Computational Cognitive Science, Tutorial 04

Wai Keen Vong (waikeen.vong@adelaide.edu.au)
University of Adelaide, School of Psychology

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Since the first problem set is now out and you guys are probably working hard on it, this week's tutorial will be a bit easier, and we'll review the major concepts that were covered in supervised classification. Also, starting from this week's tutorial, I'll be including material from the previous Friday (so for this week's tutorial we won't be covering unsupervised classification, but you will see it next week instead). Hopefully it means that for people who can't make the Friday lectures because of clashes with other classes, you'll have more time to watch it online before seeing the material in tutorials!

1 Supervised Classification

Give definitions for each of these concepts:

- The classical view of concepts
- Graded membership and family resemblance
- Supervised learning
- Prototype theory
- Normal (Gaussian) distribution
- Multivariate Normal (Gaussian) distribution
- Exemplar theory
- Parametric vs. Non-parametric classifiers
- Kernels
- The k-nearest neighbours classifier
- Kernel density estimators
- Cross validation

2 Playing with Classifiers

- Have a look inside Dan's classifiers code at the `demos.R` file (which you can download from MyUni) for examples of creating data sets and running different classifiers on them. Create your own one-dimensional data set by creating a vector of features, and a vector of class labels, and running the `simpleGaussianClassifier` on your own data.

- Now create a two-dimensional data set by having two columns of features, and a vector of class labels, and run the `multivariateGaussianClassifier`, `kNN` and `kernelClass` classifiers on them. Try them out with different parameter settings and see which classifiers work best. Can you think of situations when these classifiers break down?
- I'll be giving a demonstration of these classifiers in the tutorial, so feel free to bring your laptops and follow along. If we have time, I might also demonstrate some of the models we've covered in earlier lectures too as knowing how they work will be useful in completing the first problem set!

3 Problem Set 1 Queries

Try and have a look at the problem set before coming to this week's tutorial, and feel free to ask any questions – either with answering for help about answering the questions, or how to do certain things in R. Alternatively, e-mail me if you want to discuss it during my office hours after the tutorial.