

## Output of Assignment 3-Yu Jiahan-116010274

I use three KNN models.

First KNN model: **randomly** pick 10 vectors of each digit

### Training Information

```
Beginning of Training @ 2017-05-11 13:42:35.415550
-----
Training Information
-----
0 = 10
1 = 10
2 = 10
3 = 10
4 = 10
5 = 10
6 = 10
7 = 10
8 = 10
9 = 10
-----
Total Samples = 100
-----
```

### Testing Information

```
-----
Testing Information
-----
0 = 19, 1, 95%
1 = 15, 5, 75%
2 = 25, 0, 100%
3 = 17, 1, 94%
4 = 19, 6, 76%
5 = 15, 1, 94%
6 = 16, 0, 100%
7 = 19, 0, 100%
8 = 14, 3, 82%
9 = 14, 6, 70%
-----
Accuracy = 88.27%
Correct/Total = 173 / 196
-----
End of Training @ 2017-05-11 13:42:39.363475
```

## Prediction

```
-----  
                        Prediction  
-----  
figure 1 : 5  
figure 2 : 2  
figure 3 : 1  
figure 4 : 8  
figure 5 : 2  
figure 6 : 9  
figure 7 : 9  
figure 8 : 3  
-----
```

Second KNN model: using **all** data

## Training Information

```
Beginning of Training @ 2017-05-11 13:42:39.765500  
-----  
                Training Information  
-----  
          0 = 100  
          1 =  94  
          2 =  93  
          3 = 105  
          4 =  87  
          5 =  81  
          6 =  95  
          7 =  90  
          8 = 109  
          9 =  89  
-----  
Total Samples = 943  
-----
```

## Testing Information

Testing Information			
0	=	19, 1,	95%
1	=	20, 0,	100%
2	=	25, 0,	100%
3	=	17, 1,	94%
4	=	21, 4,	84%
5	=	16, 0,	100%
6	=	16, 0,	100%
7	=	19, 0,	100%
8	=	15, 2,	88%
9	=	20, 0,	100%
Accuracy = 95.92%			
Correct/Total = 188 / 196			
End of Training @ 2017-05-11 13:43:20.878496			

## Prediction

Prediction	
figure 1	: 5
figure 2	: 2
figure 3	: 1
figure 4	: 8
figure 5	: 2
figure 6	: 9
figure 7	: 9
figure 8	: 5

Third KNN model: calculate **mean** vector of each digit

## Training Information

```
Beginning of Training @ 2017-05-11 13:43:22.922333
-----
Training Information
-----
      0 = 1
      1 = 1
      2 = 1
      3 = 1
      4 = 1
      5 = 1
      6 = 1
      7 = 1
      8 = 1
      9 = 1
-----
Total Samples = 10
-----
```

## Testing Information

```
-----
Testing Information
-----
      0 = 19, 1, 95%
      1 = 18, 2, 90%
      2 = 24, 1, 96%
      3 = 16, 2, 89%
      4 = 23, 2, 92%
      5 = 15, 1, 94%
      6 = 16, 0, 100%
      7 = 19, 0, 100%
      8 = 13, 4, 76%
      9 = 13, 7, 65%
-----
Accuracy = 89.80%
Correct/Total = 176 / 196
-----
End of Training @ 2017-05-11 13:43:23.478248
```

## Prediction

Prediction		
figure 1	:	5
figure 2	:	2
figure 3	:	1
figure 4	:	8
figure 5	:	2
figure 6	:	9
figure 7	:	9
figure 8	:	5