CS-454 HW2 Report

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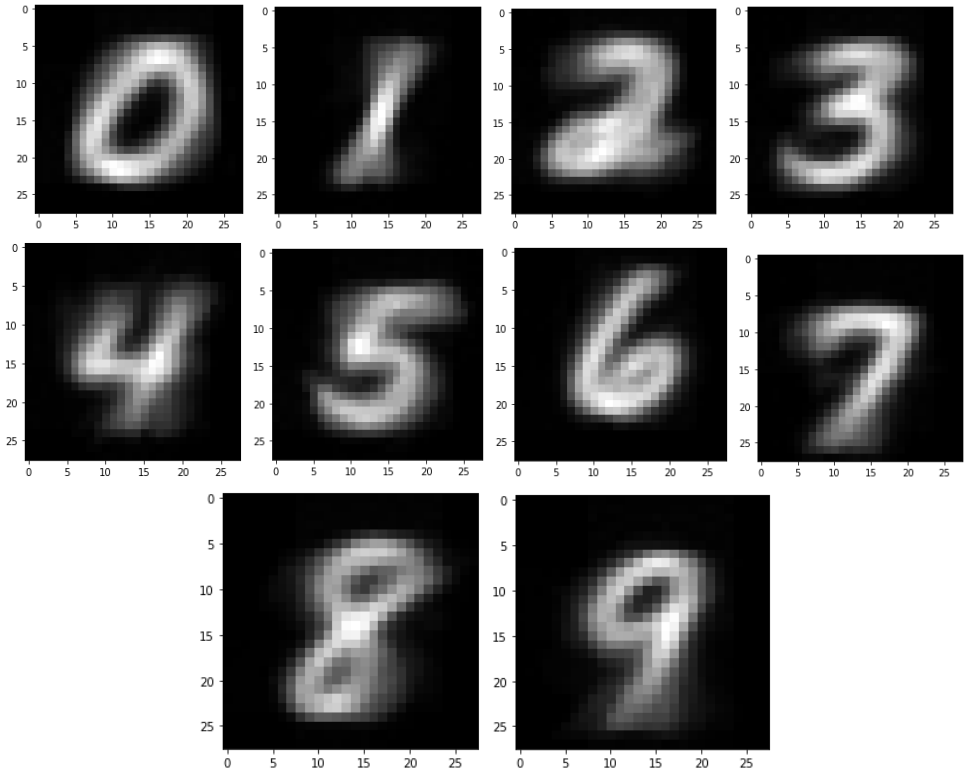
S015674

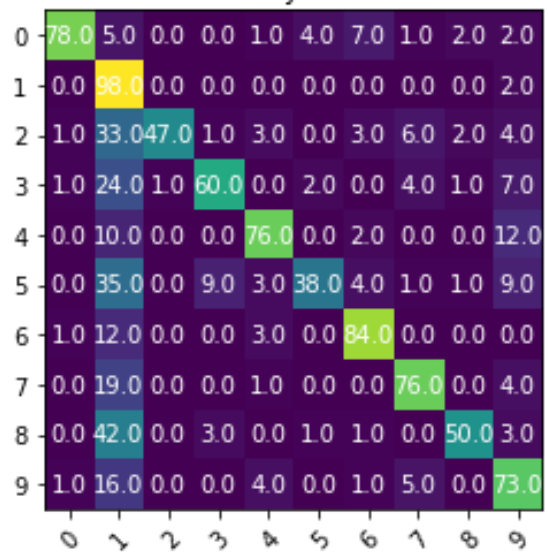
1. Nearest Mean Algorithm
    a. Training Procedure
        i. Given labeled training samples $\{(x1, y1), \dots , (xn, yn)\}$ with class labels $yi \in Y$
        ii. Compute mean values per class by $\mu l = \frac{1}{|Cl|}\sum_{i \in Cl} xi$ where Cl is the set of indices of samples belonging to class $l \in Y$

    b. Prediction procedure
        i. The class assigned to an observation x is $y = argmin_{l \in Y}|ul - x|$

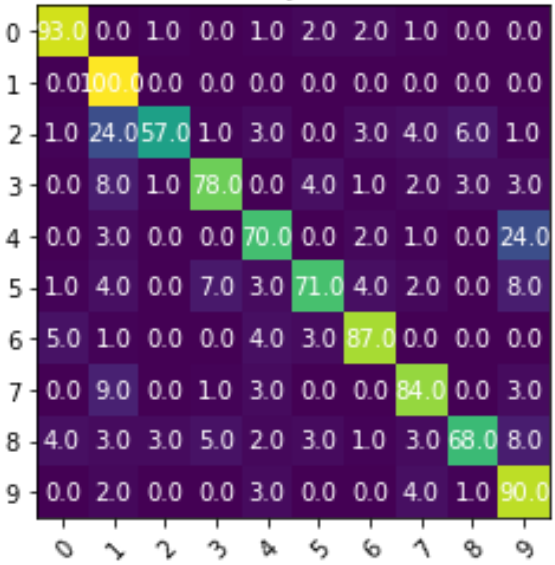
    c. Results from homework
        i. Mean images for each class



Confusion matrix of the nearest mean classifier on train dataset
accuracy= %68.0

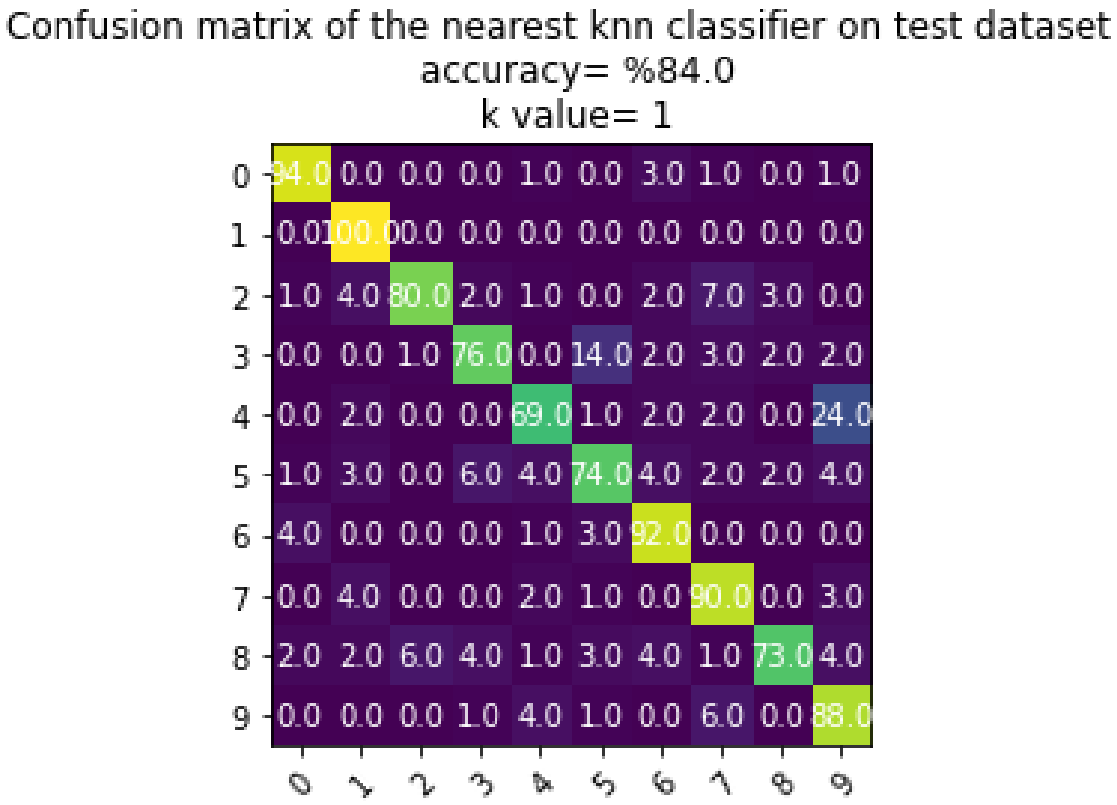


Confusion matrix of the nearest mean classifier on test dataset
accuracy= %80.0

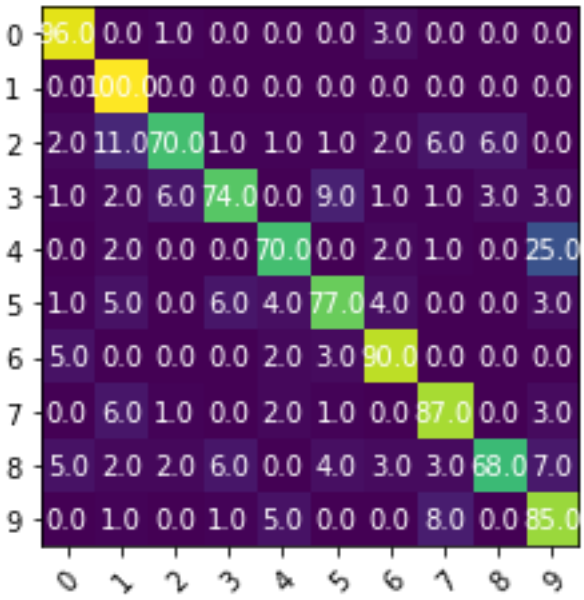


2. K Nearest Neighbors Algorithm
    a. Steps
        i. For each test instance in data
        ii. From each training sample calculate the distance from test instance
        iii. Find k smallest distances
        iv. Find k smallest distances labels
        v. From majority vote of k smallest labels determine the class of the test instance

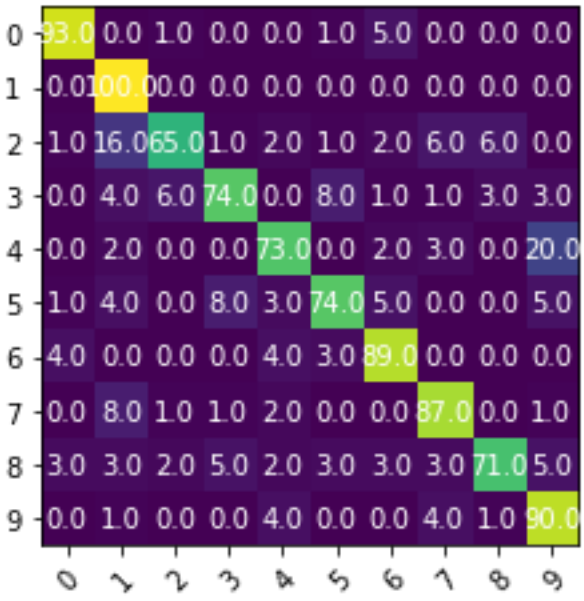
    b. Results from homework



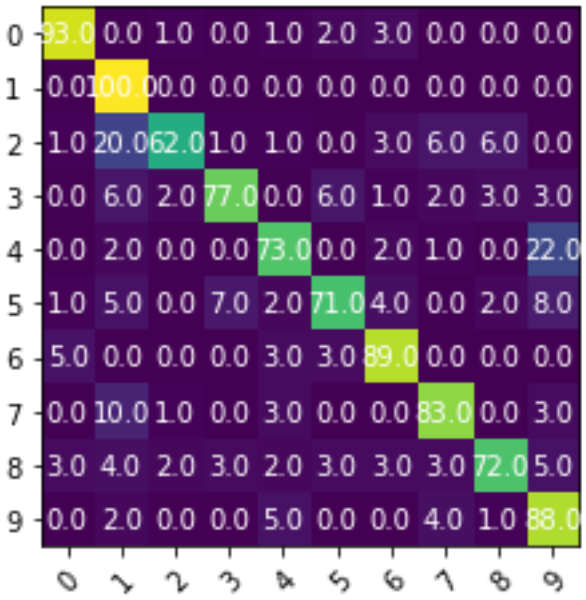
Confusion matrix of the nearest knn classifier on test dataset
accuracy= %82.0
k value= 3



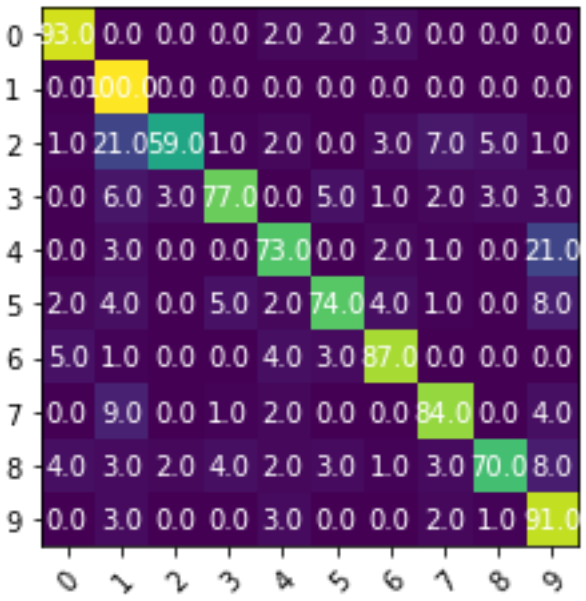
Confusion matrix of the nearest knn classifier on test dataset
accuracy= %82.0
k value= 5



Confusion matrix of the nearest knn classifier on test dataset
accuracy= %81.0
k value= 7



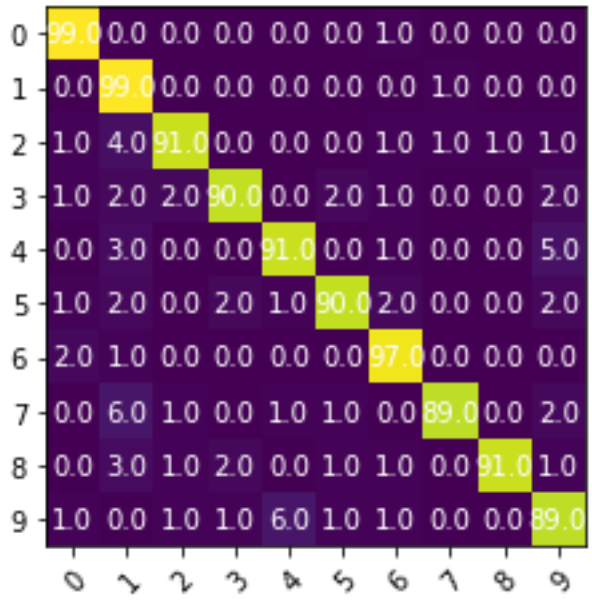
Confusion matrix of the nearest knn classifier on test dataset
accuracy= %81.0
k value= 9



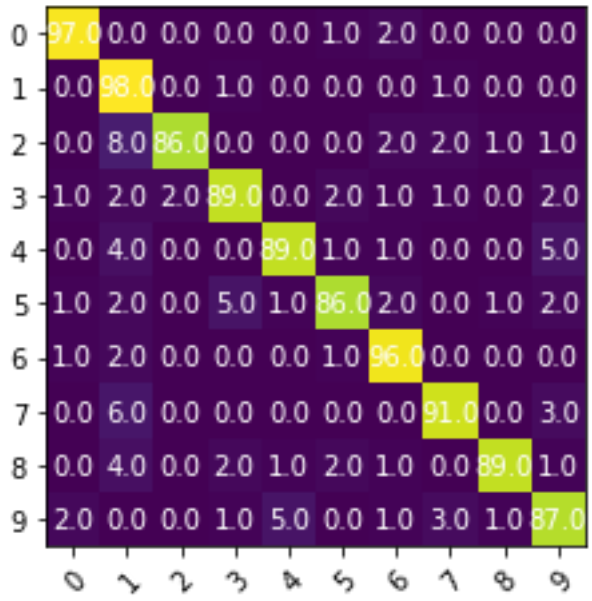
Confusion matrix of the nearest knn classifier on test dataset
accuracy= %80.0
k value= 11

Confusion matrix of the nearest knn classifier on train dataset
accuracy= %100.0
k value= 1

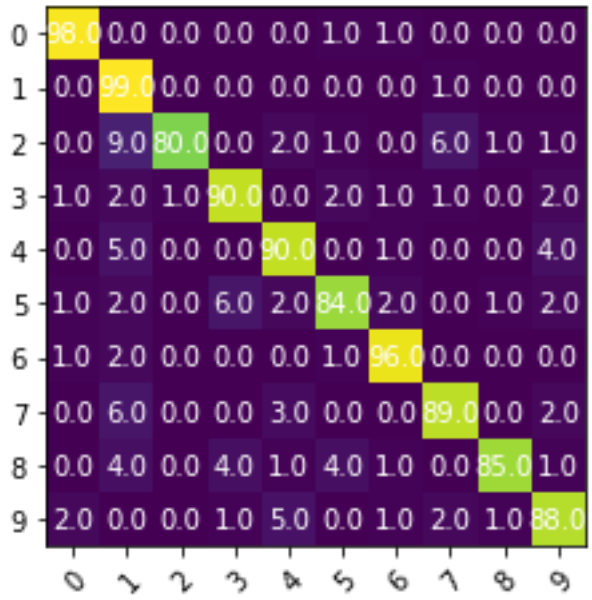
Confusion matrix of the nearest knn classifier on train dataset
accuracy= %93.0
k value= 3



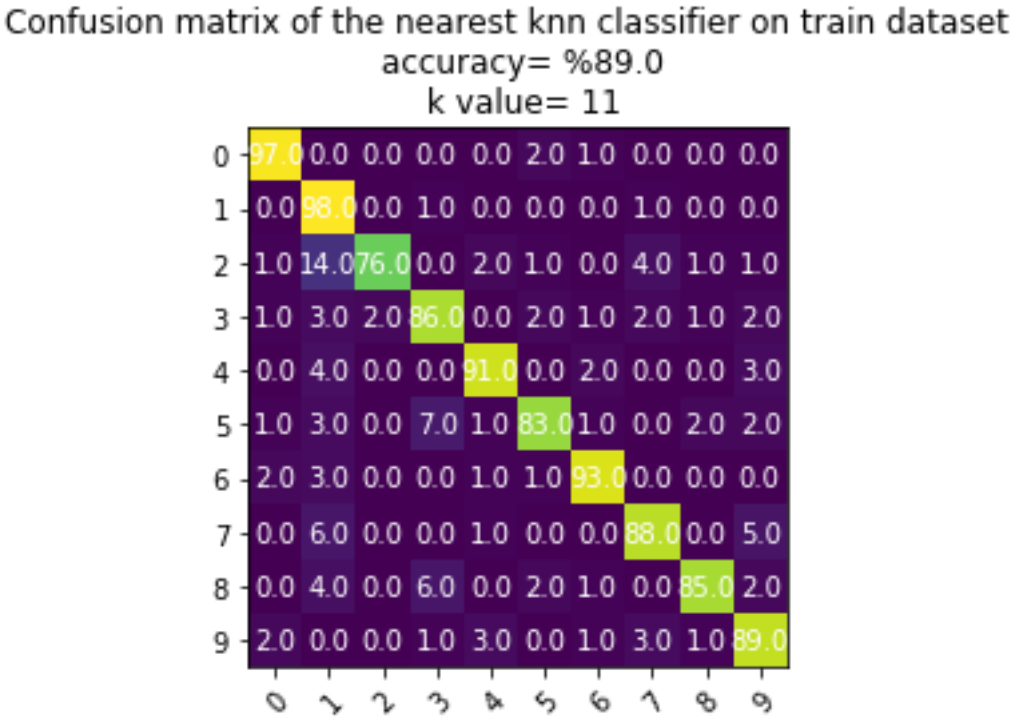
Confusion matrix of the nearest knn classifier on train dataset
accuracy= %91.0
k value= 5

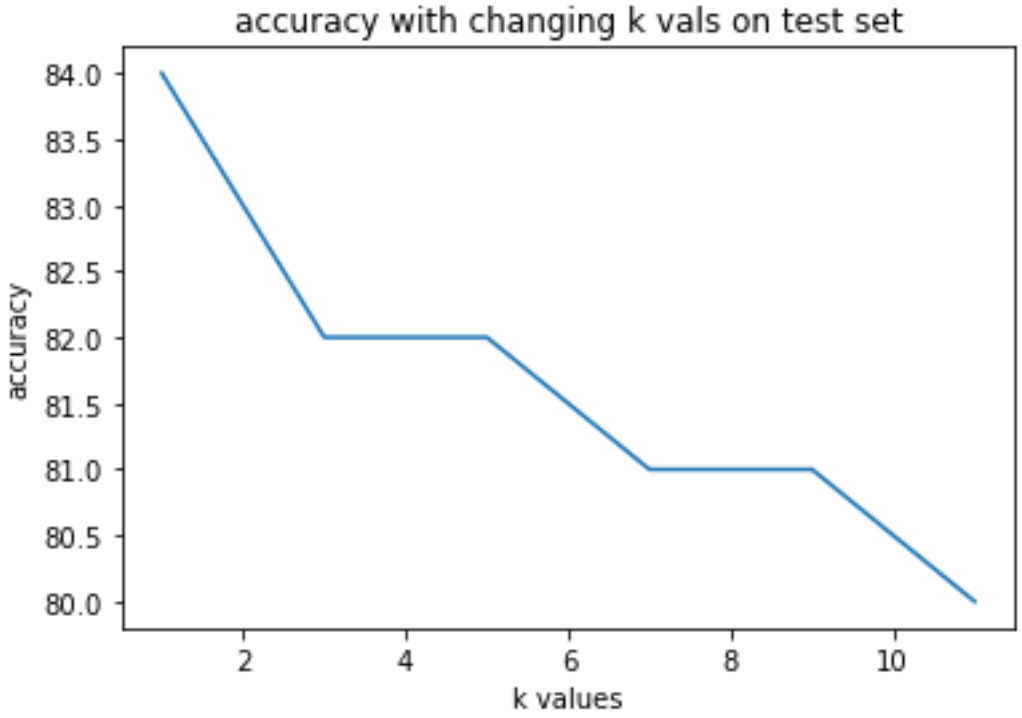


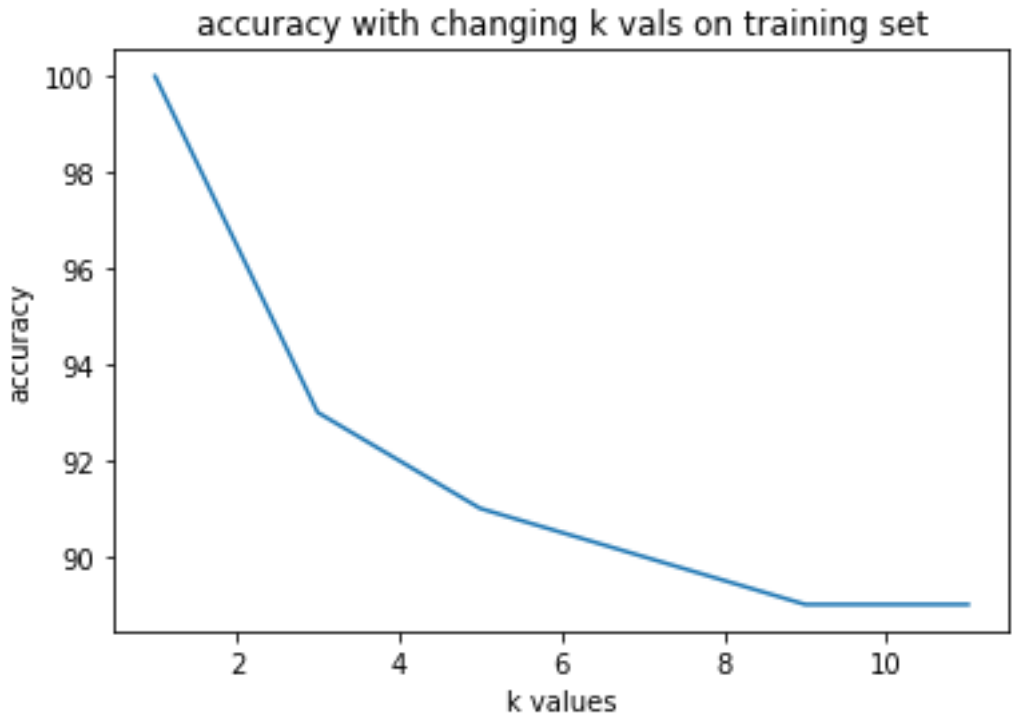
Confusion matrix of the nearest knn classifier on train dataset
accuracy= %90.0
k value= 7



Confusion matrix of the nearest knn classifier on train dataset
accuracy= %89.0
k value= 9


Confusion matrix of the nearest knn classifier on train dataset
accuracy= %89.0
k value= 11
0 97.0 0.0 0.0 0.0 0.0 2.0 1.0 0.0 0.0 0.0
1 0.0 98.0 0.0 1.0 0.0 0.0 0.0 1.0 0.0 0.0
2 1.0 14.0 76.0 0.0 2.0 1.0 0.0 4.0 1.0 1.0
3 1.0 3.0 2.0 86.0 0.0 2.0 1.0 2.0 1.0 2.0
4 0.0 4.0 0.0 0.0 91.0 0.0 2.0 0.0 0.0 3.0
5 1.0 3.0 0.0 7.0 1.0 83.0 1.0 0.0 2.0 2.0
6 2.0 3.0 0.0 0.0 1.0 1.0 93.0 0.0 0.0 0.0
7 0.0 6.0 0.0 0.0 1.0 0.0 0.0 88.0 0.0 5.0
8 0.0 4.0 0.0 6.0 0.0 2.0 1.0 0.0 85.0 2.0
9 2.0 0.0 0.0 1.0 3.0 0.0 1.0 3.0 1.0 89.0
0 1 2 3 4 5 6 7 8 9


accuracy with changing k vals on test set
accuracy
84.0
83.5
83.0
82.5
82.0
81.5
81.0
80.5
80.0
2
4
6
8
10
k values


accuracy with changing k vals on training set
100
98
96
94
92
90
accuracy
2
4
6
8
10
k values