Analysis of an opinion dynamics coupled with an environment

Anthony Couthures[*1]

[1]Centre de Recherche en Automatique de Nancy – Université de Lorraine, Centre National de la Recherche Scientifique – France

Résumé

We consider a set of individuals, referred to as agents, whose opinions evolve according to nonlinear dynamics. Their opinions impact their behavior or actions, which in turn affect their local environment (for example, via pollution, contamination of a virus, etc.). Each agent can also perceive or observe a signal about the environment, and is influenced by this external signal. This yields a coupled dynamics (opinion and external signal), which behaves in a similar manner to the prey-predator models.

One of the main features of our study is that the information provided by the external signal has a significant impact on the opinion dynamics. When the coupling is strong, the external signal may induce either chaotic behavior or convergence towards a limit cycle. When the coupling with the external signal is weak, the classical behavior characterized by local agreements in polarized clusters is observed. In both cases, conditions under which clusters of individuals don't change their actions are provided. Numerical examples are provided to illustrate the derived analytical results.

Mots-Clés: opinion dynamics, nonlinear systems, chaos, synchronization, clustering

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[*]Intervenant