

McMASTER UNIVERSITY
GRADUATE PROGRAM IN STATISTICS

STATISTICS SEMINAR

Speaker: Ali Ghodsi
Department of Statistics and Actuarial Science
University of Waterloo

Title: Distance Metric Learning Vs. Fisher Discriminant Analysis
Day: Tuesday, March 4, 2008

Time: 3:30 - 4:30 PM

Place: HH/217 - Deloitte Colloquium Room
(refreshments in HH/216 at 3:00 PM)

SUMMARY

In many fundamental machine learning problems (e.g. classification, clustering, dimensionality reduction) the Euclidean distances between data points do not represent the desired topology that we are trying to capture. Distance metric learning methods address this problem by constructing a Mahalanobis distance (quadratic Gaussian metric) over the input space and use it in place of Euclidean distances. This approach can be equivalently interpreted as a linear transformation of the original inputs, followed by Euclidean distance in the projected space.

There has been much recent attention to this problem. However, most proposed algorithms are iterative and computationally expensive. In this talk, I show how to solve one of these methods with a closed-form solution, rather than using complicated optimization methods. I provide a new problem setup in which the algorithm performs significantly better or as well as some standard methods, but without the computational complexity. Furthermore, I show a strong relationship between these methods and the Fisher Discriminant Analysis.

REFERENCES

- Ghodsi, A., Wilkinson, D. F., and Southey, F. 2007. Improving embeddings by flexible exploitation of side information. In Veloso, M. M., ed., *International Joint Conference on Artificial Intelligence*, 810816.
- Globerson, A., and Roweis, S. 2006. Metric learning by collapsing classes. In Weiss, Y.; Scholkopf, B.; and Platt, J., eds., *Advances in Neural Information Processing Systems 18*, 451458. Cambridge, MA: MIT Press.
- Xing, E. P.; Ng, A. Y.; Jordan, M. I.; and Russell, S. 2003. Distance metric learning with application to clustering with side-information. In S. Becker, S. T., and Obermayer, K., eds., *Advances in Neural Information Processing Systems 15*, 505512. Cambridge, MA: MIT Press.

ABOUT THE SPEAKER



Professor Ali Ghodsi received his B.S. from Shiraz University in Iran. He received an M.S. from Concordia University and his PhD in Computer Science from the University of Waterloo. Since 2005 he has been an assistant professor in the Department of Statistics and Actuarial Science at the University of Waterloo.

Professor Ghodsi's research interests lie at the interface of statistics and computer science. They span a variety of areas in computational statistics particularly in the areas of machine learning and probabilistic modelling. He studies theoretical frameworks and develops new machine-learning algorithms for analyzing large-scale data sets, with applications in data mining, pattern recognition, robotics, computer vision, sequential decision making, and bioinformatics.

MORE SEMINAR INFORMATION

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