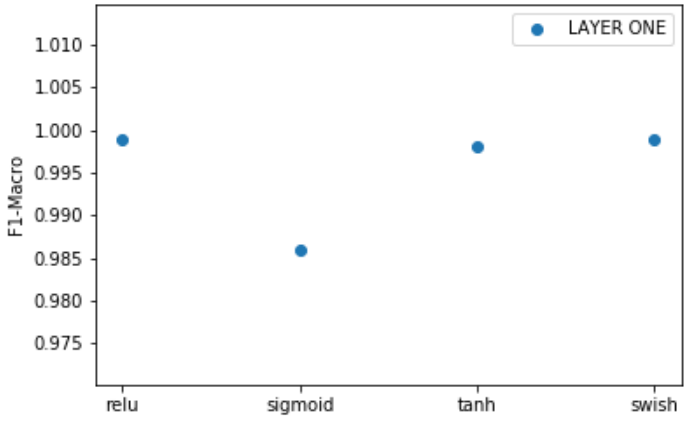
Task 3 plot :

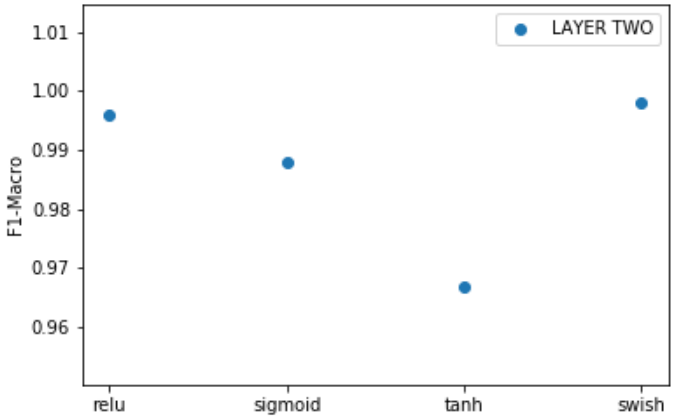

LAYER ONE
Acc
relu
sigmoid
tanh
swish


LAYER TWO
Acc
relu
sigmoid
tanh
swish


LAYER ONE
F1-Micro
1.010
1.005
1.000
0.995
0.990
0.985
0.980
0.975
relu
sigmoid
tanh
swish

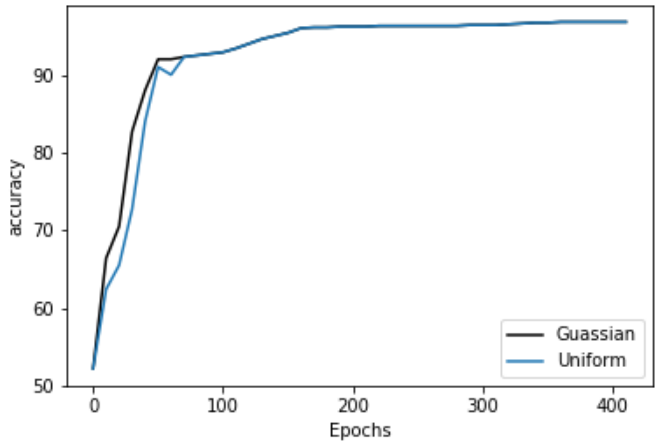

LAYER TWO
F1-Micro
1.01
1.00
0.99
0.98
0.97
0.96
relu
sigmoid
tanh
swish

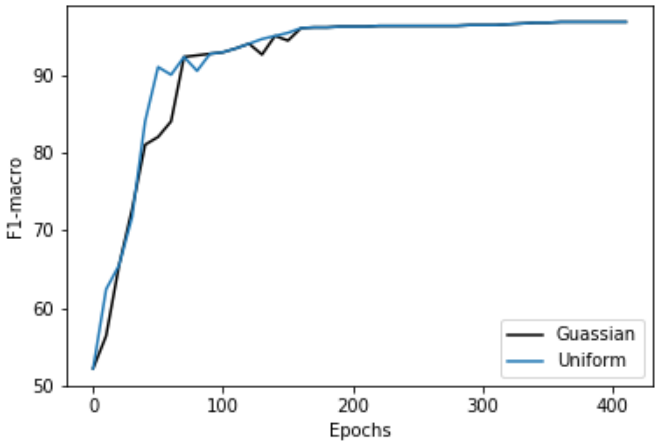

LAYER ONE
F1-Macro
1.010
1.005
1.000
0.995
0.990
0.985
0.980
0.975
relu
sigmoid
tanh
swish

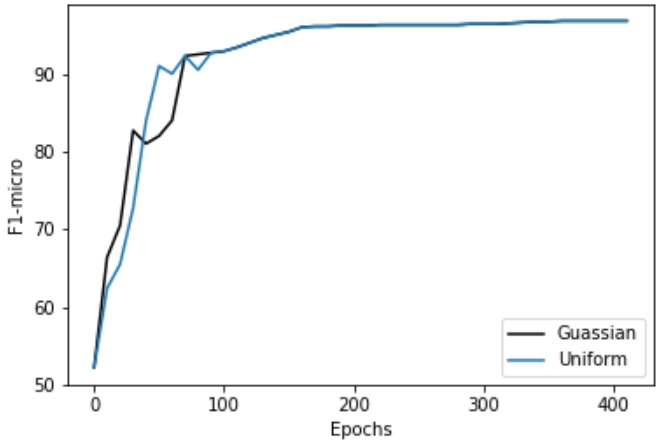


Task 4 plot :

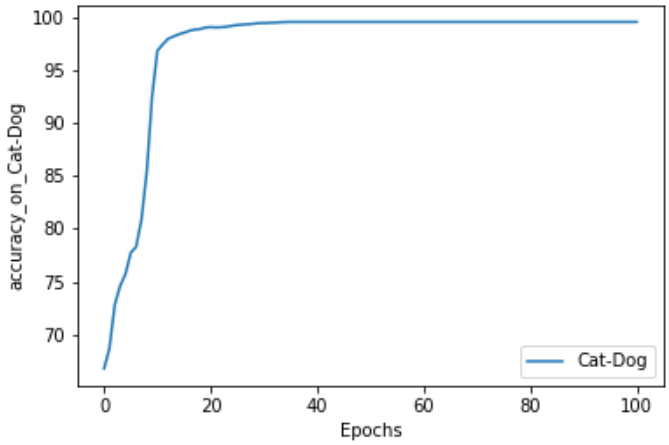
Micro and macro on y axis has to be divided by 100.



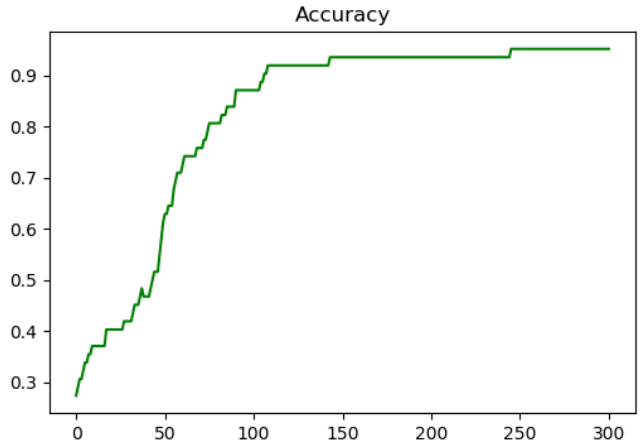


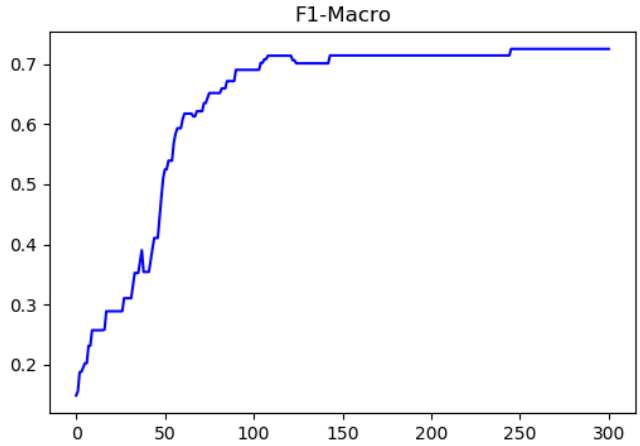


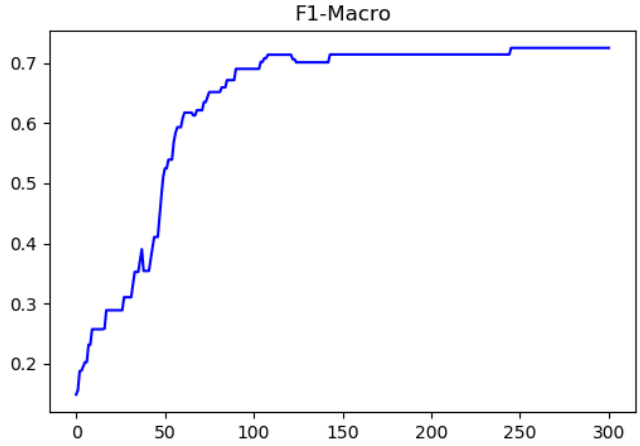
Task 5 :
Same code has been used and plots for it has been produced.



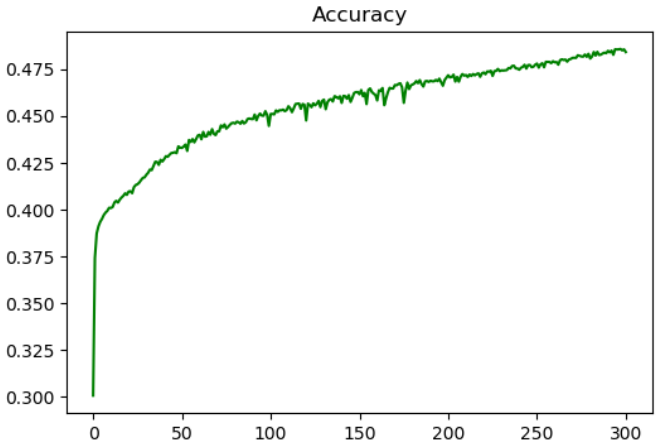
Part 3:
Plot for Dolphin:

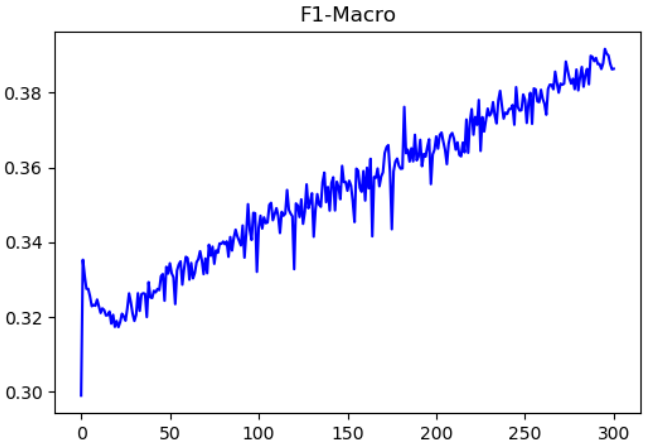


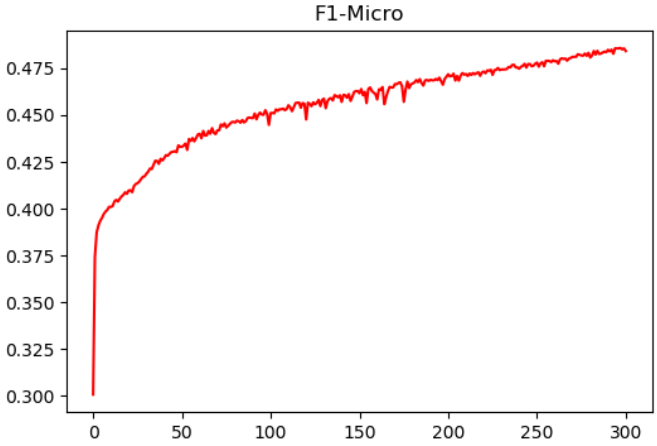




Plot for Pubmed:

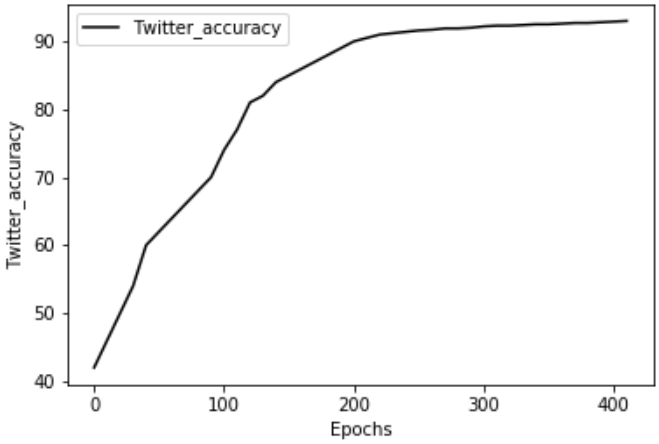


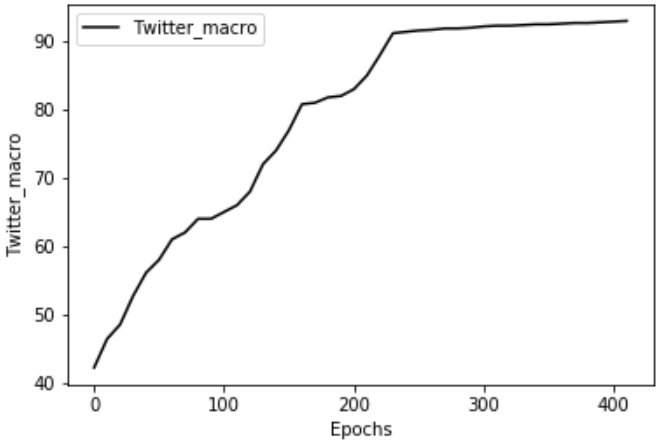


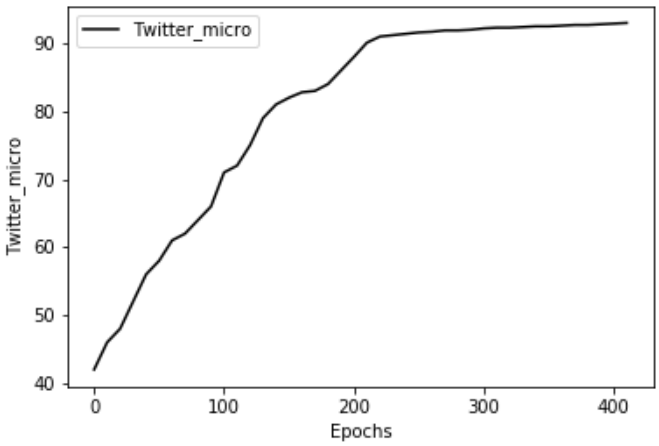


Plot for Twitter:

Macro and micro on y axis has to be divided by 100.


Twitter_accuracy
Twitter_accuracy
Epochs
40
50
60
70
80
90
0
100
200
300
400


Twitter_macro
Twitter_macro
Epochs
40
50
60
70
80
90
0
100
200
300
400


Twitter_micro
Twitter_micro
Epochs
40
50
60
70
80
90
0
100
200
300
400