Voter Model with Time Dependent Dynamics

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Abstract

The Voter model is one of the paradigmatic models of interacting particle systems and a standard framework for the study of opinion dynamics [1, 3]. We consider its time-dependent modification in which the update rules depend on the internal age of agents, that is, on how long they have kept their current opinion [1, 2]. The main question is how this age-dependent dynamics affects ordering, in particular whether the system approaches consensus, understood as a state in which all agents share the same opinion, or whether it exhibits coexistence of opinions or frozen disordered states [1]. Our analysis is based on dynamical equations derived for the model and, in particular, on a scalar differential equation obtained by linearization around the consensus, or absorbing, state. This reduction provides the main tool for studying stability and asymptotic behavior by standard qualitative methods of differential equations [4]. As an extension of the mean-field setting, we also study the model on a complete bipartite graph and examine how this interaction structure influences the long-time dynamics and the emergence of consensus.

References

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