Spread of fake information in modern world

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General Introduction

Through the drastically increasing degree of interconnectedness that could be observed in the past decades, loads of information became easily accessible by modern society. On one hand this is a chance for everybody to form his own opinion based on a variety of different information provided on different platforms. On the other hand it became easier to not only spread information, but also misinformation. In media one can currently read a lot about misinformation or “fake-news”, so we decided that it would be interesting to answer the question, if in todays society misinformation can be spread as easily as stated by some people.

Fundamental Question

In our project we would like to answer the following question:

Under what circumstances can Fake-News not only be spread, but can also have a lasting effect?

Can an opinion become eradicated completely?

How does the situation change using different input parameters?

Model

We assume that every person in society has a network of close friends with which he/she meets on a regular basis. Furthermore there are also friend with which he/she connects using social media, such as Facebook or Twitter. For explanatory reason we will for now focus on one randomly selected agent that will be called the “current agent”. Everyone of his friends does have an opinion on a special matters just as our current agent has. We assume that the opinion is strongly influenced by the social network of each agent. Therefore the more friends believe in a certain matter, the higher the chance is, that the current agent will also believe in it.
Furthermore there are also people who seem to be more credulous than others. To take this into account we will give each agent a random chance of changing their opinion based on the opinion of their friends. Please note that this degree of credulousness is chosen in the beginning and will not change during the time the simulation runs.

To introduce a Fake-News to the described model, we introduce the so called “Influencers”. Influencers are special agent that do have a fixed opinion and do not adjust there opinion based on others. There are two types of Influencers: The Influencers that will provide misinformation to everyone else and the Influencers who will provide the correct information.

Each time step in the model every agent has a chance to adapt his opinion to the one of his friends.

Through this model we would like to investigate under what circumstances (see parameters) misinformation can be spread and if it is possible to eradicate one opinion completely if there are for example more good influencer than bad ones.

We would like to implement this model using the following parameter:

Parameter	**Description**
Location	Position in a grid structure with coordinates x and y
Type of agent	Neutral: Has a chance to change his opinion based on the opinion of his friends Bad Influencer: Tries to spread misinformation Good Influencer: Tries to spread correct information
Degree of credulousness	Number between 0 and 1 that reflects the probability to adapt the opinion
Number of connections	Each agent does have a certain amount of close friends (modeled as neighbours in grid) and a number of distant friends (modeled at random position in grid)
Opinion	Value for current opinion on a subject (-1: misinformed; 0: neutral; 1: informed)

Expected Results
Based on the number of Influencer we believe that one opinion can be widely eradicated. If the number between the two opposing Influencer is about the same we think that a cluster like structure will emerge with about the same number of people believing in the correct and fake information.

Outlook:
If time allows we will extend our model in a way that the influence of friendships can vary with time. This could be interpreted as a sort of personal search engine algorithm, which focuses on things you agree or are interested in and shows less information about those subjects you disagree. Meaning, the Internet is creating an information bubble by showing only things you agree and cutting of friendships with people who share a different opinion. We would like to see what influence this has on the spreading of the (mis-)information.

Another possibility would be to adapt the model in order to have several different information available, causing a news overflow. Agents would be overwhelmed by this and could represent only a fraction of all the opinions available. By this we would like to observe what happens with people trying to find the truth if there are a lot of diverse fake news going around.

References
Spread of (mis)information in social networks(2010) by Daron Acemoglu et al.
How fake news goes viral—Here's the Math(2017) by Madhusree Mukerjee