Intelligent Data Analysis for Complex Systems

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Abstract. The study of complex systems has benefited from knowledge and advance in virtually all traditional disciplines of science, engineering, economics, and medicine. A key challenge is how to effectively deal with dynamic and evolving data, models and structures in these systems.

Statistics has been the traditional discipline for studying data analysis, but the evolution of modern computing technologies has made it possible for the huge amount of data associated with complex systems to be properly organised and analysed. These developments have called for Intelligent Data Analysis (IDA), an interdisciplinary study concerned with the effective analysis of data, drawing methods from artificial intelligence, high-performance computing, mathematics, statistics, engineering and other disciplines.

In this talk, I will look into a range of complex systems and explore the role of IDA in these systems, in particular, how to ensure that quality data are obtained for analysis, challenges in analysing time course data and modelling dynamic systems, importance in handling human factors with care, as well as considering all these when analysing complex systems. Examples in biomedicine, finance, and security will be drawn from work carried out at the Centre for Intelligent Data Analysis at Brunel University.

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