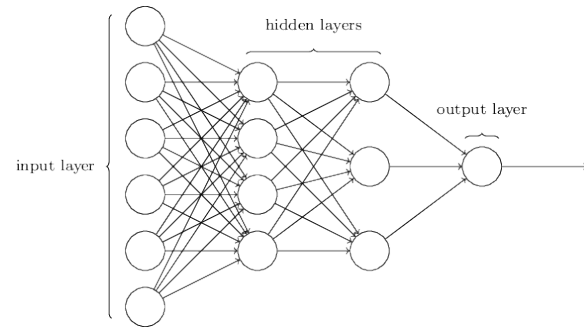
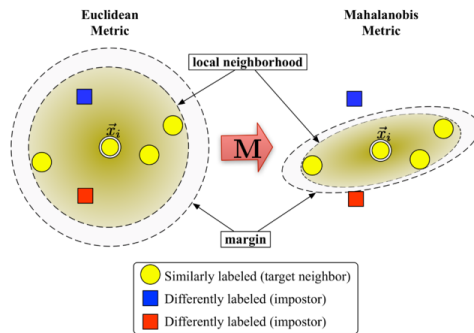


## Pattern Recognition

### Coursework on Representation and Distance Metrics Learning [50 points]



**Release on 15 Oct 2018, the report due on 14 Dec 2018 (midnight)**

The coursework requires Matlab or python programming. In all questions, you can use any existing toolbox/code, unless specified.

#### Submission instructions:

One joint report by each pair

**Page limit: 4 (four) A4 pages** per report. List of references and appendix do not count for this page limit. Use report Latex template from Blackboard.

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 discussions.

Code required for the experiments can be taken from any public library if available, otherwise implemented if necessary.

Submit the report in **pdf** through the Blackboard system. No paper 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.

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Download **Person re-ID** dataset from Blackboard.

Perform k-nearest neighbour (kNN) retrieval experiments according to standard practices in pattern recognition. Use retrieval error (i.e. @rank1, @rank10) as the performance metric to evaluate different methods. Your baseline approach is kNN on provided features. Use distance metric learning methods to improve a baseline performance.

The report should include:

**[3 points]** 100 word summary

**[10 points]** Formulation of the Machine Learning problem you address

**[10 points]** Perform evaluation experiment of the baseline approach. Consider incorporating k-means as an additional baseline.

**[10 points]** Proposed improved approach, discussing what challenge and how it is specifically addressing.

**[10 points]** Insightful and comparative evaluation of the proposed approach.

**[7 points]** A source code that executes the training and testing of the reported methods in a zip package (login1\_login2.zip). Do not include the data in the zip file. Short user instructions should be included in an appendix of the report. Place the zip on external repository (e.g. Box) and include link in the report.

Both baseline and improved approach should transform features and the retrieval should be done with k-nearest neighbour retrieval. The absolute improvement upon baseline will not affect the mark.