

Speaker: Prof. Chris Williams

Talk Title: Time Series Understanding

Talk Abstract:

Data drawn from an observed system is often usefully described by a number of hidden (or latent) factors. Given a sequence of observations, a key goal is to infer which latent factors are active at each time frame, a task I call time series understanding. In this talk I will describe the application of a switching linear dynamical model to monitoring the condition of a patient receiving intensive care. The state of health of a patient cannot be observed directly, but different underlying factors are associated with particular patterns of measurements, e.g. in the heart rate, blood pressure and temperature.

I will start by presenting the basic Factorial Switching Linear Dynamical System (FSLDS) model for ICU condition monitoring (Quinn et al, PAMI 2009). This has been developed into a Hierarchical Switching Linear Dynamical System (HSLDS) for the detection of sepsis in a neonatal ICU, by adding a higher-level discrete switch variable with semantics sepsis/non-sepsis above the factors in the FSLDS. I will also discuss the potential for recurrent neural networks for the time series understanding task.

Joint work with Yvonne Freer, Konstantinos Georgatzis, Chris Hawthorne, Partha Lal, Neil McIntosh, Paul McMonagle, Ian Piper, John Quinn, Martin Shaw and Ioan Stanculescu.

Speaker Bio:

Chris Williams is Professor of Machine Learning and Director of Research in the School of Informatics, University of Edinburgh. He is interested in a wide range of theoretical and practical issues in machine learning, statistical pattern recognition, probabilistic graphical models and computer vision. This includes theoretical foundations, the development of new models and algorithms, and applications. His main areas of research are in visual object recognition and image understanding, models for understanding time-series, unsupervised learning, and Gaussian processes.

He obtained his MSc (1990) and PhD (1994) at the University of Toronto, under the supervision of Geoff Hinton. He was a member of the Neural Computing Research Group at Aston University from 1994 to 1998, and has been at the University of Edinburgh since 1998. He was program co-chair of the NIPS conference in 2009, and is a Turing Fellow at the Alan Turing Institute.