香港浸會大學
HONG KONG BAPTIST UNIVERSITY

Organized by: Department of Mathematics

HKSIAM
香港工業與應用數學學會

Sponsored by: Hong Kong Society for Industrial and Applied Mathematics

Distinguished Lecture Series

Multi-tasking Inverse Problems: More Together Than Alone

Professor Carola-Bibiane Schönlieb

Professor of Applied Mathematics, University of Cambridge
Turing Fellow, Alan Turing Institute, British Library
Director of the EPSRC Centre for Mathematical and Statistical Analysis of Multimodal Clinical Imaging, University of Cambridge
Director of the Cantab Capital Institute for the Mathematics of Information, University of Cambridge
Head of the Cambridge Image Analysis, University of Cambridge
Fellow of Jesus College, Cambridge

Calderón Prize, the Inverse Problems International Association (2019)

Visiting Professorship, Institute Henri Poincare (2019)

Philip Leverhulme Prize (2017)
Whitehead prize, London Mathematical Society (2016)
EPSRC Science Photo Award, 1st Prize in the Category "People" (2014)
INiTS Award from INiTS (Innovation into Business), Vienna. 3rd Prize in the Category General Technologies (2010)
Mary Bradburn Award, British Federation of Women Graduates (2008)

Date: 14 October 2020 (Wednesday)

Time: 04:00-05:00 p.m. GMT+8 (Hong Kong Time)

Venue: Online via Zoom (Meeting ID: 991 4880 3896)

Abstract

Inverse imaging problems in practice constitute a pipeline of tasks that starts with image reconstruction, involves registration, segmentation, and a prediction task at the end. The idea of multi-tasking inverse problems is to make use of the full information in the data in every step of this pipeline by jointly optimising for all tasks. While this is not a new idea in inverse problems, the ability of deep learning to capture complex prior information paired with its computational efficiency renders an all-in-one approach practically possible for the first time.

In this talk we will discuss multi-tasking approaches to inverse problems, and their analytical and numerical challenges. This will include a variational model for joint motion estimation and reconstruction for fast tomographic imaging, joint registration and reconstruction (using a template image as a shape prior in the reconstruction) for limited angle tomography, as well as a variational model for joint image reconstruction and segmentation for MRI. These variational approaches will be put in contrast to a deep learning framework for multi-tasking inverse problems, with examples for joint image reconstruction and segmentation, and joint image reconstruction and classification from tomographic data.

✦✦✦ All are welcome ✦✦✦

For enquires please contact Ms. Claudia Chui, 3411 2348.

http://www.math.hkbu.edu.hk/