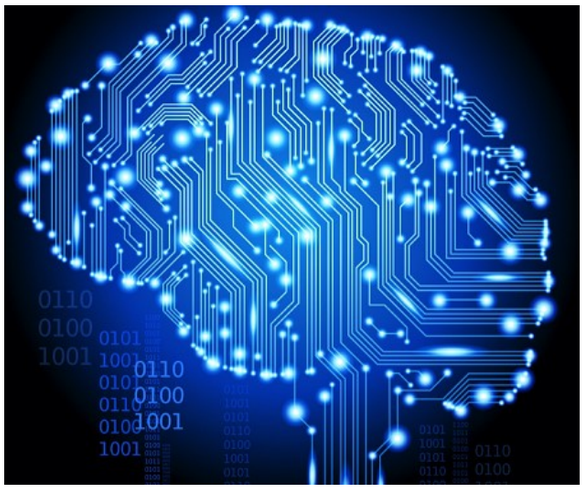
Pacific Institute for the Mathematical Sciences

PIMS Distinguished Speakers Series



BEN ADCOCK
Associate Professor
Simon Fraser University

Title: Instabilities in deep learning

Abstract: Deep learning lies at the forefront of the artificial intelligence revolution. Stunning successes has been achieved by deep learning for challenging tasks such as image classification. Yet, current deep learning implementations have a tendency to be unstable, and vulnerable to so-called adversarial attacks. In the first part of this talk, I will give an overview of these instabilities, and their potential consequences in applications. In the second part, I aim to focus on a rather different application of deep learning: namely, inverse problems in imaging. Image reconstruction is a crucial task in many different scientific, industrial and medical technologies, and one to which deep learning techniques have recently begun to be applied. However, as I will demonstrate, instabilities persist in this problem as well. I explain how such instabilities can be constructed, and conclude with some theoretical insights into why they arise and how they may eventually be mitigated.

This talk requires no prior knowledge of neural networks and should be accessible a general audience at the graduate or senior undergraduate level.

Bio:
2011: PhD University of Cambridge; 2010 to 2012: NSERC and PIMS postdoc at SFU; 2012 to 2014: Assistant Professor at Purdue University; Since 2015: faculty at SFU.

Awards: Leslie Fox Prize in Numerical Analysis in 2011, Alfred P. Sloan Research Fellowship in 2015, and CAIMS/PIMS Early Career Award in 2017.

Research interests: Numerical analysis, mathematics of data, approximation theory, computational harmonic analysis, compressed sensing, deep learning, sampling theory, spectral methods for PDEs.

Friday—November 22, 2019
12:00 to 12:50 pm

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