

smai_assignment_2_q_2_report

April 8, 2018

0.1 3-Layer Feed-Forward Neural Network

0.1.1 Dermatology Dataset

In [10]:

```
=====
Activation function : "ReLU"
=====
```

```
Learning Rate: 1e-05
No Of Epochs: 2000
```

```
No of Hidden Nodes: 1 ==> 5-fold Accuracy: 30.985915492957748
No of Hidden Nodes: 5 ==> 5-fold Accuracy: 92.67605633802816
No of Hidden Nodes: 10 ==> 5-fold Accuracy: 94.92957746478874
No of Hidden Nodes: 20 ==> 5-fold Accuracy: 96.3380281690141
No of Hidden Nodes: 30 ==> 5-fold Accuracy: 97.46478873239437
No of Hidden Nodes: 40 ==> 5-fold Accuracy: 97.18309859154928
No of Hidden Nodes: 50 ==> 5-fold Accuracy: 96.61971830985915
No of Hidden Nodes: 60 ==> 5-fold Accuracy: 97.18309859154928
No of Hidden Nodes: 70 ==> 5-fold Accuracy: 97.1830985915493
No of Hidden Nodes: 80 ==> 5-fold Accuracy: 96.61971830985915
No of Hidden Nodes: 90 ==> 5-fold Accuracy: 98.02816901408451
No of Hidden Nodes: 100 ==> 5-fold Accuracy: 98.02816901408451
```

```
=====
Activation function : "Tanh"
=====
```

```
Learning Rate: 1e-05
No Of Epochs: 2000
```

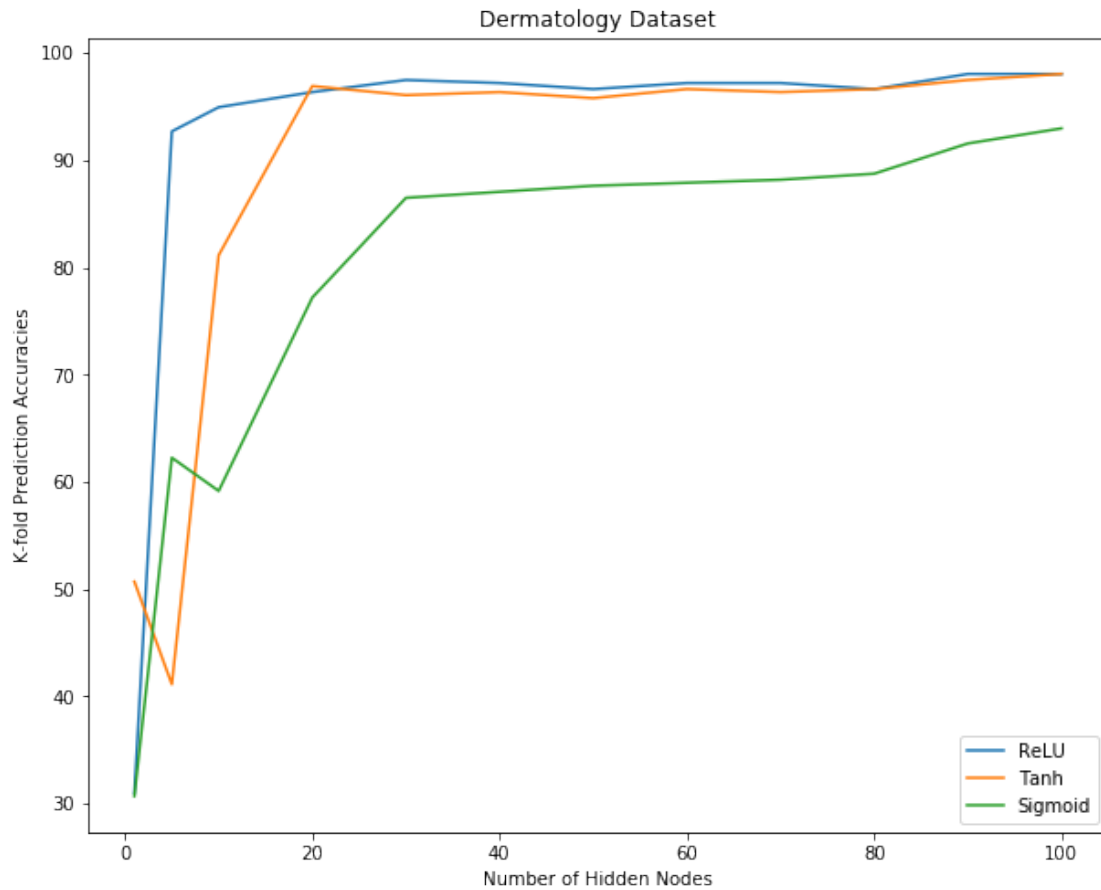
```
No of Hidden Nodes: 1 ==> 5-fold Accuracy: 50.70422535211268
No of Hidden Nodes: 5 ==> 5-fold Accuracy: 41.12676056338029
No of Hidden Nodes: 10 ==> 5-fold Accuracy: 81.12676056338027
No of Hidden Nodes: 20 ==> 5-fold Accuracy: 96.90140845070422
```

No of Hidden Nodes: 30 ==> 5-fold Accuracy: 96.05633802816901
No of Hidden Nodes: 40 ==> 5-fold Accuracy: 96.3380281690141
No of Hidden Nodes: 50 ==> 5-fold Accuracy: 95.77464788732395
No of Hidden Nodes: 60 ==> 5-fold Accuracy: 96.61971830985915
No of Hidden Nodes: 70 ==> 5-fold Accuracy: 96.33802816901408
No of Hidden Nodes: 80 ==> 5-fold Accuracy: 96.61971830985915
No of Hidden Nodes: 90 ==> 5-fold Accuracy: 97.46478873239437
No of Hidden Nodes: 100 ==> 5-fold Accuracy: 98.02816901408451

=====
Activation function : "Sigmoid"
=====

Learning Rate: 1e-05
No Of Epochs: 2000

No of Hidden Nodes: 1 ==> 5-fold Accuracy: 30.70422535211268
No of Hidden Nodes: 5 ==> 5-fold Accuracy: 62.25352112676056
No of Hidden Nodes: 10 ==> 5-fold Accuracy: 59.15492957746479
No of Hidden Nodes: 20 ==> 5-fold Accuracy: 77.1830985915493
No of Hidden Nodes: 30 ==> 5-fold Accuracy: 86.47887323943662
No of Hidden Nodes: 40 ==> 5-fold Accuracy: 87.04225352112675
No of Hidden Nodes: 50 ==> 5-fold Accuracy: 87.6056338028169
No of Hidden Nodes: 60 ==> 5-fold Accuracy: 87.88732394366198
No of Hidden Nodes: 70 ==> 5-fold Accuracy: 88.16901408450704
No of Hidden Nodes: 80 ==> 5-fold Accuracy: 88.73239436619717
No of Hidden Nodes: 90 ==> 5-fold Accuracy: 91.54929577464789
No of Hidden Nodes: 100 ==> 5-fold Accuracy: 92.95774647887325



0.1.2 Pendigit Dataset

In [11]:

```
=====
Activation function : "ReLU"
=====
```

```
Learning Rate: 1e-06
No Of Epochs: 2000
```

```
No of Hidden Nodes: 1 ==> 5-fold Accuracy: 9.946595460614152
No of Hidden Nodes: 5 ==> 5-fold Accuracy: 9.946595460614152
No of Hidden Nodes: 10 ==> 5-fold Accuracy: 84.0720961281709
No of Hidden Nodes: 20 ==> 5-fold Accuracy: 88.27770360480642
No of Hidden Nodes: 30 ==> 5-fold Accuracy: 88.73164218958611
No of Hidden Nodes: 40 ==> 5-fold Accuracy: 88.7316421895861
No of Hidden Nodes: 50 ==> 5-fold Accuracy: 88.90520694259013
```

No of Hidden Nodes: 60 ==> 5-fold Accuracy: 88.95861148197596
No of Hidden Nodes: 70 ==> 5-fold Accuracy: 88.91855807743659
No of Hidden Nodes: 80 ==> 5-fold Accuracy: 88.99866488651536
No of Hidden Nodes: 90 ==> 5-fold Accuracy: 89.01201602136182
No of Hidden Nodes: 100 ==> 5-fold Accuracy: 89.0520694259012

Model Chosen with hidden Nodes: 100

Accuracy over test data for this model is: 87.07833047455689

=====
Activation function : "Tanh"
=====

Learning Rate: 1e-05
No Of Epochs: 2000

No of Hidden Nodes: 1 ==> 5-fold Accuracy: 9.906542056074766
No of Hidden Nodes: 5 ==> 5-fold Accuracy: 41.97596795727637
No of Hidden Nodes: 10 ==> 5-fold Accuracy: 83.67156208277704
No of Hidden Nodes: 20 ==> 5-fold Accuracy: 86.16822429906543
No of Hidden Nodes: 30 ==> 5-fold Accuracy: 87.94392523364488
No of Hidden Nodes: 40 ==> 5-fold Accuracy: 87.91722296395194
No of Hidden Nodes: 50 ==> 5-fold Accuracy: 88.18424566088117
No of Hidden Nodes: 60 ==> 5-fold Accuracy: 88.53137516688919
No of Hidden Nodes: 70 ==> 5-fold Accuracy: 88.53137516688919
No of Hidden Nodes: 80 ==> 5-fold Accuracy: 88.57142857142858
No of Hidden Nodes: 90 ==> 5-fold Accuracy: 88.75834445927903
No of Hidden Nodes: 100 ==> 5-fold Accuracy: 88.74499332443257

Model Chosen with hidden Nodes: 90

Accuracy over test data for this model is: 86.59233847913093

=====
Activation function : "Sigmoid"
=====

Learning Rate: 1e-05
No Of Epochs: 2000

No of Hidden Nodes: 1 ==> 5-fold Accuracy: 9.906542056074766
No of Hidden Nodes: 5 ==> 5-fold Accuracy: 36.301735647530045
No of Hidden Nodes: 10 ==> 5-fold Accuracy: 83.77837116154872
No of Hidden Nodes: 20 ==> 5-fold Accuracy: 86.34178905206943
No of Hidden Nodes: 30 ==> 5-fold Accuracy: 87.70360480640853
No of Hidden Nodes: 40 ==> 5-fold Accuracy: 87.91722296395194
No of Hidden Nodes: 50 ==> 5-fold Accuracy: 88.03738317757009
No of Hidden Nodes: 60 ==> 5-fold Accuracy: 88.1708945260347
No of Hidden Nodes: 70 ==> 5-fold Accuracy: 88.46461949265687

No of Hidden Nodes: 80 ==> 5-fold Accuracy: 88.54472630173564
No of Hidden Nodes: 90 ==> 5-fold Accuracy: 88.70493991989319
No of Hidden Nodes: 100 ==> 5-fold Accuracy: 88.73164218958611

Model Chosen with hidden Nodes: 100

Accuracy over test data for this model is: 87.02115494568325

