SoftMech Training Day

Friday, 8th January 2021

Welcome: Overview of the Training Day

Peter Stewart & Dirk Husmeier

10:50-11:00

Part 1: Mathematical modelling principles

11:00 -12:00

Introduction to mathematical modelling - Peter Stewart (10 minutes)

The principle of mass balance - Raimondo Penta (10 minutes)

Other conservation principles in more advanced models - Yangkun Du (10 minutes)

Parametrisation of mathematical models - Jakub Kory (10 minutes)

Solving and visualising mathematical models - Namshad Thekkethill (10 minutes)

Validating a mathematical model against data - Muhamad Hifzhudin Bin Noor Aziz (10 minutes)

Part 2: Video lecture on ``Dark Data" by David Hand (recorded)

12:00 - 13:00

In the era of big data, it is easy to imagine that we have all the information we need to make good decisions. But in fact the data we have are never complete, and may be only the tip of the iceberg. Just as much of the universe is composed of dark matter, invisible to us but nonetheless present, the universe of information is full of dark data that we overlook at our peril. In this video lecture, data expert David Hand will take you on a fascinating and enlightening journey into the world of the data we don't see. You will learn more about the many ways in which we can be blind to missing data and how that can lead us to conclusions and actions that are mistaken, dangerous, or even disastrous. In practice, we all have to make decisions using data. This video lecture will show you how to reduce the risk of making bad ones.

Lunch break: 13:00 – 14:00

Part 3: Speed dating
14:00-15:00

Get to know your peers and fellow students. This session will consist of a series of one-to-one meetings using Zoom breakout rooms to explore common research interests and collaboration opportunities.

Part 4: Parameter estimation and uncertainty quantification
15:00 – 16:00

David Dalton (12 minutes)
Sensitivity analysis: how to find out which parameters of your model matter

Dirk Husmeier (12 minutes)
Optimization for finding the best model parameters: speeding the process up with a surrogate model

Alan Lazarus (12 minutes)
Parameter estimation and uncertainty quantification: how confident are you about your parameter estimates?

Agnieszka Borowska (12 minutes)
Inference in coupled stochastic partial differential equations: combining Approximate Bayesian Computation and Gaussian Process regression

Yalei Yang (12 minutes)
Pattern recognition in cardiac magnetic resonance image processing with hierarchical Bayesian models