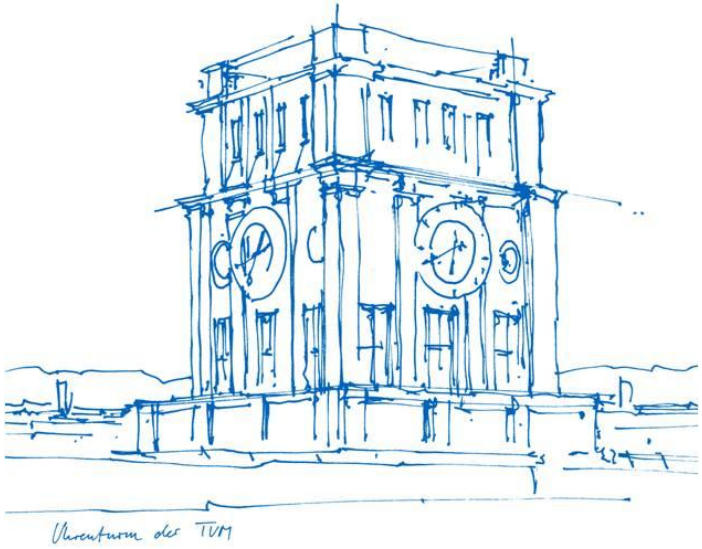
MODELING RUMORS: THE NO PLANE PENTAGON FRENCH HOAX CASE

How a minority population can spread rumors?



Abhijeet Parida

MSc. Computational Science & Engg.

Technische Universität München

Introduction

- Rumor formation is strategically important
- Information spreads fast in the internet age
- More people share it as a fact
- More people believing does not prove authenticity but incite dangerous acts
- Boundary between rumor and truth is narrow

Introduction(contd.)

- Study on Minority spreading rumor
- Majority rule reaction - diffusion model
- Minority propagate in random geometries at social gathering
- Minority idea always achieve a majority
  - Start beyond a certain threshold
  - Coherent with social paradigm
- Collective bias form public opinion

The Pentagon French Hoax

- People hold America to be powerful and dubious
- 9/11 was a shocker for them
- People absorbed all kind of false propaganda
- Majority (80%) considered believed in the truth
- Right Sounding questions debates across French Media

Source- veriteperdue

The Minority Spreading Model

- Model assumes that people seek truth with repeated discussions with their peers
- Perfect society where everyone power of conviction is equal
- People align themselves along the local consensus because of no priori
- To moderate the model doubt is allowed
- In case of a doubt the people align to the social thought of the population

The Minority Spreading Model (contd.)

- Fix the ratio of various social meeting as $\{a_i\}$, probability of being in groups of i

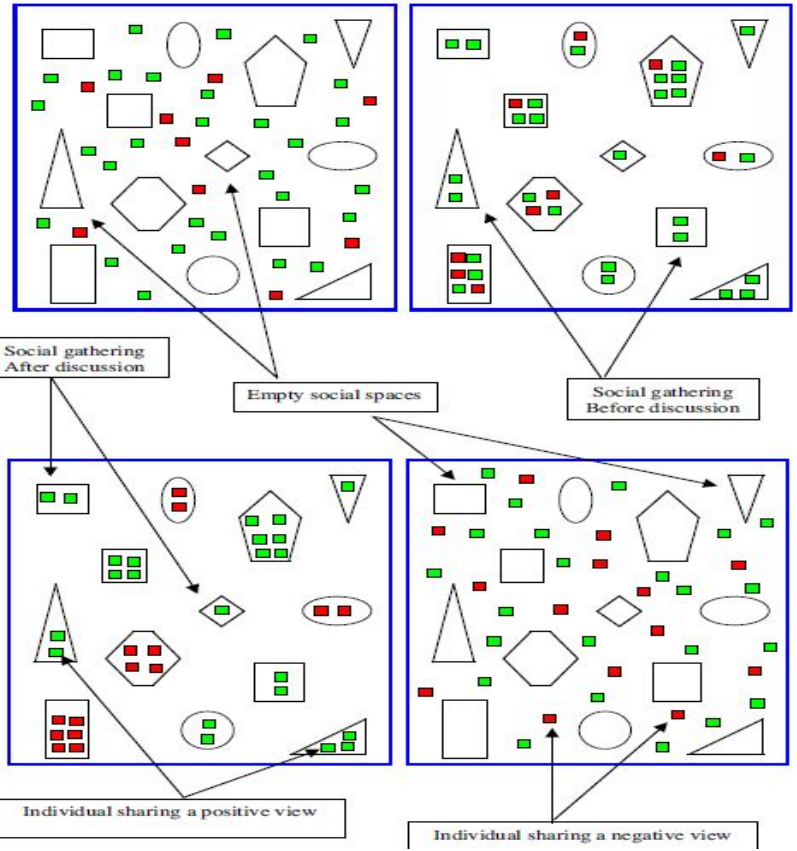
$$\sum_{i=1}^{L} a_i = 1,$$

- $N_+(t)$, people believing the truth; $N_-(t)$, people believing the rumor
- $P_+(t)$ probability of people believing the truth

$$P_+(t) = \frac{N_+(t)}{N},$$

$$P_-(t) = 1 - P_+(t).$$

The Minority Spreading Model (contd.)



Source- Galam 2002

The Minority Spreading Model (contd.)

- Mathematical formulation of the social gathering and influence

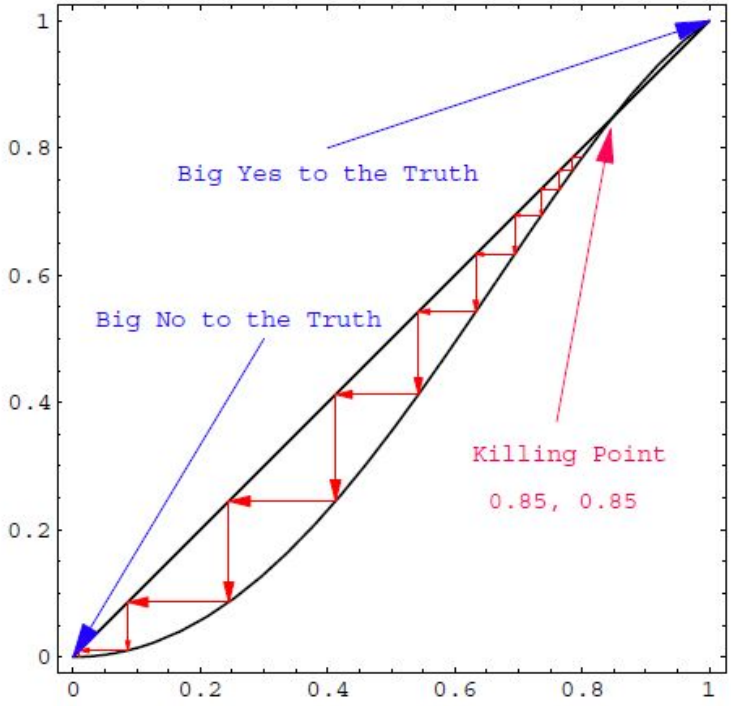
$$P_+(t+1) = \sum_{k=1}^{L} a_k \sum_{j=N[\frac{k}{2}+1]}^{k} C_j^k P_+(t)^j \{1 - P_+(t)\}^{(k-j)},$$

$$\text{where } C_j^k \equiv \frac{k!}{(k-j)!j!} \text{ and } N[\tfrac{k}{2}+1] \equiv Integer Part\ of\ (\tfrac{k}{2}+1).$$

- The stationary points $P_+(t)=P_+(t+1)$ is the killing point P_k
- If $P_+(t) > P_k \Rightarrow P_+(t+1) > P_+(t)$ truth believers increase
- If $P_+(t) < P_k \Rightarrow P_+(t+1) < P_+(t)$ truth believers decrease

Quantitative Illustration

- Set of $\{a_i\}$, where $a_1=0$; $a_2=a_3=a_4=⅓$
- Killing point = 0.847



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Quantitative Illustration(contd.)

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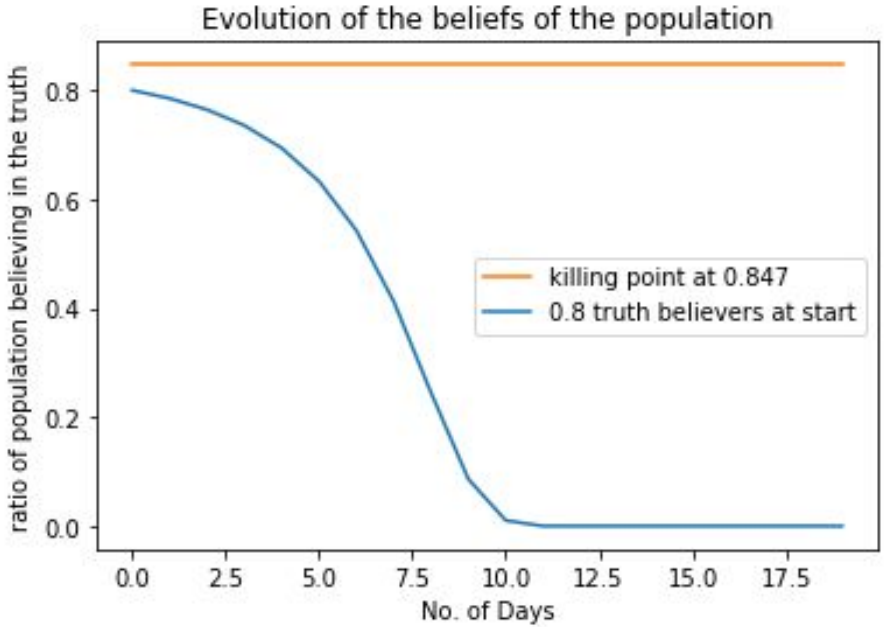
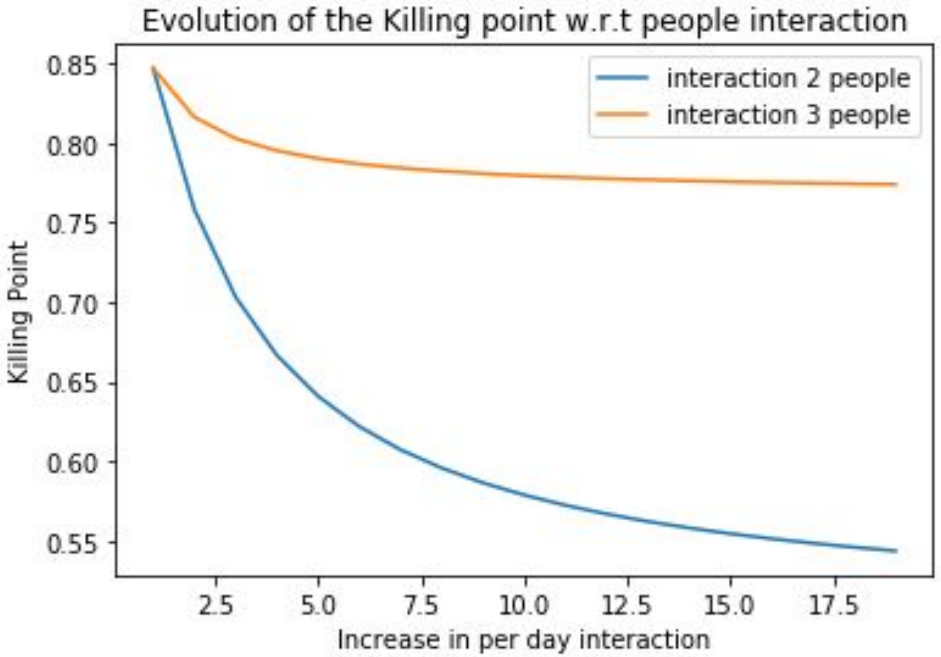


- 6^{th} day only 20% believe truth
- 11^{th} day no one believe truth

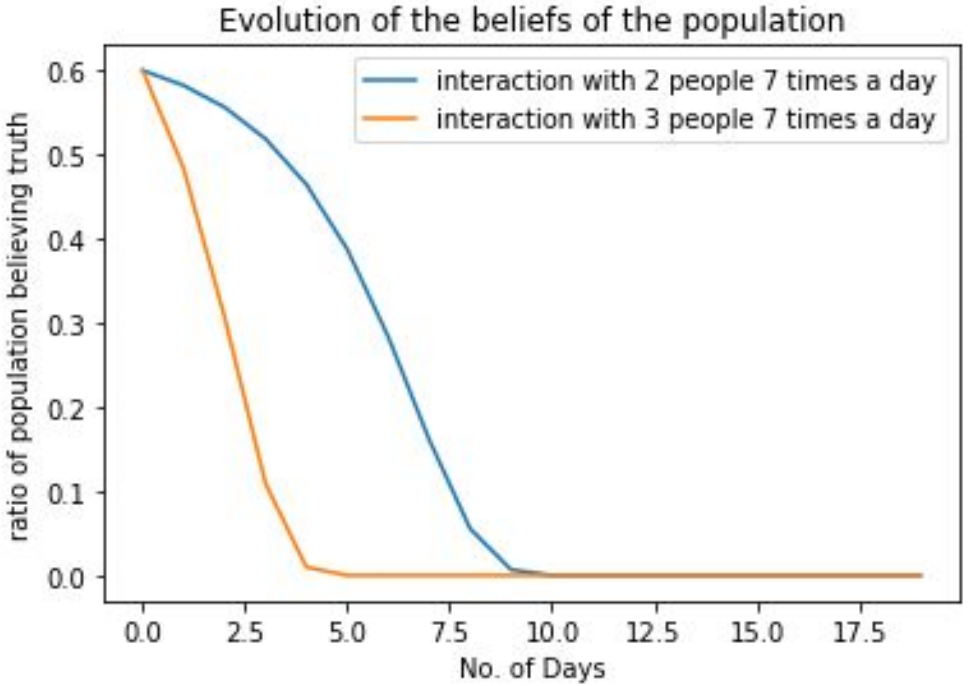
Additional Results: Killingpoint v/s Interaction

- More interaction leads to lower killing points
- Killing points saturated after some interaction



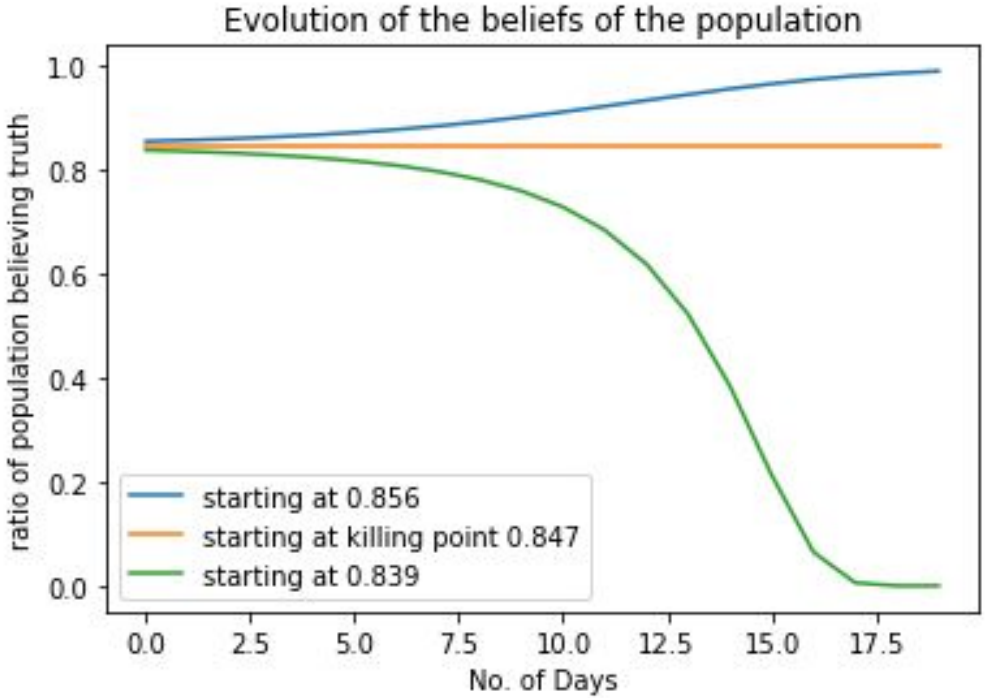
Additional Results: Speedup Rumors Spread

- Interacting with more people spreads rumor faster



Additional Results: Spread Rumors Faster

- Rumors spread fast
- All people believe in the rumor by 17 days
- 97% people believe the truth at the end of 20 days



Conclusion

- Real life situation not every person is open to change
- People should doubt the local state most times
- Rumors have an inherent nature to spread fast
- More interaction allow to spread rumor faster but to certain limit
- Rumors can only be stopped by non compromise institutional intervention

Conclusion(contd.)

- The majority rule diffusion dynamics shows a rumor to spread requires two criterion
  - Initial support beyond critical point(which is very low)
  - Some larger social paradigm

Reference

- "Modeling Rumors:The No Plane Pentagon French Hoax Case" by Serge Galam

Code

- https://github.com/a-parida12/RumorModeling

Thank You