Seminars

Date	Speaker	Seminar
22 August 2019 Time:11:10 to 12:00 Room M/2.06	Dr. Mofei Jia, Xi'an (Jiaotong-Liverpool University, China)	Curbing the Consumption of Positional Goods: Behavioural Interventions versus Taxation Little is known whether behavioural techniques, such as nudges, can serve as effective policy tools to reduce the consumption of positional goods. We study a game, in which individuals are embedded in a social network and compete for a positional advantage with their direct neighbours by purchasing a positional good. In a series of experiments, we test four policy interventions to curb the consumption of the positional good. We manipulate the type of the intervention (either a nudge or a tax) and the number of individuals exposed to the intervention (either the most central network node or the entire network). We illustrate that both the nudge and the tax can serve as effective policy instruments to combat positional consumption if the entire network is exposed to the intervention. Nevertheless, taxing or nudging the most central network node does not seem to be equally effective because of the absence of spillover effects from the center to the other nodes. As for the mechanism through which the nudge operates, our findings are consistent with an explanation where nudging increases the psychological cost of the positional consumption.
18 July 2019 Time:11:10 to 12:00 Room M/2.06	Nina Golyandina (St. Petersburg State University)	Detecting signals by Monte Carlo singular spectrum analysis: the problem of multiple testing The statistical approach to detection of a signal in noisy series is considered in the framework of Monte Carlo singular spectrum analysis. This approach contains a technique to control both type I and type II errors and also compare criteria. For simultaneous testing of multiple frequencies, a multiple version of MC-SSA is suggested to control the family-wise error rate.
1 July 2019 Room M/0.40	Dr. Joni Virta (University of Aalto)	Statistical properties of second-order tensor decompositions Two classical tensor decompositions are considered from a statistical viewpoint: the Tucker decomposition and the higher order singular value decomposition (HOSVD). Both decompositions are shown to be consistent estimators of the parameters of a certain

		noisy latent variable model. The decompositions' asymptotic properties allow comparisons between them. Also inference for the true latent dimension is discussed. The theory is illustrated with examples.
8 April 2019	Dr. Andreas Anastasiou (LSE)	Detecting multiple generalized change-points by isolating single ones In this talk, we introduce a new approach, called Isolate-Detect (ID), for the consistent estimation of the number and location of multiple generalized change-points in noisy data sequences. Examples of signal changes that ID can deal with, are changes in the mean of a piecewise-constant signal and changes in the trend, accompanied by discontinuities or not, in the piecewise-linear model. The method is based on an isolation technique, which prevents the consideration of intervals that contain more than one change-point. This isolation enhances ID's accuracy as it allows for detection in the presence of frequent changes of possibly small magnitudes. Thresholding and model selection through an information criterion are the two stopping rules described in the talk. A hybrid of both criteria leads to a general method with very good practical performance and minimal parameter choice. Applications of our method on simulated and real-life data sets show its very good performance in both accuracy and speed. The R package IDetect implementing the Isolate-Detect method is available from CRAN.
1 April 2019	Stephen Disney (Cardiff University)	When the Bullwhip Effect is an Increasing Function of the Lead Time We study the relationship between lead times and the bullwhip effect produced by the order-up-to policy. The usual conclusion in the literature is that longer lead-time increase the bullwhip effect, we show that this is not always the case. Indeed, it seems to be rather rare. We achieve this by first showing that a positive demand impulse response leads to an always increasing in the lead time bullwhip effect when the order-up-to policy is used to make supply chain inventory replenishment decisions. By using the zeros and poles of the z-transform of the demand process, we reveal when this demand impulse is positive. To make concrete our approach in a nontrivial example we study the ARMA(2,2) demand process.
22 March 2019	Martina Testori (University of Southampton)	How group composition affects cooperation in fixed networks: can psychopathic traits influence group dynamics? Static networks have been shown to foster cooperation for specific cost-benefit ratios and numbers of connections across a series of interactions. At the same time, psychopathic traits have been

		discovered to predict defective behaviours in game theory scenarios. This experiment combines these two aspects to investigate how group cooperation can emerge when changing group compositions based on psychopathic traits. We implemented a modified version of the Prisoner's Dilemma game which has been demonstrated theoretically and empirically to sustain a constant level of cooperation over rounds. A sample of 190 undergraduate students played in small groups where the percentage of psychopathic traits in each group was manipulated. Groups entirely composed of low psychopathic individuals were compared to communities with 50% high and 50% low psychopathic players, to observe the behavioural differences at the group level. Results showed a significant divergence of the mean cooperation of the two conditions, regardless of the small range of participants' psychopathy scores. Groups with a large density of high psychopathic subjects cooperated significantly less than groups entirely composed of low psychopathic players, confirming our hypothesis that psychopathic traits affect not only individuals' decisions but also the group behaviour. This experiment highlights how differences in group composition with respect to psychopathic traits can have a significant impact on group dynamics, and it emphasizes the importance of individual characteristics when investigating group behaviours.
18 March 2019	Joe Paat (ETH Zurich)	The proximity function for IPs Proximity between an integer program (IP) and a linear program (LP) measures the distance between an optimal IP solution and the closest optimal LP solution. In this talk, we consider proximity as a function that depends on the right hand side vector of the IP and LP. We analyze how this proximity function is distributed and create a spectrum of probabilistic-like results regarding its value. This work uses ideas from group theory and Ehrhart theory, and it improves upon a recent result of Eisenbrand and Weismantel in the average case. This is joint work with Timm Oertel and Robert Weismantel. The proximity functions for IPs.
15 March 2019	Prof Philip Broadbridge (La Trobe University)	Shannon entropy as a diagnostic tool for PDEs in conservation form After normalization, an evolving real non-negative function may be viewed as a probability density. From this we may derive the corresponding evolution law for Shannon entropy. Parabolic equations, hyperbolic equations and fourth-order "diffusion" equations evolve information in quite different ways. Entropy and irreversibility can be introduced in a self-consistent manner and at an elementary level by reference to some simple evolution equations such as the linear heat equation. It is easily seen that the

		2nd law of thermodynamics is equivalent to loss of Shannon information when temperature obeys a general nonlinear 2nd order diffusion equation. With the constraint of prescribed variance, this leads to the central limit theorem. With fourth order diffusion terms, new problems arise. We know from applications such as thin film flow and surface diffusion, that fourth order diffusion terms may generate ripples and they do not satisfy the Second Law. Despite this, we can identify the class of fourth order quasilinear diffusion equations that increase the Shannon entropy.
4 March 2019	Dr. Emrah Demir (Cardiff Business School)	Creating Green Logistics Value through Operational Research Green logistics is related to producing and dispatching goods in a sustainable way, while playing attention to environmental factors. In a green context, the objectives are not only based on economic considerations, but also aim at minimising other detrimental effects on society and on the environment. A conventional focus on planning the associated activities, particularly for the freight transportation, is to reduce expenses and, consequently, increase profitability by considering internal transportation costs. With an ever-growing concern about the environment by governments, markets, and other private entities worldwide, organizations have started to realize the importance of the environmental and social impacts associated with transportation on other parties or the society. Efficient planning of freight transportation activities requires a comprehensive look at wide range of factors in the operation and management of transportation to achieve safe, fast, and environmentally suitable movement of goods. Over the years, the minimization of the total travelled distance has been accepted as the most important objective in the field of vehicle routing and intermodal transportation. However, the interaction of operational research with mechanical and traffic engineering shows that there exist factors which are critical to explain fuel consumption. This triggered the birth of the green vehicle routing and green intermodal studies in operational research. In recent years, the number, quality and the flexibility of the models have increased considerably. This talk will discuss green vehicle routing and green intermodal transportation problems along with models and algorithms which truly represent the characteristics of green logistics.
25 February 2019	Oded Lachish (Birkbeck,	Smart queries versus property independent queries

	University of London)	In the area of property testing, a central goal is to design algorithms, called tests, that decide, with high probability, whether a word over a finite alphabet is in a given property or far from the property. A property is a subset of all the possible words over the alphabet. For instance, the word can be a book, and the property can be the set of all the books that are written in English - a book is 0.1 far from being written in English if at least 0.1 of its words are not in English. The 0.1 is called the distance parameter and it can be any value in [0,1]. The input of a test is the distance parameter, the length of the input word and access to an oracle that answers queries of the sort: please give me the i'th letter in the word. The quality of a test is measured by it query complexity, which is the maximum number of queries it uses as a function of the input word length and the distance parameter, ideally this number does not depend on the input length. Tests that achieve this ideal for specific properties have been discovered for numerous properties. In general, tests that achieve the ideal for different properties differ in the manner in which they select their queries. That is, the choice of queries depends on the property. In this talk, we will see that for the price of a significant increase in the number of queries it is possible to get rid of this dependency. We will also give scenarios in which this trade-off is beneficial.
18 February 2019 (Time 13:10 - 14:00)	Prof. Giles Stupfler (University of Nottingham)	Asymmetric least squares techniques for extreme risk estimation Financial and actuarial risk assessment is typically based on the computation of a single quantile (or Value-at-Risk). One drawback of quantiles is that they only take into account the frequency of an extreme event, and in particular do not give an idea of what the typical magnitude of such an event would be. Another issue is that they do not induce a coherent risk measure, which is a serious concern in actuarial and financial applications. In this talk, I will explain how, starting from the formulation of a quantile as the solution of an optimisation problem, one may come up with two alternative families of risk measures, called expectiles and extremiles. I will give a broad overview of their properties, as well as of their estimation at extreme levels in heavy-tailed models, and explain why they constitute sensible alternatives for risk assessment using some real data applications. This is based on joint work with Abdelaati Daouia, Irène Gijbels and Stéphane Girard.

21 January 2019	Stefano Coniglio (University of Southampton)	Bilevel programming and the computation of pessimistic single-leader-multi-follower equilibria in Stackelberg games We give a very broad overview of bilevel programming problems and their relationship with Stackelberg games, with focus on two classical limitations of this paradigm: the presence of a single follower and the assumption of optimism. We then investigate the problem of computing an equilibrium in Stackelberg games with two or more noncooperating followers who react to the strategy chosen by the leader by playing a Nash Equilibrium, focusing, in particular, on the pessimistic case where, if the follower's game (parameterized by the leader's strategy) admits more Nash equilibria, the followers choose one which minimizes the leader's utility. We then address the case where the followers are restricted to pure strategies, illustrate some hardness and inapproximability results, and the concentrate on exact solution algorithms. After proposing a single-level (but undecidable) reformulation for the problem, we propose an exact implicit enumeration algorithm capable of computing the supremum of the problem as well as an alpha-approximate strategy, for any nonnegative alpha. Experimental results are presented and illustrated, showing the viability of our approach.
11 December 2018	Anatoly Zhigljavsky (Cardiff University	Multivariate dispersion
3 December 2018	Dr Ilaria Prosdocimi (University of Bath)	Detecting coherent changes in flood risk in Great Britain Flooding is a natural hazard which has affected the UK throughout history, with significant costs for both the development and maintenance of flood protection schemes and for the recovery of the areas affected by flooding. The recent large repeated floods in Northern England and other parts of the country raise the question of whether the risk of flooding is changing, possibly as a result of climate change, so that different strategies would be needed for the effective management of flood risk. To assess whether any change in flood risk can be identified, one would typically investigate the presence of some changing patterns in peak flow records for each

		station across the country. Nevertheless, the coherent detection of any clear pattern in the data is hindered by the limited sample size of the peak flow records, which typically cover about 45 years. We investigate the use of multi-level hierarchical models to better use the information available at all stations in a unique model which can detect the presence of any sizeable change in the peak flow behaviour at a larger scale. Further, we also investigate the possibility of attributing any detected change to naturally varying climatological variables.
26 November 2018	Prof Benjamin Gess (Max Planck Institute Leipziz)	Random dynamical systems for stochastic PDE with nonlinear noise In this talk we will revisit the problem of generation of random dynamical systems by solutions to stochastic PDE. Despite being at the heart of a dynamical system approach to stochastic dynamics in infinite dimensions, most known results are restricted to stochastic PDE driven by affine linear noise, which can be treated via transformation arguments. In contrast, in this talk we will address instances of stochastic PDE with nonlinear noise, with particular emphasis on porous media equations driven by conservative noise. This class of stochastic PDE arises in particular in the analysis of stochastic mean curvature motion, mean field games with common noise and is linked to fluctuations in non-equilibrium statistical mechanics.