



**Title:** Transmission of Strategic Information - Information Theory and Game Theory

**Abstract:** What information one has to transmit to a destination having a distinct objective? This proposal focuses on optimization technics coming from Information Theory, that allow to manipulate strategic information in Games. Shannon's entropy determine the optimal level of compression of an information source whereas the mutual information characterize the maximal number of messages one can send reliably through a noisy channel. Information theoretical tools reduce the dimension of large problems with informational asymmetries and formulate optimal solutions in terms of entropy's inequalities for target probability distributions. We will investigate the theoretical limits for multi-agents problems and apply the solutions to real-life scenario among: autonomous devices, internet of things, digital communications, traffic-car signaling, decentralized stochastic control, neural network control, repeated games, mechanism design and Bayesian persuasion. This internship will take place at laboratory ETIS located in ENSEA engineering school in Cergy and scholarship is provided.

**Bibliography:**

E. Kamenica and M. Gentzkow, "Bayesian persuasion," *American Economic Review*, vol. 101, pp. 2590 – 2615, 2011.

C. E. Shannon, "A mathematical theory of communication," *Bell System Technical Journal*, vol. 27, pp. 379–423, 1948.

T. M. Cover and J. A. Thomas, *Elements of information theory*. New York: 2nd. Ed., Wiley-Interscience, 2006.

A. E. Gamal and Y.-H. Kim, *Network Information Theory*. Cambridge University Press, Dec. 2011.

O. Gossner, P. Hernandez, and A. Neyman, "Optimal use of communication resources," *Econometrica*, vol. 74, pp. 1603–1636, Nov. 2006.

M. Le Treust, "Joint empirical coordination of source and channel," *IEEE Transactions on Information Theory*, vol. 63, pp. 5087–5114, Aug 2017.

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