PR exam

Date : 21.2.2018

Prüfer : Prof. Nöth

Note : 1.3

1. Nearest neighbour

1.1 In the programming exercise, we dealt about the Nearest neighbour classifier. He drew some points on the sheet with pulse rate on one axis and blood pressure on other axis. Some points are classified as Diseased and others as cold or healthy. This is the data some hospital has from the previous year. Now if a point is plotted in the graph, how will you decide the class it belongs to ?

Answer : I hope that is pretty simple and everybody would be able to answer it.

1.2 In the tutorial class, we explained about a trick how to execute this. As the test samples are more which is more computationally intensive, what is the trick ?

**Answer :** I think so we should explain the trick which they have given in the nearest\_neighbour python file. I didn't explain that. But I said we use Vectorization . And also I said that we do blocking of the data. So that we can work on the entire vector by splitting it small vectors. For more information, google about blocking of array or matrix you will find numerous topics about it.

1.3 He also asked something about how the error of nearest neighbour is related to bayesian decision rule.

**Answer :** There was something mentioned in lecture that P(bayesian) <= P(nearest\_neighbour)<= 2\* p(bayesian). I wrote this and he was literally happy and moved on to next question.

2. Adaboost and Viola/Jones

2.1 He asked me to explain about the concept of adaboost.

Answer : I explained that it is combination of many weak classifier. What happens to sample weights after classification by each classifier. He expects this. He wants to know what happens to misclassified and correctly classified samples after one classifier. Then I wrote down the main points of algorithm. The error factor , classifier weights and samples weights formula. He asked me about the classifier weights formula specifically. Please try to draw the graph of the classifier weights ( alpha\_m) and explain what really happens in the graph. He also asked me what will be the classifier weights of good classifier. I said that it will be more and explained why. He was really satisfied with that.

2.2.1 Viola/Jones - Explain

Answer : I explained the three steps involved in it. 1) Feature selection from the image sub-window. 2) Adaboost is used as feature selector instead of classifier. 3) Classifier cascade. And explained something in each step. He expects keywords like face and non-face. If face, classifier will pass through the image. If non-face, classifier will rejected the feature selected.

2.2.2 He drew a confusion matrix for face and non-face instead of positive and negative from lecture. He asked me which elements of the matrix your classifier will not consider.

Answer : The non-face column of your classifier or hypothesis or predictor whichever way you like to call it.

3. Support vector machines

3.1 Basic concept of support vector machine

Answer : I explained him the SVM is used for linearly separable data. Two types : Hard and soft margin. Drew a graph for both and explained.

3.2 He drew two interlinked ellipse and asked me to use soft margin SVM.

Hope you can visualize the ellipses properly.

Answer : He marked nothing. I was confused slightly. Then I plotted some 'plus' points and 'minus' points inside the ellipse. And a misclassification of each ellipse. I wrote down the optimization problem for soft margin SVM with all constraints( decision boundary and slack variable ). Then I drew the soft margin decision boundary between the ellipses.

He asked me where will the misclassified samples be projected.

Answer: Gave some thought and said that it will be projected on the respective margins. And its correct.

He also asked me whether the decision boundary is unique for soft margin SVM.

Answer: It is not unique.

Which factor is responsible for the non-uniqueness ?

Answer: It is the mu which we multiple with slack variables. You can call it as weighting factor also.

ufffff. Exam over.

Prepare well for your exam.

All the best.

Kindly forgive me for grammar/spelling mistakes. Didn't give a check for that.