

学术报告会

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Graph Signal Processing: Fundamentals

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Abstract:

Networks and graphs can be applied to a wide variety of disciplines including biology, sociology, economics, engineering, or computer science. Often, networks have intrinsic value and are themselves the object of study. In other occasions, the network defines an underlying notion of proximity, but the object of interest is a signal defined on top of the graph, i.e., data associated with the nodes of the network. This is the matter addressed in the field of graph signal processing (GSP), whose goal is to contribute to the advancement of the understanding of network data by redesigning traditional tools originally conceived to study signals defined on regular domains (such as time-varying signals) and extend them to analyze signals on the more complex graph domain. The purpose of this talk is to present the foundations of GSP. We start by introducing the concepts of graph signal and graph-shift operator. This will allow us to define linear graph filters, which are basic operators to transform graph signals. As in the time-varying case, it turns out that graph signals and filters are easier to understand in the frequency domain. Hence, the last part of the talk will be focused on defining the counterparts of the Fourier and inverse Fourier transform for signals and systems in the graph domain. Differences with respect to the classical time domain will be highlighted and illustrative examples will be provided through the talk.

Biography:

Antonio G. Marques received the Telecommunications Engineering degree and the Doctorate degree, both with highest honors, from the Carlos III University of Madrid, Spain, in 2002 and 2007, respectively. In 2007, he became a faculty of the Department of Signal Theory and Communications, King Juan Carlos University, Madrid, Spain, where he currently develops his research and teaching activities as an Associate Professor. From 2005 to 2015, he held different visiting positions at the University of Minnesota, Minneapolis. In 2015 and 2016 he was a Visiting Scholar at the University of Pennsylvania. His research interests lie in the areas of communication theory, signal processing, and networking. His current research focuses on stochastic resource allocation wireless networks and smart grids, nonlinear network optimization, and signal processing for graphs. Dr. Marques has served the IEEE and EURASIP in a number of posts (currently, he is an Associate Editor of the IEEE Signal Process. Letters and of the EURASIP J. on Advances in Signal Process.), and his work has been awarded in several conferences and workshops.