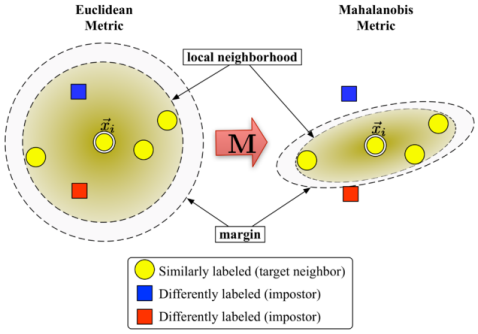
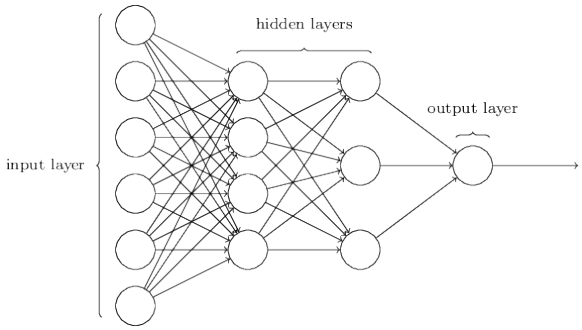
EE468/EE9SO29/EE9CS729

Pattern Recognition

Coursework on Distance Metrics and Neural Networks [50% mark]





Release on 28 Nov 2017, the report due on 22 Dec 2017 (midnight)

The course work requires Matlab programming. In all questions, you can use any existing toolbox/code, unless specified. Some suggestions are below.

Submission instructions:

One joint report by each pair

Page limit: 3 (three) A4 pages per report with 10 font size (use the IEEE standard double column paper format, either in MS word or latex). List of references and appendix do not count for this page limit. Use report template from Blackboard.

At master level of this course, general principles for writing technical report are expected to be known and adhered to. Similarly for practices in conducting experiments, some are as listed below:

- Select relevant results that support the points you want to make rather than everything that matlab gives.
- The important results should be in the report, not just in the appendix.
- Use clear and tidy presentation style, consistent across the report e.g. figures, tables.
- The experiments should be described such that there is no ambiguity in the settings, protocol and metrics used.
- The main points are made clear, identifying the best and the worst case results or other important observations.
- Do not copy standard formulas from lecture notes, explain algorithms in detail, or copy figures from other sources. References to lecture slides or publications/webpages are

enough in such cases, however short explanations of new terms or parameters referred to are needed.

Find and demonstrate the parameters that lead to optimal performance and validate it by presenting supporting results. Give insights, discussions, and reasons behind your answers. **Quality and completeness of discussions within the page limit** will be marked. Include formulas where appropriate, results presented in figures and their discussion.

Code required for the experiments can be taken from any public library if available, otherwise implemented if necessary. Source code, is not expected, however if needed it can go to appendices, which do not count for the page limit.

Submit the report in **pdf** through the Blackboard system. No hard copy is needed. Write your **full names, logins and CID numbers on the first page. Use both logins in the submitted filename e.g. login1_login2.pdf.** The latest submission before the deadline will be assessed.

If you have questions, please post it on **goo.gl/Ad4cxw**

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Download Wine recognition data from Blackboard. Its number of features are: class 1: 59, class 2: 71, class 3: 48.

NOTE: 1st dimension out of 15 identifies training and test split (1-training, 2-test). 2nd dimension is class identifier (1-3).

Q1. [20] Distance Metrics

Perform nearest neighbour classification experiments according to standard practices in pattern recognition. Use classification error as a fraction of incorrectly classified test points to compare different metrics from the course.

Q2. [15] K-means clustering

Employ K-means to reduce the complexity of nearest neighbour classifier and compare the performance for different distance metrics.

Q3. [15] Neural Network

Using Matlab Neural Network toolbox create a network, train and test with the wine data.