

# An agent-based SIR-model for election dynamics

Sean McMahon and Xiangyu Yao

March 21, 2018

## Abstract

We discuss a mathematical model for simulating election dynamics. Our model utilizes an SIR-model similar to the one introduced by Liu and Zhang in Ref. [1] to simulate the spread of information through the voting-eligible population. In this SIR-model, voting-eligible individuals can be categorized into one of three groups: (1) individuals that have not learned the information, (2) individuals that actively spread the information, or (3) individuals who possess the information but do not spread it. An individual can obtain information either through interactions with active individuals or through spontaneous media events. The effect of an information transfer interaction is determined through a modified version of the agent-based model for opinion dynamics presented by Sobkowicz in Ref. [2]. In this agent-based model, the probability of an individual voting for a certain candidate is adjusted when they receive new information. This adjustment is based on their personal political preference and the content of the received information. We consider these interactions on a dynamic social network as in Ref. [1] and explore how the spread of information through the population affects the outcome of the election.

## References

- [1] Chuang Liu, Zi-Ke Zhang, Commun Nonlinear Sci Numer Simulat 19 (2014) 896904
- [2] Sobkowicz P (2016) Quantitative Agent Based Model of Opinion Dynamics: Polish Elections of 2015. PLoS ONE 11(5): e0155098. <https://doi.org/10.1371/journal.pone.0155098>