

方向:
参数反演 感染率 γ , 恢复率 β
模型优化 SEIR, SIRS, ...
平台对比 twitter, weibo, facebook, web forums, ...
结合内容分析

(Zihui Ma, Lingyao Li and et al, 2024) conducted a case study of 2020 Western U.S. wildfire season by using SIR theory to explore the magnitude and velocity of topic diffusion on Twitter, which showed that there was a clear relationship between topic trends and wildfire propagation patterns.

(Pingqi Jia, Chao Wang and et al, 2019) proposed an improved SIR model, which divided the rumor spreading channels into two categories, group and point-to-point.

(Sifan Xu, Xinyan Zhao and Jie Chen, 2024) analyzed data on Twitter discussions during the Texas winter storm in 2021. The study showed great fit of the SIR model for topic growth and that temporal distance affects users’ construal of the event in line with core predictions of construallevel theory.

(Jiyoung Woo and Hsinchun Chen, 2016) examined that SIR model is a plausible model to describe the diffusion process of a topic.

In the web forum context, $S(t)$ is the number of possible authors who might have an interest in a topic at time t . $I(t)$ is the number of authors who write posts on the topic during the same period. $R(t)$ is the number of authors whose posts lose infectivity to others on a topic. α , infection rate, indicates how many possible authors will be infected per contact between an infective and a susceptible. β , recovery rate, indicates how many infective authors per infective recover during a unit time.

Table 2 The analogy between epidemics and topic diffusion in the web forum

| Elements of SIR model | Epidemics | Topic diffusion in web forums |
|--------------------------|---|---|
| What flows | Disease | Idea/topic (keywords) |
| Susceptible: $S(t)$ | People who can have contact with an infective and possibly will become infected | Possible authors (including commenters) who might read posts on a topic |
| Infective: $I(t)$ | People who have a disease and possibly will infect others | Current authors who write posts on a topic |
| Recovered: $R(t)$ | People who recover from a disease and lose the power to infect others | Past authors whose posts lose influence toward others |
| Infection rate: α | The probability of transmission in a contact between an infective and a susceptible | The probability of writing a comment or thread after reading posts on the topic |
| Recovery rate: β | The probability that the infective becomes recovered | The probability that posts lose infectivity |
| Recruitment rate: μ | The proportional increase rate of the population | The proportional increase rate of author pools |
| Carrying capacity: K | The maximum population that the environment can support | The highest value of the total authors that a topic can recruit |

(Huiqin Zhang, Yingfang Liu and Xudong Chen, 2019) build a dissemination model of Weibo information based on a BA scale-free network and SIRS model.

TITLE: SIHR rumor spreading model in social networks

The model extends the classical Susceptible-Infected-Removed (SIR) rumor spreading model by adding a direct link from ignorants to stiflers and a new kind of people-Hibernators.

The result shows that the direct link from the ignorants to the stiflers advances the rumor terminal time and reduces the maximum rumor influence. Moreover, the forgetting and remembering mechanisms of hibernators postpone the rumor terminal time and reduce the maximum rumor influence.

DOI: 10.1016/j.physa.2011.12.008

TITLE: Rumor spreading model with consideration of forgetting mechanism: A case of online blogging LiveJournal

In comparison with the Susceptible-Infected-Removed (SIR) model, we provide a more detailed and realistic description of rumor spreading process with combination of forgetting mechanism and the SIR model of epidemics.

DOI: 10.1016/j.physa.2011.03.010

TITLE: Analysis of the impact of education rate on the rumor spreading mechanism

In this study, the classical SIR rumor spreading model is extended to consider the forgetting mechanism and population's education rate, to thus yield the SEIR rumor spreading model. A system of nonlinear ordinary differential equations that describes the dynamical behavior of the SEIR rumor spreading model is derived. Further, analyses of our model are carried out to determine the rumor final size and to investigate the impact of education rate on the rumor final size. Our analytical and numerical results show that the more there are educated individuals within a population, the smaller is the rumor final size. In brief, education significantly contributes to the rumor spreading cessation.

DOI: 10.1016/j.physa.2014.07.041

TITLE: SICR rumor spreading model in complex networks: Counterattack and self-resistance

In this paper, considering the counterattack mechanism of the rumor spreading, we introduce two new models: Susceptible-Infective-Counterattack-Refractory (SICR) model and adjusted-SICR model. We then derive mean-field equations to describe their dynamics in homogeneous networks and conduct the steady-state analysis.

DOI: 10.1016/j.physa.2014.03.021