Social Conflicts: A Statistical Physics Approach

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Abstract: Statistical Physics offers many efficient methods to treat systems of interacting particles, giving an uncountable number of applications, in particular in condensed matter [1]. Recently, there is an increasing number of investigations using methods borrowed from Statistical Physics to study various complex systems from animals behaviors, forest fires, propagation of infectious sicknesses, ... In this work, we use spins to model individuals in society. The fact that each spin has several states allows us to assimilate it with a person whose position on a matter depends on the interaction with his/her neighbors. In this work, we study social conflicts such as the competition between two political parties in a country, or the two opposite opinion trends in a society [2]. We can take as examples the Democrat and the Republican Parties in the recent American presidential election, or the opposite opinions in the Brexit.

We use for each party an ensemble of intra-party interacting spins (persons). The solidity or the strength of the party is characterized by the interaction and the number of individual states. The inter-party interaction is a time-dependent interaction coming from an average of the strength of the other party at an earlier time. We use a social temperature which reflects the social ambiance (agitation) in which the two parties are immersed. We have used a time-dependent mean-field approximation to calculate the change of opinion of one party due to the other and we have shown that the change oscillates with time, depending on the parameters. It is interesting to note that the period of oscillation can give some ideas to policy makers to make decisions at their favorable moments. We have also carried out Monte Carlo simulations to compare to the mean-field theory. The agreement between the two methods is remarkable.

An extension of this work to the problem of three-party conflicts is under way.

References

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