Speaker: Oliver Schulte, Simon Fraser University

Title: What is the value of an action in ice hockey? Q-Learning for the National Hockey League.

Abstract: A fundamental goal of sports statistics is to understand which actions contribute to winning. This talk describes how fundamental modeling tools from Artificial Intelligence can be applied to answer this question. For ice hockey, we build a Markov Decision Process (MDP) Model for an extensive dataset about NHL matches. This dataset comprises all play-by-play event/action sequences from 2007 to 2014, for a total of over 2.8M events/actions. The MDP facilitates data exploration by revealing which action patterns lead to key events such as goals and penalties. The resulting model can be viewed as a stochastic simulator for professional ice hockey. We use dynamic programming to compute the MDP’s Q-function, which indicates the value of an action as a function of the game context (state). The total Q-values of a player’s actions can be used to measure the player’s performance. This is a novel method for evaluating players, and presents an AI-based alternative to existing methods such as the +/- score or sabermetrics.

This is joint work with Kurt Routley (SFU, CS) and Tim Schwartz (SFU, Statistics).

Bio: Oliver Schulte is a Professor in the School of Computing Science at Simon Fraser University, Vancouver, Canada. He received his Ph.D. from Carnegie Mellon University in 1997. His current research focuses on machine learning for structured data, such as relational databases and event data. He has published papers in leading AI and machine learning venues on a variety of topics, including learning Bayesian networks, learning theory, game theory, and scientific discovery. While he has won some nice awards, his biggest claim to fame may be a draw against chess world champion Gary Kasparov.