

COMS 474
Homework 8

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Problem 1

[15 points; 3 each]

Consider the following data set. There are two classes for Y (mapped to $\{-1, +1\}$). There is one feature X that can be used for prediction.

Y	X
-1	6
-1	7
-1	11
+1	9
+1	13
+1	14

A

Draw the scatter plot of the data by hand.

B

Sketch the prediction function $\hat{Y}(x)$ for the $k = 1$ nearest neighbour classifier on the scatter plot. Briefly explain your process.

C

Sketch the prediction function $\hat{Y}(x)$ for the $k = 3$ nearest neighbour classifier on the scatter plot. Briefly explain your process.

D

Sketch the prediction function $\hat{Y}(x)$ for the $k = 5$ nearest neighbour classifier on the scatter plot. Briefly explain your process.

E

Describe what would happen if you tried to use the max margin classifier for this data set.

Problem 2

[20 points; 4 each A-E]

For this problem you will fit classifiers to the same data sets you used in the last homework.

A

Change the classifiers used to the following nearest neighbour classifiers:

- 1-NN
- 10-NN
- 10-NN with distance-based weights (include argument weights='distance')
- Radius based neighbour classifiers for radii 3, 4, and 6 (uniform weights)
- Radius based neighbour classifiers for radii 3, 4, and 6 with distance-based weights

B