

Research Proposal

The Emergence of Leadership in Social Networks

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Team: NeCS (<http://necs.inrialpes.fr>)
Duration: 6 months

Topic description:

Social scientists maintain that leadership is closely related to self-appraisals: individuals with manifest power and control typically correspond to self-weighted persons who accord little influence to others. In practice, when a person experiences that he is able to exert influence (e.g. by winning a discussion), he will become more self-confident and stubborn. He will therefore be less open to the influence of the other agents.

This principle has led to the definition of mathematical models for the evolution of leadership. In [F11], a group of individuals meets to discuss about several issues, which are considered sequentially. At the end of each discussion round, each individual is able to perceive whether his/her initial opinion has prevailed on the others in the discussion: a positive outcome would increase his/her self-confidence in the next round. In the long run, this phenomenon could lead to some of the agents becoming increasingly influential: this would imply the rise of opinion leaders from initially small differences between the individuals.

The available mathematical descriptions of this phenomenon are either intractable or restricted to rather specific assumptions [JMFB15]. The ambition of this project is looking for a model that is at the same time tractable and able to provide reasonable insight into the social dynamics. The activities will build upon well-established models of opinion evolution, either deterministic or stochastic [FRTI13], and will involve extended simulations of the proposed dynamics.

Candidate profile: The ideal candidate is expected to have good command of dynamical systems, probability, and graph theory.

Context: This work will be carried out in the NeCS team (Networked Control Systems), a joint CNRS/INRIA team at GIPSA-Lab laboratory in Grenoble, France. The team's innovative research concerns control and estimation of networked systems, with a broad spectrum of applications including security and privacy in control systems.

Bibliography

- [FRTI13] P. Frasca, C. Ravazzi, R. Tempo, and H. Ishii. Gossips and prejudices: ergodic randomized dynamics in social networks. IFAC Workshop on Distributed Estimation and Control in Networked Systems, Koblenz, Germany, Sep. 2013, pp. 212–219
- [F11] N.E. Friedkin. A formal theory of reflected appraisals in the evolution of power. *Administrative Science Quarterly*, 56(4): 501–529, 2011
- [JMFB15] P. Jia, A. MirTabatabaei, N.E. Friedkin, and F. Bullo. Opinion dynamics and the evolution of social power in influence networks. *SIAM Review*, 57:3, 367–397, 2015