Computer Vision Methods for Medical & Biomedical Images

Exercise 6

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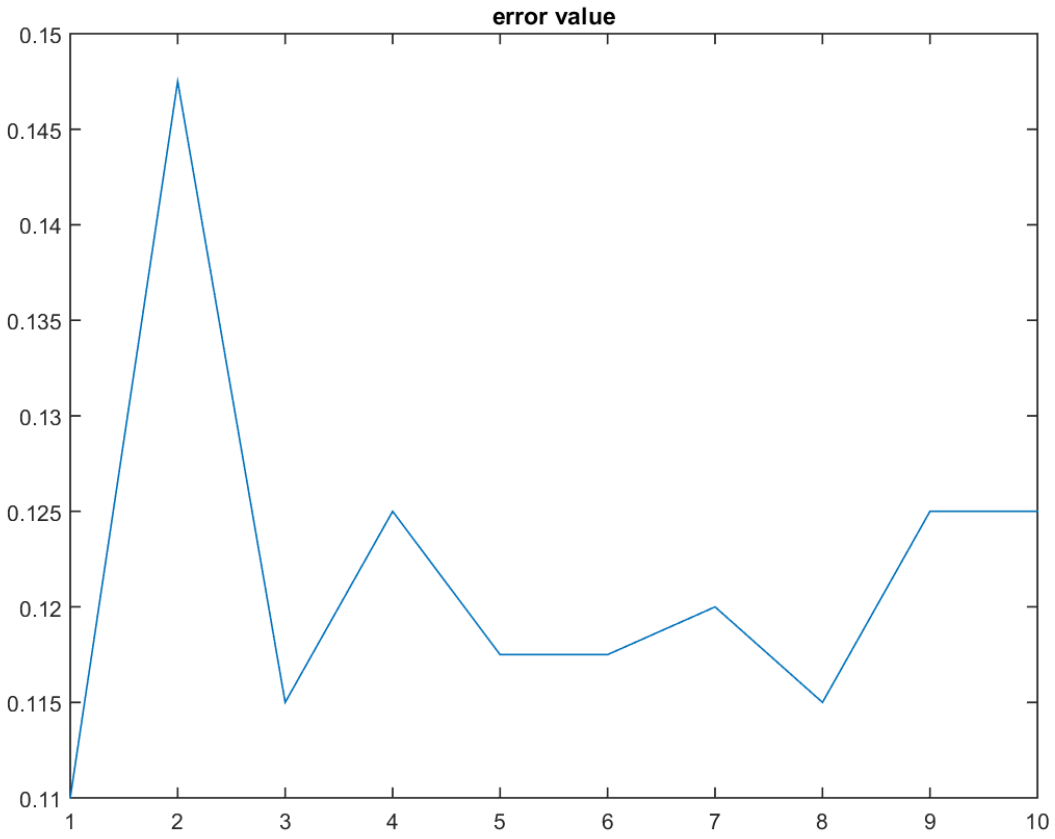
Section 1

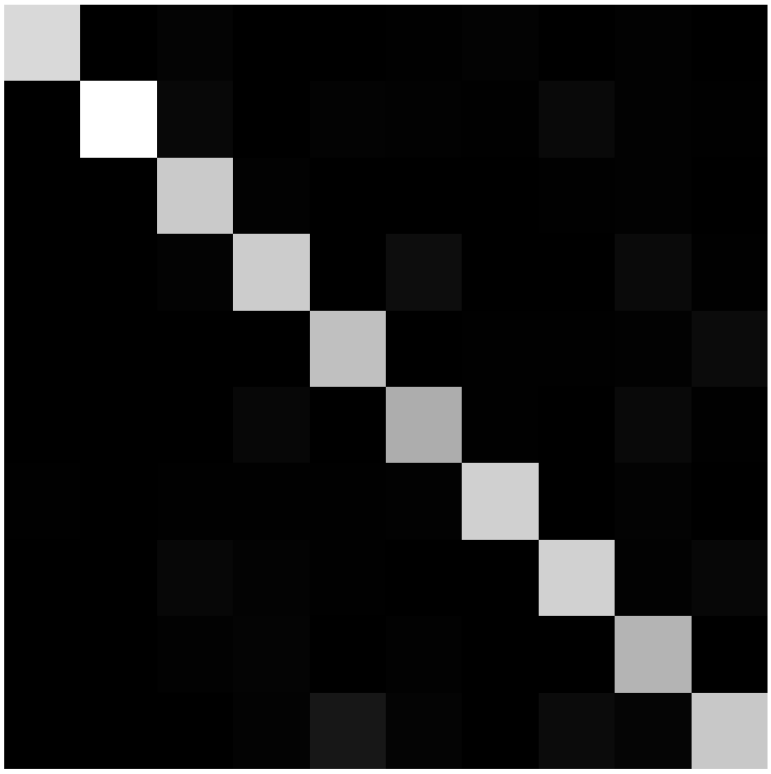
Q1. I guess we would have to prefer the larger value of k as the larger k results smoother classification boundary

Q2. I expect higher error rate will occur, because extracting handwritten digit number which could contain small noises in the background is unlike the images we trained with for a best classifier.

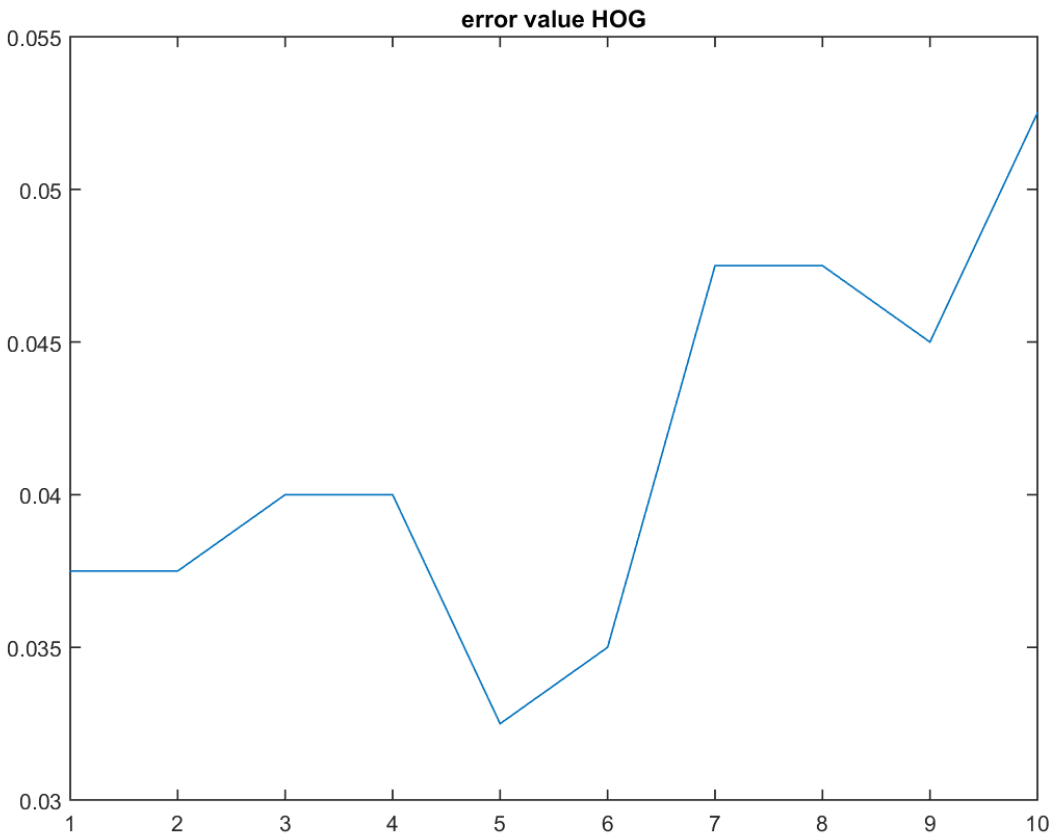
1. Plot chart how training and validation error varies with k



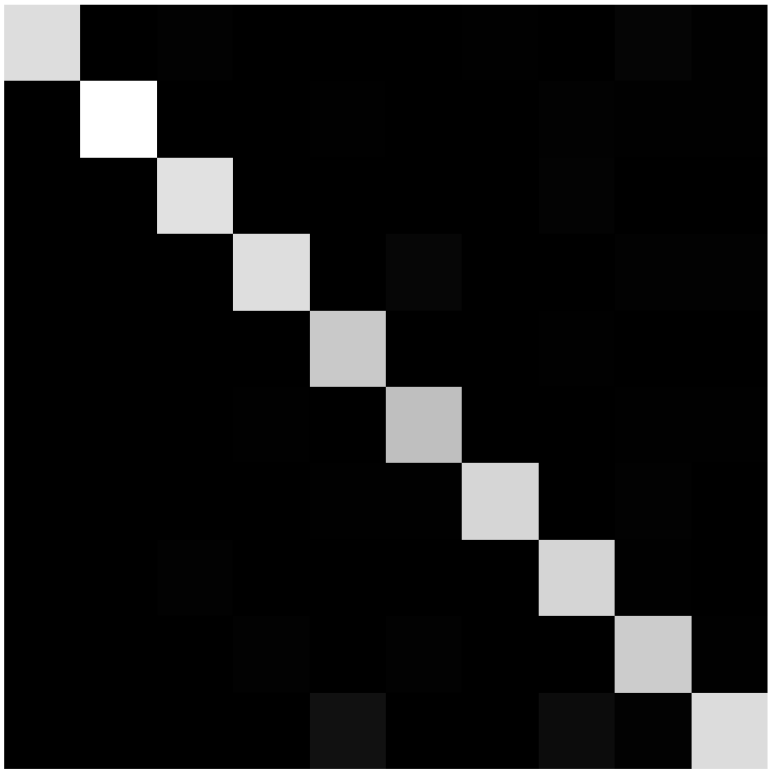
2. Confusion matrix with best kNN classifier



3. Best K = 1, error = 0.1100
4. Plot chart how training and validation error varies with k (using HOG)


error value HOG
0.055
0.05
0.045
0.04
0.035
0.03
1
2
3
4
5
6
7
8
9
10

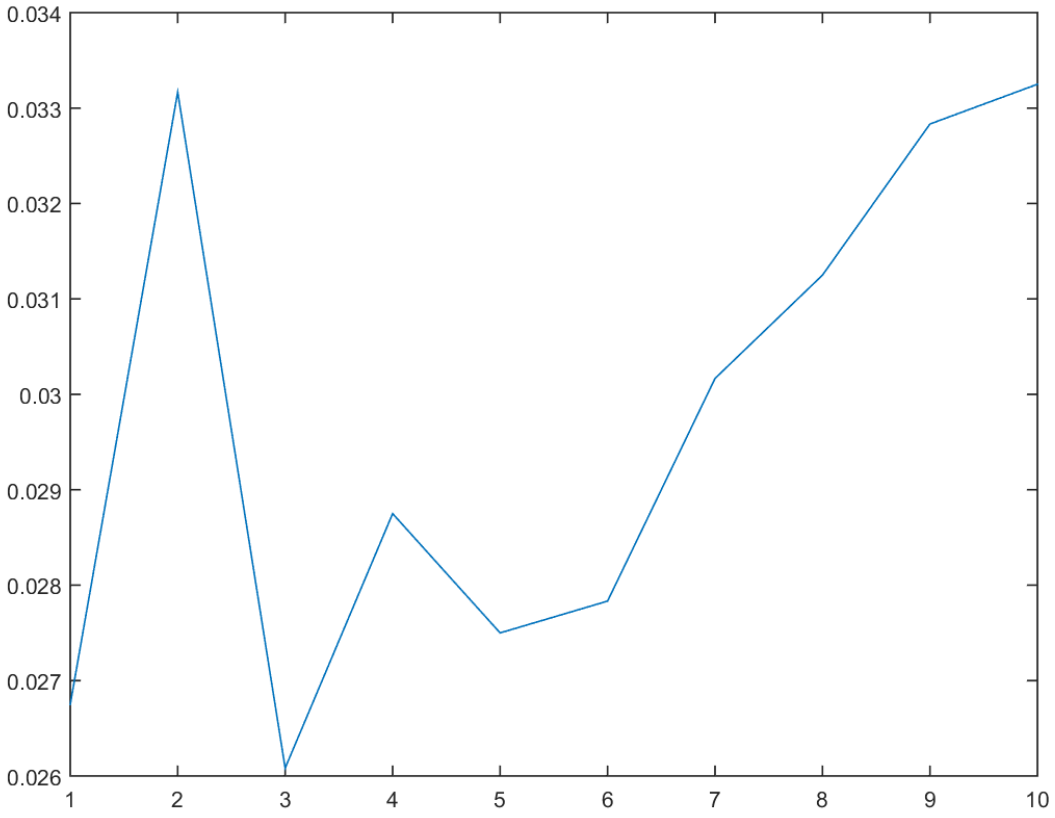
5. Confusion matrix with best kNN classifier (using HOG)



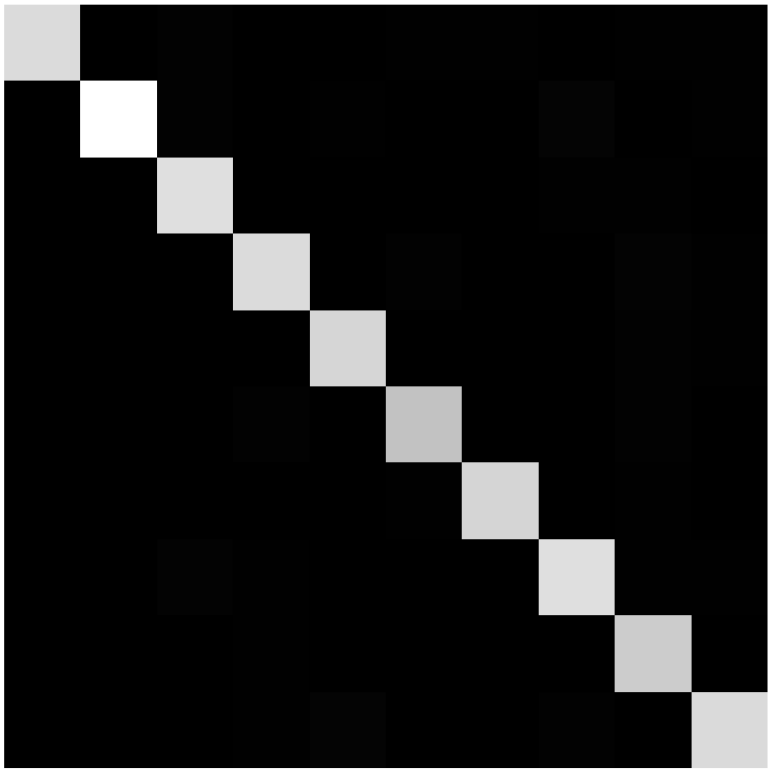
6. Best value k = 5, error rate = 0.325

Q3. I think yes for most of cases using image features results better, except in which cases using pixel values of training images of very high resolution might can outdo using features.

7. Plot chart how training and validation error varies with k (used 60,000 training data set)



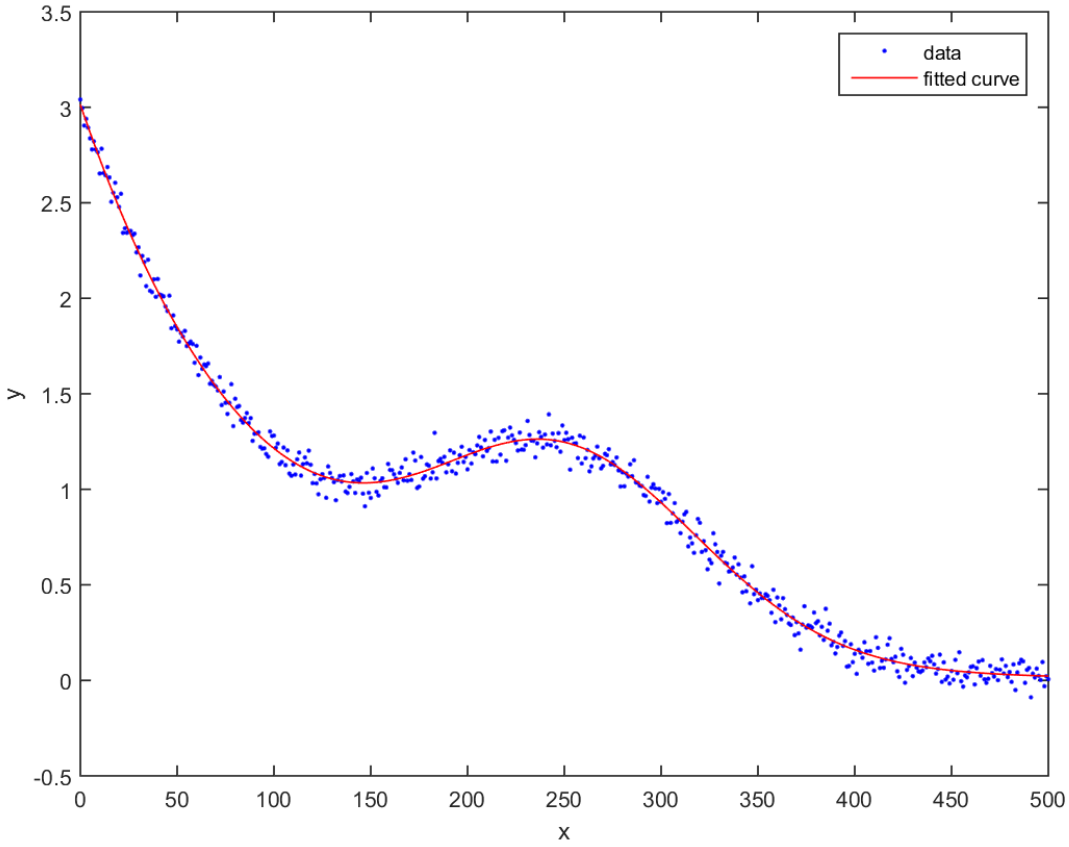
8. Confusion matrix with best kNN classifier (used 60,000 training data set)



9. Best value k = 3, error rate = 0.0261

Section 2

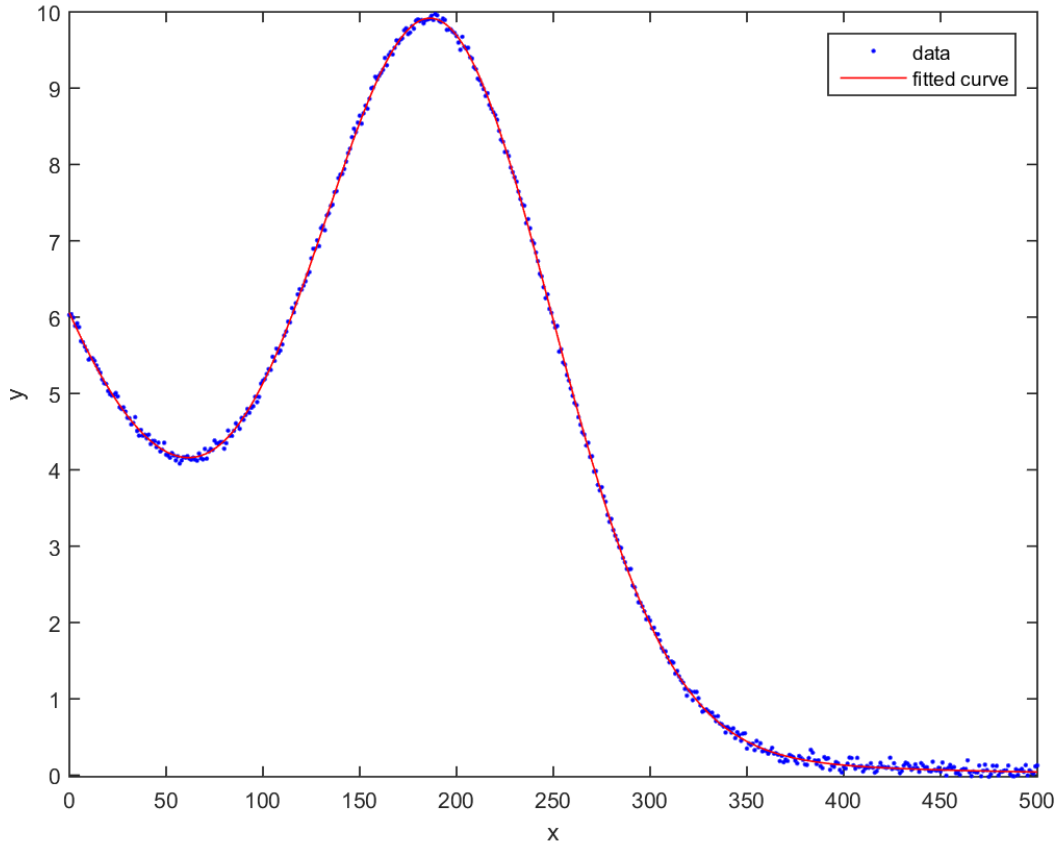
1. Plot showing the best fit line



2. The parameter value

   a = 3.013 (2.987, 3.038)
   b = 0.009943 (0.009715, 0.01017)
   c = 0.996 (0.9809, 1.011)
   d = 250.6 (249.4, 251.8)
   e = 99.3 (97.25, 101.3)

3. Plot showing the best fit line



4. The parameter value

a = 5.998 (5.974, 6.021)
b = 0.009944 (0.009796, 0.01009)
c = 8.993 (8.969, 9.016)
d = 190 (189.9, 190.1)
e = 84.86 (84.61, 85.11)