WESTERN SYDNEY UNIVERSITY

School of Computer, Data and Mathematical Sciences

# Research Seminar (11:00 am Thursday 13 June 2024)

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| 11:00 am-11:15 am | **Briefing:** Associate Professor Yi Guo<br>Open the seminar |
| 11:15 am -12:00 pm | **Invited Talk**<br>**Invited Speaker:** Associate Professor Georgy Sofronov in Statistics at Macquarie University.<br>Georgy Sofronov received a PhD degree in Probability Theory and Mathematical Statistics from Moscow State University in 2002. He has held academic positions at universities in Russia and Australia including the University of Queensland and the University of Wollongong. Currently, he is an Associate Professor in Statistics at Macquarie University. His research interests include change-point problems, optimal stopping rules, Markov chain Monte Carlo simulation, and the Cross-Entropy method.<br><br>**Topic:** Change-point detection problems<br>**Abstract:** Change-point problems (or break point problems, disorder problems) can be considered one of the central issues of mathematical statistics, connecting asymptotic statistical theory and Monte Carlo methods, frequentist and Bayesian approaches, fixed and sequential procedures. In many real applications, observations are taken sequentially over time or can be ordered with respect to some other criterion. The basic question, therefore, is whether the data obtained are generated by one or by many different probabilistic mechanisms. The change-point problem arises in a wide variety of fields, including bioinformatics, biomedical signal processing, speech and image processing, seismology, industry (e.g. fault detection) and financial mathematics. In this talk, I will give an overview of various approaches to change-point detection methods. |
| 12:00 pm-12:45 pm | **NCDMSers Presentation**<br>**Speaker:** Dr Nishanthi Raveendran, School of Computer, Data and Mathematical Sciences, Western Sydney University<br><br>**Topic:** Statistical solutions to spatial clustering problems<br>**Abstract:** Spatial clustering is one of the important components of spatial data analysis. Spatial data are often heterogeneous, indicating that there may not be a unique simple statistical model describing the data. However, if we cluster the data into homogeneous clusters or domains, it will be easier to apply the appropriate statistical model for each domain. The problem of finding homogeneous domains is known as segmentation, partitioning or clustering. It is commonly used in many areas including disease surveillance, spatial epidemiology, population genetics, landscape ecology, crime analysis and many other fields. Generally, these problems are quite complicated due to the multivariate nature of data, resulting in complex and highly parameterized likelihoods. To solve these problems, we propose to use the multiple change-point methodology. In this talk, I will present some novel statistical approaches based on Binary segmentation, Sequential importance sampling, Markov chain Monte Carlo and Cross Entropy methods to spatial clustering problems. |
| 12:45 pm-13:00 pm | **Closing Remarks and Network** |

Venue: PS-EA.2.29

Zoom Meeting ID: 833 2174 8049
Password: 2024
Link: https://uws.zoom.us/j/83321748049?pwd=M0ZTUTl4RWY1dy9TVGRNUFVPR3h4Zz09