

摘要

随着 BBS、微博、微信等日益普及，网络媒体渗透日常生活的各个方面，成为人们在获取信息、交换意见、表达观点的重要渠道。越来越多的社会公众将网络媒体作为事件曝光和问题解决的平台。网络媒体具有巨大的社会影响力，事件经过网络媒体曝光，迅速成为当时的热门话题，引发全社会的讨论，促使政府采取措施解决问题和澄清事情真相。面对日益普及的网络媒体和日益复杂的事件舆情，网络媒体的管理和事件舆情的引导已经成为社会治理的重要职责。然而事件舆情的演化是非常复杂的，不仅舆情演化速度快、影响因素众多，而且存在着舆情反转现象。突发事件不断发生的背后是事件主体的利益诉求。利益相关者的策略选择导致了突发事件的产生，事件通过网络媒体的传播形成事件舆情，会影响部分利益主体的利益。部分利益主体为了推动事情的解决，主动将事件在网络媒体曝光。

本文研究的主要内容包括：

(1) 运用动态主题模型(DTM)对单个话题的热度演化和内容演化进行分析。单个话题的演化包括话题热度演化和话题内容演化，受到突发事件的影响。使用 Cox-Stuart 趋势检验预测话题趋势，使用话题距离矩阵发现话题内容的突变节点。研究使用谱聚类将 DTM 模型生成的天涯杂谈语料库话题分为家庭生活、社会事务和政府执政三种类别，使用话题平均热度、话题热度标准差、话题内容平均变化和话题内容变化标准差对家庭、社会事务和政府执政三种类别话题受突发事件影响差异进行分析。

(2) 使用 LDA 对多个话题的演化周期和演化路径进行分析，使用桑基图表示话题演化的复杂关系。突发事件包括多个话题，话题之间存在话题融合和话题分裂等现象。研究使用 Kleinberg 模型获取 LDA 生成的话题中的突发话题，提出桑基演化图对话题演化中的话题产生、话题继承、话题融合、话题分裂和话题消失关系进行分析。突发区间表示话题是社会公众的关注焦点，根据 Kleinberg 模型可以获得每个话题的突发区间，对突发事件的发展阶段进行划分。

(3) 引入高效用项集，提出 HU-BTM 突发话题发现模型。为了更好的发现海量数据中的突发话题，研究将高效用项集、突发词等先验信息加入话题模型，

引入基于普通 Pólya 坛子模型的 Gibbs 抽样算法。与 Online LDA、BBTM 等模型相比，HU-BTM 模型的突发话题发现准确率和召回率均更佳。

(4) 针对药品质量安全突发事件，研究使用演化博弈论建立社会公众、医药企业和监管机构的博弈模型。突发事件产生的背后是事件主体的利益冲突，研究考虑了社会舆论对博弈主体的行为的影响，提出社会公众、医药企业和监管机构的三方博弈模式。通过对博弈的模型均衡解的分析和参数对博弈均衡影响的分析，提出药品质量安全监管的基本措施。使用 WSR 理论对药品质量安全突发事件进行分析，重点对突发事件中的“人理”进行分析。研究提出药品质量安全监管的 WSR 框架，并从生产者、消费者、监管者等主体的利益关系协调角度对“人理”要素进行分析。

关键词： 舆情演化，突发事件发现，演化博弈论，WSR 系统方法论

Abstract

With the increasing popularity of tianya community, Weibo and WeChat, online media has penetrated into every aspect of daily life and become an important channel for people to obtain information, exchange and express opinions. More and more people regard online media as platforms for event exposure and problem solving. These events, exposed by online media, quickly became a hot topic at that time, triggering discussions in the whole society and prompting the government to take measures to solve the problem and clarify the truth of the matter. Facing the increasingly popular network media and complex event public opinion, network media management and event public opinion guidance has become an important responsibility of social governance. However, the evolution of event public opinion is very complex, which is not only characterized by rapid evolution and numerous influencing factors, but also the phenomenon of public opinion inversion. Behind the constant occurrence of emergencies is the interest appeal of the event subject.

The main contents of this paper include:

(1) Use the dynamic topic model to analyze the heat evolution and content evolution of a single topic. The evolution of a single topic includes the heat evolution of the topic and the content evolution of the topic, which is affected by emergencies. The topic trend was predicted by using COX-Stuart trend test, and the topic distance matrix was used to find the sudden points of the topic content. At the same time, the use of spectral clustering DTM model generation topic will be divided into three types of family life, social affairs and administration category, use the heat topic average heat, topic marked difference, subject content, the average change topic and content change of standard deviation to the family and social affairs and administration three categories topic affected by emergencies differences were analyzed.

(2) LDA is used to analyze the evolution cycle and path of multiple topics, and a sankey diagram of topic evolution is proposed. The event includes many topics, among

which there exists the phenomenon of topic fusion and topic division. In this paper, we use Kleinberg model to obtain emergent topics generated by LDA, and propose a Sankey evolution map to analyze the topic inheritance, topic fusion, topic fragmentation and topic disappearance in topic evolution.

(3) The high utility items sets are introduced and a HU-BTM model is proposed to improve the efficiency of topic filtering. In order to improve the efficiency of topic filtering generated by the topic model, the prior information such as high utility patterns and burst words are added to the topic model, and the Gibbs sampling algorithm based on the general Polya urn model is introduced. Compared with Online LDA, BBTM and other models, the HU-BTM model has better accuracy and recall rate.

(4) To study the use of evolutionary game theory to establish a game model for the public, pharmaceutical companies and regulatory agencies in view of drug quality and safety emergencies. Behind the emergence of emergencies is the interest conflict of the event subject. The study considers the impact of public opinions, and proposes a trilateral game for the public, pharmaceutical enterprises and regulatory authorities. By analyzing the equilibrium solution of the game model and the influence of parameters on the equilibrium, the basic measures of drug quality and safety supervision are put forward. WSR theory is employed to analyze drug safety emergencies, with emphasis on the analysis of Renli in emergencies. This paper puts forward the WSR framework of drug quality and safety supervision, and analyzes the elements of Renli from the perspective of the coordination of interests among producers, consumers and regulators.

Key Words: Evolution of public opinions, Bursty events detection, Evolutionary game theory, WSR system approach