CA_Assignment2

May 19, 2018

1 Cognitive Algorithms - Assignment 3 (30 points)

Cognitive Algorithms
Summer term 2018
Technische Universität Berlin
Fachgebiet Maschinelles Lernen

Due on May 23, 2018 10am via ISIS

After completing all tasks, run the whole notebook so that the content of each cell is properly displayed. Make sure that the code was ran and the entire output (e.g. figures) is printed. Print the notebook as a PDF file and again make sure that all lines are readable - use line breaks in the Python Code " if necessary. Points will be deducted, if code or content is not readable!

Upload the PDF file that contains a copy of your notebook on ISIS.

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Members: - Chen, Yang - Liu, Huiran - Smejkal, Karel - Tian, Qihang - Arat, Emrecan

1.1 # Part 1: Theory (13 points)

1.1.1 Task 1: Multiple Choice Questions (2 points)

A) The goal of LDA is to find a $\mathbf{w} \in \mathbb{R}^d$ that ... - [ ] minimizes mean class difference and minimizes variance in each class
- [ ] minimizes mean class difference and maximizes variance in each class
- [ ] maximizes mean class difference and maximizes variance in each class
- [X] maximizes mean class difference and minimizes variance in each class

B) Below you can see a figure that shows a data set of two classes (blue and yellow) and three different lines. Assume NCC is trained on the given data. Which line corresponds to the resulting decision boundary of NCC. - [ ] The black line resembles the decision boundary given by NCC.
- [X] The red line resembles the decision boundary given by NCC.
- [ ] The green line resembles the decision boundary given by NCC.

1.1.2 Task 2: Covariance (11 points)

Let X and Y be two random variables. In the lecture you learned about covariance and correlation.

$$\text{Cov}(X,Y) = \mathbb{E}(((X - \mathbb{E}(X))(Y - \mathbb{E}(Y)))$$

$$\text{Corr}(X,Y) = \frac{\text{Cov}(X,Y)}{\sqrt{\mathbb{V}(X)}\sqrt{\mathbb{V}(Y)}}$$