CMPE 257 Machine Learning Fall 2018

Homework 02

Due: 23:59pm on October 6, 2018

Please submit your homework on Canvas in PDF format. For Problems 10, 11, and 12, also submit the '.ipynb' file.

LFD stands for 'Learning From Data', the textbook.

1. (10pts) Problem 2.1 in LFD
2. (10pts) Problem 2.3 in LFD
3. (10pts) Problem 2.8 in LFD
4. (10pts) Problem 2.12 in LFD
5. (10pts) Problem 2.22 in LFD
6. (10pts) Prove that selecting the hypothesis *h* that maximizes the likelihood $\prod_{n=1}^{N} P(y_n|x_n)$ is equivalent to minimizing the cross-entropy error

$$E_{in}(\boldsymbol{w}) = \frac{1}{N}\sum_{n=1}^{N} \ln(1 + e^{-y_n \boldsymbol{w}^T \boldsymbol{x}_n})$$

7. (10pts) Derive the gradient of the in-sample error $\nabla E_{in}(\boldsymbol{w}(t))$ used in the gradient descent algorithm.
8. (10pts) Exercise 3.6
9. (10pts) Exercise 3.13 (a) (b) (c)
10. (20pts) Problem 3.1 in LFD. You can use "LFD Problem 3_1.ipynb" as the start point to generate the data. Feel free to write your own code to generate the data.
11. (10pts) Problem 3.2 in LFD
12. (20pts) Problem 3.3 in LFD
13. (10pts) Problem 3.16 in LFD

No late homework is accepted. Discussions are allowed, copying is not!