Tuesday October 29, 2019 at 14:30
Politecnico di Torino, DISMA, Aula Buzano (third floor)

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Estimation of performance indices
for large-scale networks using graphons

Prof. Giacomo Como introduces the seminar.

Abstract

In recent years, the attention to the analysis of large-scale networks has increased in the scientific community due to the continuous evolution of the world towards a networked environment. Traditionally, researchers have studied the interactions of agents in networks using the concepts of Graph Theory, where the structures are modeled by graphs. However, for large-scale networks many problems arise since a complete representation of the network is often not available and the inaccuracies can affect the calculation of some properties. A new approach to study networks of large size is the concept of graph functions (graphons) as limits of sequences of dense graphs. Since many properties and characteristics of networks with a pattern similar to a graphon can be inferred from the latter, it is possible to apply the rich theory of operators to the study of graphs. In this talk, we present the main properties of graphons and their application to the estimation of performance indices associated with the spectrum of large networks sampled from graphons. The first application is focused on the estimation of a noise index for a SIS epidemic over a network based on the graphon operator, whose spectrum is related to the eigenvalues of the adjacency matrix of a graph. In the second part we present a study of the degree function and two operators derived from graphons that reflect some properties of the Laplacian matrix of a graph. We analyze the main characteristics of the operators and a relation with the average effective resistance of sampled networks.

Biography

Renato Vizuete received the B.S. degree (summa cum laude) in Electronics and Control Engineering from Escuela Politécnica Nacional, Ecuador and the M.S. degree (très bien) in Systems, Control and Information Technologies from Université Grenoble Alpes, France. He was the recipient of the Persyval-Lab Excellence Master Scholarship from Université Grenoble Alpes in 2018. He is currently a PhD student at L2S CentraleSupélec and GIPSA-lab under the supervision of Elena Panteley and Paolo Frasca. His current research interests include: control theory, multi-agent systems, hybrid systems, networked control systems and graphons.

Save the date for the next event: October 31, 2019
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