On Strategic Information Transmission and Decentralized Control

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Résumé

In classical control and communication theory, system components (sensors, encoders, controllers) are typically modeled as a "team" working cooperatively to minimize a common cost function (e.g., mean squared error). However, in modern distributed systems, such as smart grids or networked control under adversarial attack, components may have misaligned incentives. This talk introduces the framework of Strategic Information Transmission (Cheap Talk), where an encoder and decoder play a non-cooperative game. We demonstrate a fundamental structural shift: while in a noiseless team setting, optimal strategies are typically linear, strategic conflicts force the encoder to voluntarily quantize information to maintain credibility. We review the classical constant-bias result (Crawford & Sobel, Econometrica 1982), discuss connections to the Witsenhausen counterexample in control, and briefly present findings on state-dependent bias. Unlike the constant case, state-dependent bias can support equilibria with infinite messages, yet fully informative communication remains impossible.

Mots-Clés: Strategic Communication, Decentralized Control, Strategic Quantization, Witsenhausen Counterexample.

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