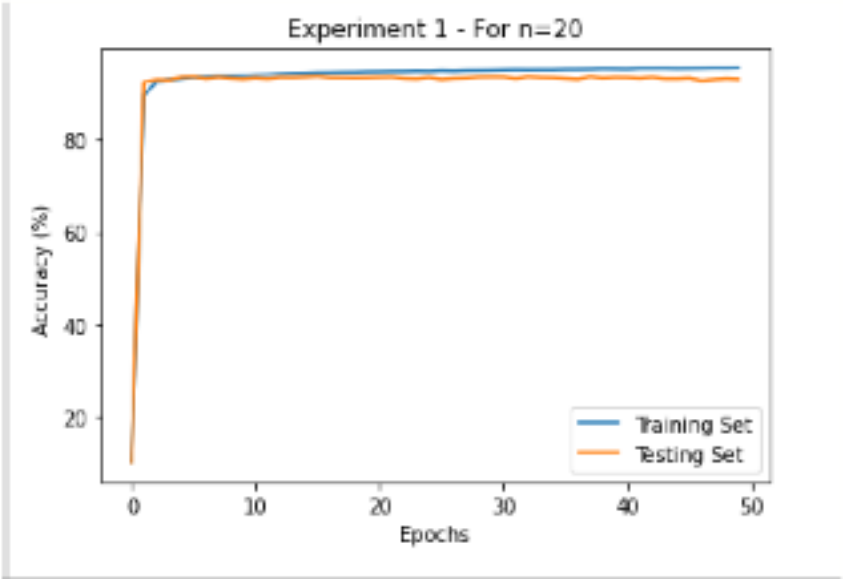
Results:

Experiment 1: Vary the number of hidden inputs

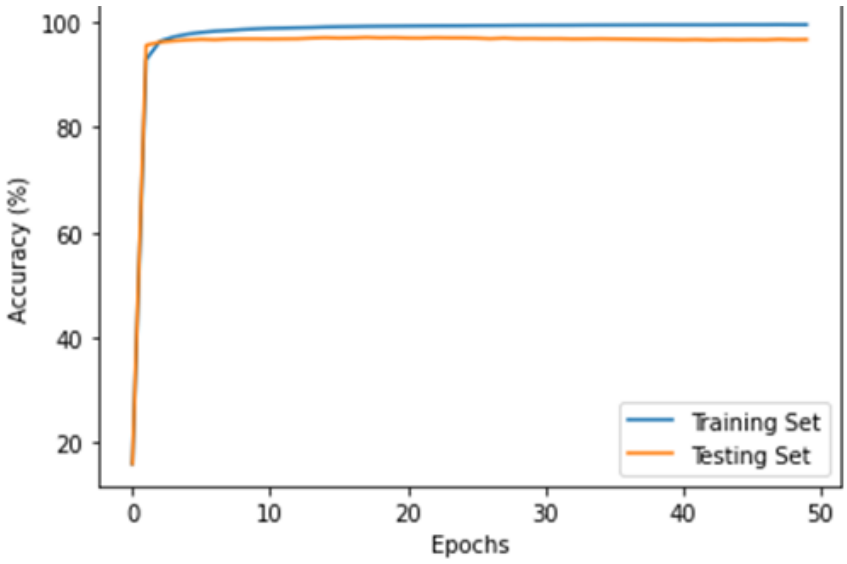
a) N = 20

```
Confusion matrix for epoch  49
[[ 959    0    6    3    0    6    1    2    3    0]
 [   0 1110    4    4    0    1    4    5    5    2]
 [   3    1  949   12    8    5    3   20   28    3]
 [   2    0   32  919    0   30    0    5   19    3]
 [   1    0    8    1  903    0    5    4    3   57]
 [   4    0    9   21    1  818    5    5   26    3]
 [  14    4   22    3    8   27  866    2   11    1]
 [   0    2    9    6    4    3    0  979    6   19]
 [   9    0    9   22    8   24    7    7  881    7]
 [   4    3    1   14   18    6    0   11   18  934]]
```



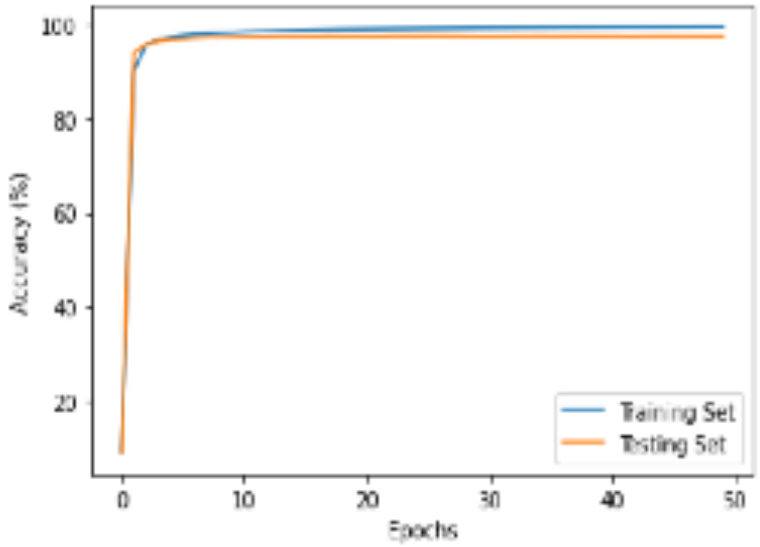
b) N = 50

```
Confusion matrix for epoch  49
[[ 960    0    3    1    0    3    6    1    5    1]
 [   0 1115    4    2    1    1    2    5    5    0]
 [   5    3  975    5    4    4    4    9   20    3]
 [   0    1   12  945    0   17    0    5   24    6]
 [   1    0    5    2  945    0    6    2    3   18]
 [   2    1    4   10    1  851    4    2   12    5]
 [   5    4    4    1    3    7  929    0    5    0]
 [   0    3   13    1    4    0    0  994    7    6]
 [   3    0    6    7    6    4    5    5  933    5]
 [   3    6    2    5   18    8    0    7   17  943]]
```



c) N = 100

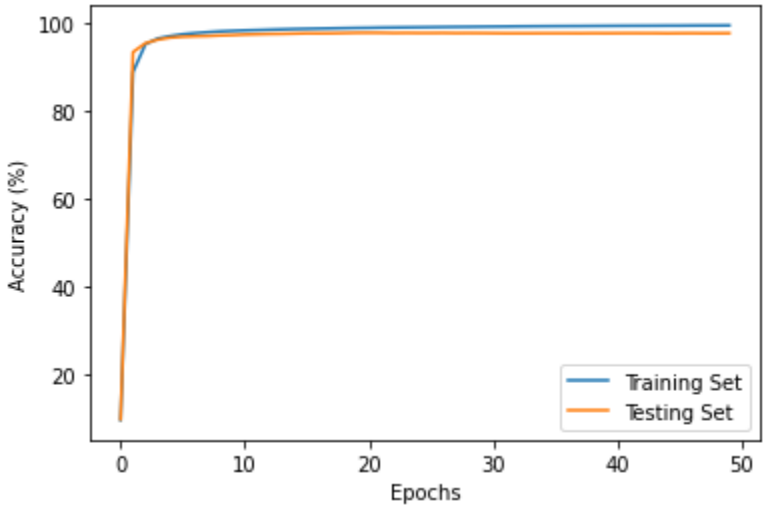
```
confusion matrix

[966   0   1   1   0   2   1   1   7   1]
[   0 1120    2    3    0    2    2    1    5    0]
[  6   5 988   6   0   1   0  10  12   4]
[  1   0   7 957   0  14   0   8  14   9]
[  1   0   3   0 959   0   2   3   1  13]
[  5   1   1   7   2 853   9   1   5   8]
[  8   5   0   0   5  14 911   0  11   4]
[  0   6   9   2   8   2   0 985   5  11]
[ 10   2   3   6   4   4   6   4 925  10]
[  4   6   0   6  10   3   1   2   9 968]
testing - accuracy: 96.32
```



EXPERIMENT 2: Vary the momentum value

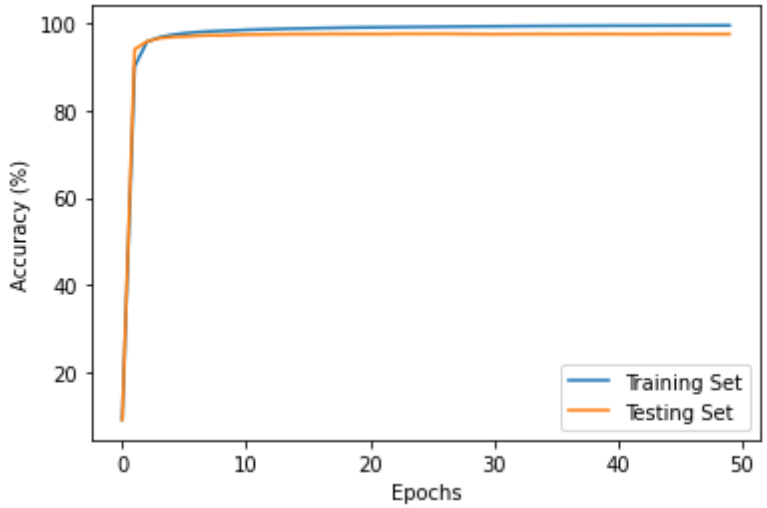
a) M = 0

```
confusion matrix

[972   1   0   0   0   0   2   1   2   2]
[   0 1123    3    3    0    1    2    0    3    0]
[   2    4 1005    5    1    1    2    6    4    2]
[  0   0   1 995   0   5   0   3   2   4]
[  1   0   3   1 948   0   7   0   2  20]
[  3   0   0   6   0 871   4   3   2   3]
[  5   3   0   1   2   3 940   0   3   1]
[  0   2  12   5   2   0   0 990   2  15]
[  6   1   2   1   2   3   3   3 951   2]
[  4   6   0   7   7   3   0   4   2 976]
testing - accuracy: 97.71
```



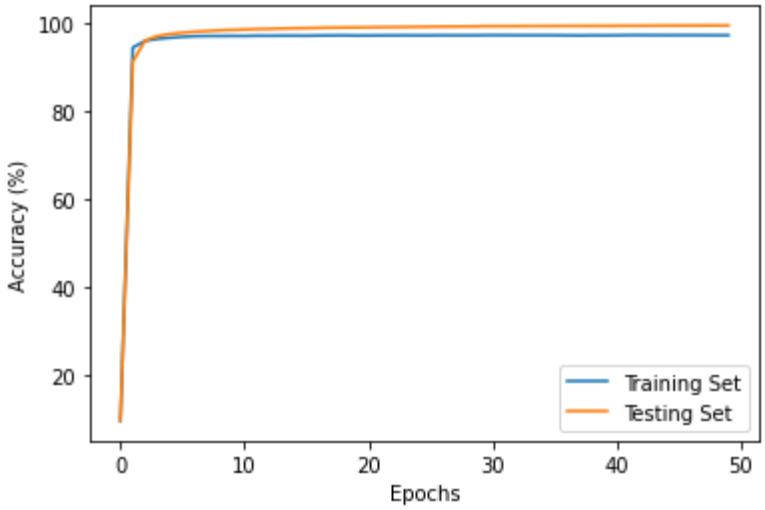
b) M= 0.25

```
confusion matrix

[968   0   0   3   0   1   3   3   2   0]
[   0 1124    1    5    0    1    1    1    2    0]
[   2    1 1011    5    1    0    2    6    4    0]
[  1   0   5 985   0   7   0   3   4   5]
[  1   0   1   0 963   0   5   0   1  11]
[  4   1   0   7   0 864   4   2   4   6]
[ 10   2   0   1   0   6 936   0   2   1]
[  1   3  11   5   2   0   0 997   1   8]
[  4   2   3   3   5   3   5   3 941   5]
[  3   4   0   8   9   2   2   4   6 971]
testing - accuracy: 97.6
```



c) M= 0.5

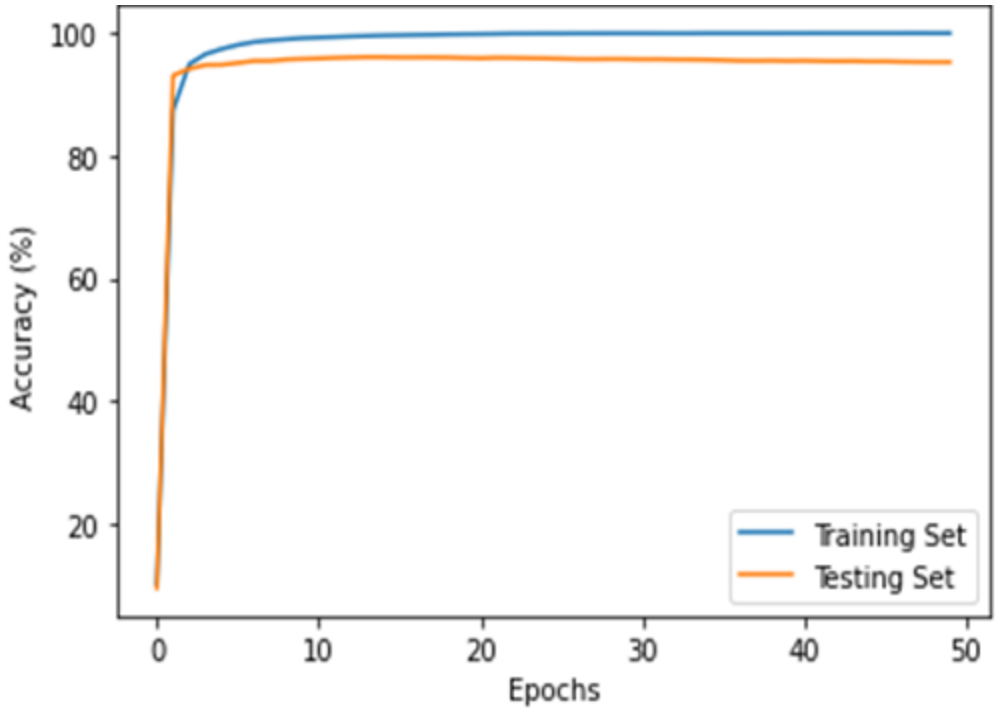
```
confusion matrix

[969   0   0   0   0   0   2   2   4   3]
[   0 1123    2    3    0    1    3    2    1    0]
[  8   1 999   3   1   1   2   7   8   2]
[  1   0   2 990   0   4   1   3   2   7]
[  1   2   2   1 952   0   9   1   1  13]
[  3   0   0  14   0 856   7   1   5   6]
[  5   3   1   1   2   4 938   0   4   0]
[  1   3   8   5   0   0   0 993   5  13]
[  3   1   0   3   6   8   1   2 946   4]
[  4   5   0   5   8   1   1   4   4 977]
testing - accuracy: 97.43
```



EXPERIMENT 3: Vary the training example

a) 15000

```
Confusion matrix for epoch  49
[[ 956    1    4    1    0    0    6    1   10    1]
 [   0 1118    1    4    2    2    2    1    5    0]
 [   4    5  973    8    4    1    5    9   19    4]
 [   2    1    7  946    0   14    0    6   23   11]
 [   0    1    2    1  918    0    5    2    7   46]
 [   3    1    2   15    0  827   10    5   19   10]
 [   4    2    4    2    4   10  916    0   14    2]
 [   2    2   12    1    2    1    0  979   10   19]
 [   5    0    3    7    4    4    7    3  935    6]
 [   4    6    0    4   11    2    1   10   24  947]]
```



b) 30000

```
Confusion matrix for epoch  49
[[ 965    1    0    4    0    1    1    1    4    3]
 [   0 1113    3    2    1    3    4    1    8    0]
 [   6    3  987    7    1    1    3    5   19    0]
 [   1    0    3  973    0    8    0    9   10    6]
 [   3    1    2    1  938    0    5    4    5   23]
 [   3    0    0   23    1  828   11    4   17    5]
 [   4    3    0    0    7   12  919    0   13    0]
 [   1    3   11    4    4    0    0  984    7   14]
 [   9    1    1    3    4    6   11    4  931    4]
 [   3    5    2    6    7    3    0    4   11  968]]
```