UNIVERSIDAD DE GRANADA

Departamento de
Estadística e
Investigación Operativa

Conferencias Edificio Mecenas (31 octubre)

24/10/2024

Conferencia 1:
"Stochastic Models for Reservoirs"
Prof. Nikolaos Limnios (Université de Technologie de Compiègne, Sorbonne University Alliance, France)

Lugar: Salón de Grados (Edificio Mecenas)
Fecha: 31-Octubre-2024
Hora: 12:00

Summary:

Reservoir problems are cases of inventory theory, which includes moreover dams, storage, etc. We will consider a finite reservoir with random input and a specific output rule. Such reservoirs are encountered, for example, in cities for the management of drinking water. In fact, water is taken from a source, i.e., a river, it is then treated in a complex treatment unit; then stored in one or more reservoirs to be distributed to users, i.e., individuals, companies, etc. The treatment unit is generally very complex and suffers breakdowns quite often. Without the reservoir, these breakdowns would lead to the water supply being stopped to users. This is generally unacceptable in our modern societies. The reservoir will provide a buffer time for the repair of the treatment at the input. The larger the reservoir, the more time allocated to treatment will be important and the failure will not be perceived by users. But also, the larger the reservoir, the higher the costs of its construction and maintenance will be. So, we are in the presence of a problem of optimization of the size of the tank. Several other problems can be considered here. The evolution in average of the level of the tank in time; the average time of emptying (important for the problem of cavitation of the pumps at the outlet), etc. We will, under reasonable assumptions, build a Markovian model and

try to answer the previous questions.

Short biography:

Nikolaos Limnios received his diploma from the AUTh, Greece in 1979; his DEA from University of Technology of Compiegne (UTC), France in 1980; and his PhD in 1983 from the same university. He received his Doctorat d'Etat in 1991 from UTC. He is a Professor in Applied Mathematics at UTC since 1993. He is the co-author of the books Semi-Markov Processes and Reliability (Birkhäuser, 2001); Stochastic Systems in Merging Phase Space (Word Scientific, 2005); and Semi-Markov Chains and Hidden Semi-Markov Models toward Applications (Springer, 2008); Applied Nonparametric Statistics in Reliability (Springer, 2011); Applied Probability - From Random Sequences to Stochastic Processes (Springer, 2018), Discrete-time Semi-Markov Random Evolutions and their Applications (Birkhauser, 2023).

Publication Topics:

Stochastic processes: Diffusion and Poisson Approximation.

Statistical Inference for Stochastic processes.

Semi-Markov Processes

Reliability, Biostatistics, Seismology, Insurance and Finance

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Conferencia 2:
"Point processes on linear networks: foundations, challenges and applications"
Prof. Maria Isabel Borrajo García (Universidad de Santiago de Compostela, Spain)

Lugar: Salón de Grados (Edificio Mecenas)
Fecha: 31-Octubre-2024
Hora: 13:00

Summary:

Point processes on linear networks have gained significant attention in recent years due to their broad applications across various fields. Data sets representing the spatial locations of a series of events arise in a wide range of scenarios, such as trees in a forest, earthquakes in a region, or traffic accidents on road networks. While the former are examples of spatial point processes in two- or three-dimensional Euclidean spaces, the latter represent point patterns constrained to a one-dimensional subset within a Euclidean plane, known as a linear network. This talk introduces the foundational concepts of point processes on linear networks, highlighting how they differ from traditional spatial point processes on planar domains. We will explore the mathematical framework, focusing on key properties and the unique challenges posed by the structure of linear networks, such as roads or rivers. In addition, we will examine practical applications, particularly the modelling of traffic accidents. A widely studied problem in statistics is population comparison, which involves determining whether two (or more) samples originate from the same stochastic process. This problem also arises in the context of point processes on linear networks, such as comparing car-to-car versus car-to-motorcycle collisions. We will present two specific testing methods: Kolmogorov-Smirnov and Cramér-von Mises-type test statistics. A comprehensive simulation study is conducted to evaluate the finite sample performance of these methods, which will also be applied to real-world data on traffic collisions in Rio de Janeiro, Brazil.

REFERENCES:

1. Fuentes-Santos, I., González-Manteiga, W., and Mateu, J. (2023). Testing similarity between firstorder intensities of spatial point processes. A comparative study. Communications in StatisticsSimulation and Computation, 52(5).
2. González-Pérez, I., Borrajo, M. I. and González-Manteiga, W. (Under review). Nonparametric testing of first-order structure in point processes on linear networks.

Short biography:

María Isabel Borrajo (Narón, 1989) es Profesora Contratada Doctora en el Departamento de Estadística, Análisis Matemático y Optimización de la Universidad

de Santiago de Compostela. Obtuvo su doctorado en Matemáticas en febrero de 2018, con la tesis titulada "Nonparametric inference on point processes with covariates". Fue Profesora Interina de Sustitución en el Departamento de Estadística de la Universidad de Oviedo durante el curso 2017/2018 y desde septiembre de 2018 trabajó como investigadora posdoctoral en la Universidad de Lancaster (Reino Unido). Las líneas de investigación en las que trabaja actualmente son la inferencia no paramétrica y los procesos puntuales.

Publication Topics:

Estadística Espacial

Inferencia No Paramétrica

Procesos puntuales

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