

Facoltà di Ingegneria, Università degli Studi di Ferrara
9 settembre 2011, aula 8, ore 10:30-11:30

Belief Condensation Filtering: Framework and Algorithms

Santiago Mazuelas

Laboratory for Information and Decision Systems (LIDS). Massachusetts Institute of Technology
<http://wgroup.lids.mit.edu/>
mazuelas@mit.edu

Abstract

Inferring a sequence of variables from observations is a prevalent task in a multitude of applications. However, traditional techniques such as Kalman filters (KFs) and particle filters (PFs) are often either inaccurate or too complex, and there is a lack of a common theoretical framework unifying the analysis and development of filtering techniques. In this talk, new developments to fill these knowledge gaps will be presented: 1) a general framework for filtering that allows to hierarchize filtering techniques and formulate optimality leading to the concept of belief condensation (BC) filtering, and 2) new filtering techniques corresponding to such optimal methodology as well as techniques for BC that accurately approximate complex distributions by tractable ones. Finally, simulation results will be presented for the important filtering task that arises in navigation/tracking showing that the proposed BC filters can obtain the same level of accuracy as particle filters, approaching the theoretical benchmark, but with several orders of magnitude smaller complexity.

About the speaker

Santiago Mazuelas received his Ph.D. in mathematics and Ph.D. in telecommunications engineering from the University of Valladolid, Spain, in 2009 and 2011, respectively.

He has been a postdoctoral fellow in the Wireless Communication and Network Sciences Laboratory at MIT since 2009. He previously worked from 2006 to 2009 as a Researcher and Project Manager in CEDETEL, Spain, as well as a junior lecturer in the University of Valladolid. He has received the young scientists prize for the best communication at the Union Radio-Scientifique Internationale (URSI) XXII Symposium 2007, Spain and the Special prize end of degree for the best student record in Telecommunications Technical Engineering. His general research interest is to utilize mathematics in order to solve engineering problems. Currently his work is focused on the application of mathematical and statistical theories to communications, localization, and navigation networks. He is author of three patents as well as more than a dozen of papers published in leading international journals.

Dr. Mazuelas is currently reviewer of the IEEE Transactions on Signal Processing, IEEE Transactions on Wireless Communications, IEEE Transactions on Vehicular Technology, IEEE Transactions on Instrumentation and Measurements, IEEE Communication Letters, IEEE Signal Processing Letters, and the EURASIP Journal on Wireless Communications and Networking. He also served in the Technical Program Committee of the 2010 and 2011 IEEE Global Communications Conference, the 2011 IEEE International Conference on Ultra-Wideband, the IEEE 3rd Latin-American Conference on Communications 2011, and the 2010 and 2011 IEEE Wireless Telecommunications Symposium.