STATISTICS SEMINAR

Wednesday, October 4, 2017
4:15 pm
G01 Biotechnology

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Network Comparison

The topology of any complex system is key to understanding its structure and function. Fundamentally, algebraic topology guarantees that any system represented by a network can be understood through its closed paths. The length of each path provides a notion of scale, which is vitally important in characterizing dominant modes of system behavior. Here, by combining topology with scale, we prove the existence of universal features which reveal the dominant scales of any network. We use these features to compare several canonical network types in the context of a social media discussion which evolves through the sharing of rumors, leaks and other news. Our analysis enables for the first time a universal understanding of the balance between loops and tree-like structure across network scales, and an assessment of how this balance interacts with the spreading of information online. Crucially, our results allow networks to be quantified and compared in a purely model-free way that is theoretically sound, fully automated, and inherently scalable.

Sofia Olhede is since 2007 a professor of Statistics and an Honorary professor of Computer Science at University College London. She was awarded her PhD in 2003 at Imperial College London, where she was a Lecturer (assistant professor) and Senior Lecturer (associate professor) between 2002 and 2006. She is Director of UCL's Centre for Data Science, and until last year, chair of the Alan Turing Institute's Science Committee. Sofia served on the UK Royal Society's Machine Learning Committee, the British Academy and Royal Society Data Governance Project, and is a member of the Personal Data and Individual Access Control section of the The IEEE Global Initiative for Ethical Considerations in Artificial Intelligence and Autonomous Systems. She currently holds a European Research Council consolidator fellowship, and previously held a five year UK Engineering and Physical Sciences research council Leadership Fellowship. Sofia chairs and founded the UCL 'Theory of Big Data' international workshop series that attracts around 200 participants every year, and that is in its 3rd successful year.

Refreshments will be served following the seminar in 1181 Comstock Hall.