COSC FACULTY CANDIDATE 2010 SEMINAR

SPEAKER: Dr. Alexandru Niculescu-Mizil, IBM T.J. Watson Research Center

DATE: FRIDAY, APRIL 2, 2010
TIME: 11:00 AM
WHERE: PGH 232

Host: Dr. Ricardo Vilalta

TITLE: Transfer Learning for Scientific Discovery

ABSTRACT:
As more and more data is collected in virtually all fields of science, scientists are increasingly turning to machine learning and data mining for help with understanding this data and discovering interesting regularities in it. Thus, developing powerful tools for data exploration and understanding is an increasingly important challenge for machine learning and data mining.

In this talk I will focus on one such tool: Bayesian Networks. Bayesian Networks provide a compact, intuitive description of the dependency structure of a domain by using a directed acyclic graph to encode statistical dependencies between variables. One of the most useful features of Bayesian Networks is the ability to learn this dependency graph from observational data, and use is as a powerful data analysis tool to gain valuable insights into the problem at hand.

While receiving significant attention in the machine learning community, Bayesian Network structure learning remains challenging, especially when training data is scarce. In this talk I show how structure learning performance can be significantly improved through inductive transfer, when data is available for multiple related problems. Departing from the traditional approach of learning the dependency graph for a single problem in isolation, I present a score and search algorithm for jointly learning multiple related Bayesian Networks that improves the quality of the leaned dependency structures by transferring useful information among the different related problems. I demonstrate the effectiveness of the algorithm using two standard benchmark structure learning problems, and a real bird ecology problem.

SHORT BIO
Alexandru Niculescu-Mizil is a Herman Goldstine postdoctoral fellow at IBM T.J. Watson Research Center. He received his Ph.D. from Cornell University in 2008 under the supervision of Rich Caruana, a Masters of Science degree in Computer Science from Cornell University and a Magna Cum Laude Bachelors degree in Mathematics and Computer Science from University of Bucharest. His research interests are in machine learning and data mining, particularly in inductive transfer, graphical model structure learning, probability estimation, empirical evaluations, ensemble methods and on-line learning. He received an ICML Distinguished Student Paper Award in 2005 for his work on probability estimation, and a COLT Best Student in 2008 paper award for his work on on-line learning. In 2009 he led the IBM Research team that won the KDD Cup.