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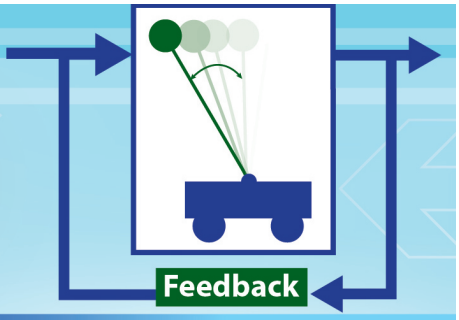

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On Estimation with Strategic Sensors

Cédric Langbort

University of Illinois at Champaign Urbana
Department of Aerospace Engineering

Friday, March 17, 2017

3:30 – 4:30 pm • 1500 EECS

ABSTRACT: Motivated by security issues such as false-data attacks in power grids, misreports in participatory sensing apps, and adversarial machine learning, we consider the problem of estimation in the presence of strategic and self-interested sensors. We model this situation as a non-cooperative game between informed sensors and a receiver, whose estimation of the state of Nature impacts the sensors' utility. In so doing, we extend the frameworks of "cheap talk" and "strategic information transmission" from Economics to better accommodate the applications described above, and revisit them using estimation and information theoretic tools. We compute equilibrium reporting and estimation strategies under a variety of assumptions on sensor(s)' strategic intent and modeling abilities, as well as in the static and dynamic setting. We show the perhaps surprising result that, when sensors "herd" (i.e., are expected to act identically, even as they are being strategic) the estimation error not only behaves better (as a function of sensor number) than in the fully strategic case, but also than in the presence of honest but misinformed sensors. We also consider the issues of compression, communication (over a noisy channel), side information and mismatched priors in the same context, thus uncovering interesting counterparts of classical information theoretic results when encoder and decoder have different objectives.

BIO: Cédric Langbort is an Associate Professor of Aerospace Engineering (with tenure) at the University of Illinois at Urbana–Champaign (UIUC), where he is also affiliated with the Decision & Control Group at the Coordinated Science Lab (CSL), and the Information Trust Institute. Prior to joining UIUC in 2006, he studied at the Ecole Nationale Supérieure de l'Aéronautique et de l'Espace-Supaero in Toulouse (France), the Institut Non-Linéaire in Nice (France), and Cornell University, from which he received the Ph.D. in Theoretical & Applied Mechanics in January 2005.