Voting Influences among a Social Network of Friends

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Application Description

Background: Social media provides a platform to which group of friends can share information. The power of influence is a function of how close individuals are within a network and how many individuals have shared the information. Social media presents the opportunity to study how dissemination influences voting patterns within a network of friends.

Project Goal: To explore the extent to which information shared within a network affects voting patterns of a population

Application: Using an node adjacency matrix to map a network of friends and observing how the spread of information affects voting trends amongst the population. Information flow will be dependent on probabilities of "sharing" and seeing a message.

Results analysed will be compared to a base rate probability of voting, where social media influence is not a factor. The comparison between the simulation result and this statistic will present the extent of social media influences on voting behavior for one network of friends

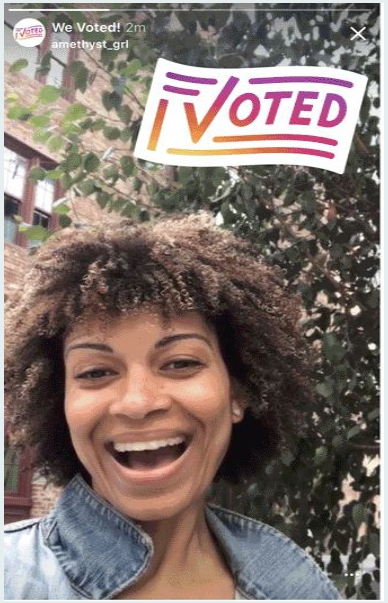
Probabilities and Automata Models

Based our simulation off a past experiment done via Facebook (Bond et. al)

Our model:

- 2 types of political messages:
  - Informational message
  - Social message
- 2 types of friends:
  - Distant friends
  - Close friends

Bond et al., 2012



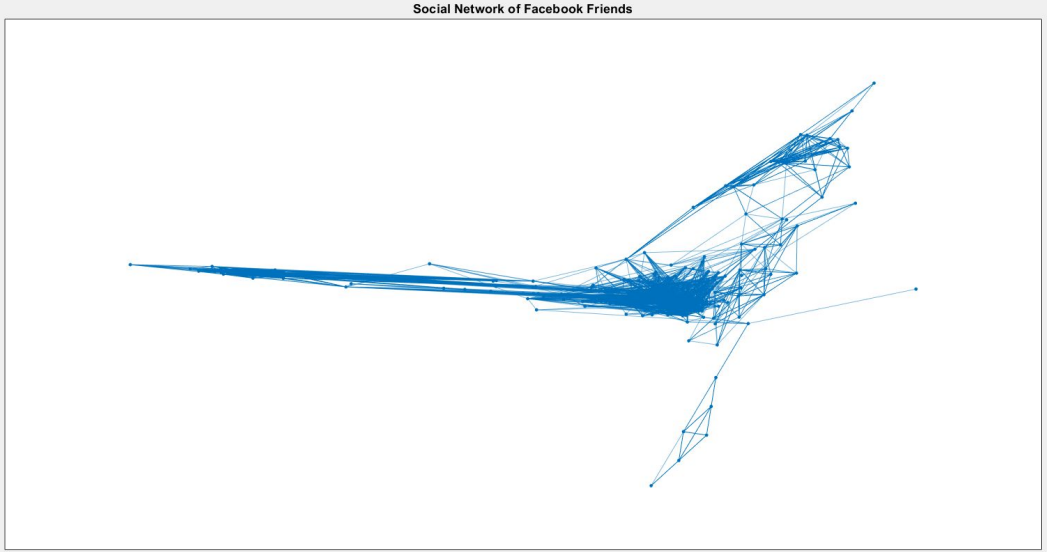
Statistics:

- About **61.4%** of eligible voters voted in 2016 US election (US Census Bureau).
- A person who receives the informational message is **0%** more likely to vote while a person who receives the social message is **0.39%** more likely to vote (Bond et. al).
- **22%** of registered voters post about voting on their social media platform (Rainie).

Specific Problem- Social Network Node Adjacency Matrix

We imported a node adjacency matrix describing a group of 4038 friends on Facebook with varying numbers of connections. (McAuley)

Then based on our research there is some diffusion of the political posts, and informational ads within the matrix, which we simulated.



Solution: Analyzing a Transition Matrix with Known Voter Probabilities

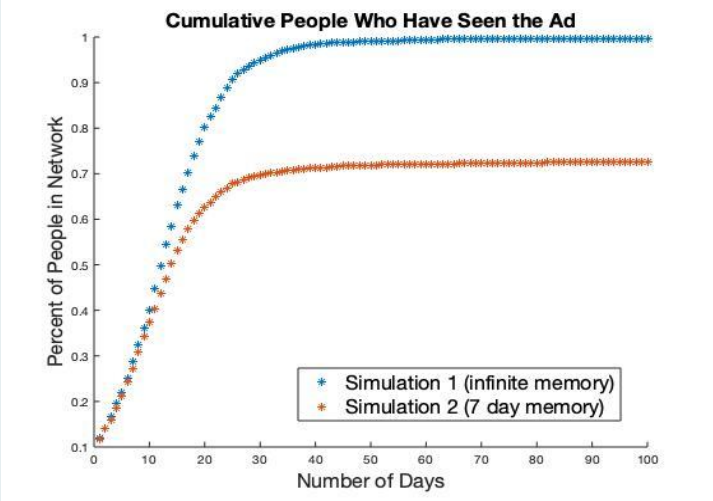
- Normalized the adjacency matrix:
  - Assume: **close** friend is **twice** as likely to see someone's post than a **distant** friend
- Randomly selected **10%** of people to receive initial political ad
  - They have a **22%** chance of reposting it
- The probability of their friend seeing it is based on the normalized transition matrix
- If seen:
  - Probability of voting increases by **0.0039**
  - **22%** chance of reposting about it in the next time step

Diffusion visualization:

Implementation: Matlab

- 5 simulations were run, each **100 times**
- 2 different "memory types"
- 3 different ways to start distributing the message
- Dependent variable: # time steps for message to reach 66% of people

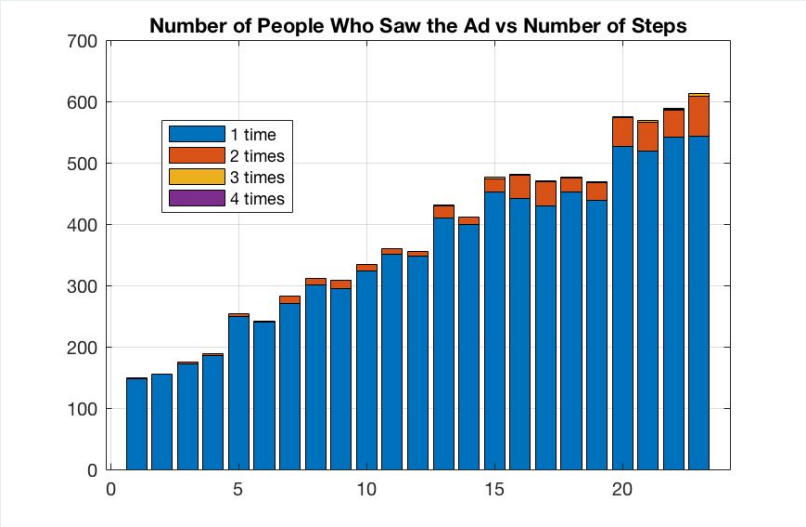
Memory Type	Choice of Starters	Avg. Time Steps (Days) to 66%	Std. Deviation
Infinite	Random 10%	16	0.50
7-days	Random 10%	23	0.9261
7-days	Most "popular" 10%	72	10.72
7-days	Least "popular" 10%	135	29.2

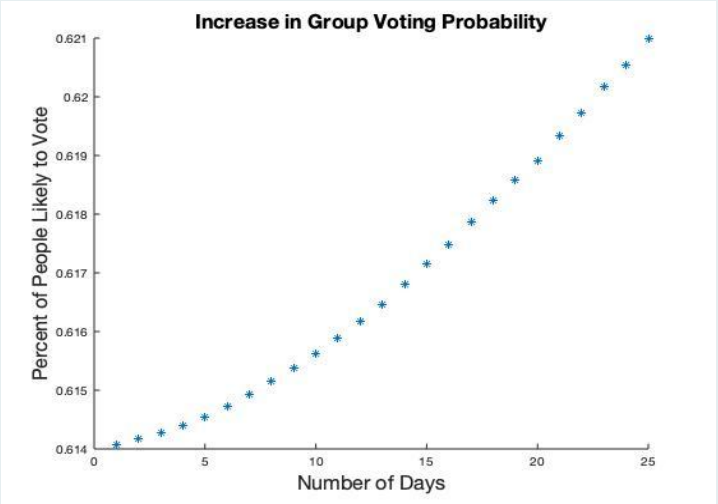


Results

Results for 7-day memory, random choice of starters simulation

- Average # of steps for 66% of the population to get the message: **23**
- Percent of people who voted based on social media influence: **61.97% vs baseline of 61.4%**
  - For infinite memory, even greater increase: **62.48%**
- How early do you need to post for people to see the message before election day to see a result? **23 days**





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