Cornell University $\mathbb{I}$*nformation,* $\mathbb{S}$*ystems, and* $\mathbb{N}$*etworks seminar*

Error Exponents for the analysis and design of distributed detection systems: Neyman-Pearson Fusion of Dependent Local Decisions in a Sensor Network

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ISN Seminar Speaker:
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Abstract

The problem of binary distributed detection in sensor networks has drawn much attention in last years. With the aim of exploiting all their detection potential, the literature on this issue has faced optimal distributed detection problems, where optimality usually refers to the minimization of some cost function related to the overall detection performance among other design parameters of the network. In particular, there has been a considerable research interest on characterizing optimal decentralized detection systems with various architectures. This characterization usually involves the derivation of optimal data fusion rules and optimal local processing schemes according to a specific criterion. It is well-known that an explosive combinatorial complexity appears when analyzing systems with a moderate size, above all if a correlation structure among the sensor observations is assumed under some of the two possible hypothesis. In order to avoid misleading conclusions obtained for a specific network size and further understand the effects of distribution of the data processing, the aforementioned characterizations have been undertaken in an asymptotic regime where the number of sensor observations approaches infinity. In particular, supported by the information theory and the large deviation theory most works center on the error exponents associated with the optimal Neyman-Pearson and Bayesian fusion rules. This talk will provide a brief summary regarding these statistical tools. At the same time, it will show the application of them to the analysis and design of distributed detection systems performing a Neyman-Pearson test on dependent local decisions. This way, we will reveal how the error exponents can provide design tools that link the detection performance of the sensor network with different physical and design parameters such as the sensor spacing.

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Biography

Jorge Plata-Chaves (S'09) was born in Madrid, Spain, in 1984. He received the B.Sc. degree in Ingeniería de Telecomunicación and the M.Sc. degree from the Universidad Carlos III de Madrid, Spain, in 2007 and 2009, respectively.

He is currently working toward the Ph.D. degree in the Department of Signal Theory and Communications at Universidad Carlos III de Madrid, Spain. His research interests are in information theory and statistical signal processing with application to detection, estimation and localization in wireless mobile sensor networks.