

COSC420 Course Outline

Introduction to artificial neural networks (ANNs) and "deep learning". These are computational tools inspired by the brain. They offer new perspectives on computation, and insights into human cognition. Deep learning is a currently popular technology underlying advances in artificial intelligence, as used by organisations such as Google, Baidu, Microsoft and Apple.

As this topic will be new to most, the course is divided into two phases. The first introduces basic material and will be in a lecture driven format. We will cover an introduction to the topic, the practical use and tuning of ANNs, and fundamental algorithms / architectures including (a selection of): 1-layer nets, multi-layer nets, back propagation, Hopfield nets, Boltzmann machines, unsupervised learning, dynamic architectures, reinforcement learning, and "deep learning" / convolutional nets.

The second phase covers current research within the field, and will be in a more open, student driven format. The material will be different every year, as it will be driven by your specific interests. Topics which have been frequently covered in the past include: advanced neural network theory, applications to vision and robotics, purpose built hardware ("neurocomputers"), applications within artificial life and software agents, neural/symbolic hybrids, mathematical and Bayesian interpretations, and applications to neuroscience and psychological modelling.