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Comparable Analysis of News Diffusion between Mainstream and Alternative Media in Twitter

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Extended Abstract

Social media such as Twitter plays an essential role in delivering news to many people. It also contributes to the increasing number and diversity of news media, mainly called "Alternative media," which sometimes have a different opinion from "Mainstream media." On the other hand, alternative media have some quality concerns. For example, the Pizzagate conspiracy – a debunked theory connecting a restaurant and members of the U.S. Democratic Party to a child sex ring - was spread by alternative media. These situations are similar in other countries; for example, in Japan, there were cases where fake news by alternative media was spread [3]. However, it is not clear whether the nature of alternative media (e.g., the relationship with echo chamber) revealed by previous researches [2], mainly focus on the social in the U.S., is also applicable in Japan, and besides which media are alternative media in Japan.

Our study investigates how each news media tends to spread on Twitter by Hawkes process-based model (as shown in Figure 1.) Understanding the characteristics of the diffusion of news media in Japan on Twitter (e.g., the difference between mainstream and alternative) is useful for comparing those in other countries and how people perceive the news.

In preparation for the analysis, we firstly investigate which news media belongs to mainstream or alternative media. We asked 1,000 users the question regarding the position of 35 news media in Japan in Yahoo! crowdsourcing (`https://crowdsourcing.yahoo.co.jp/`), which is a major crowdsourcing platform in Japan, and decide the position of news media in Japan. We then examine the difference in diffusion between mainstream and alternative media on social media, mainly focusing on the diffusion speed of news articles. As the analysis method, we adopt the Time-Dependent Hawkes process (TiDeH) [4], which describes the information diffusion on social media considering the interest decay and circadian rhythms. This modeling method gives us each parameter such as a and τ; a represents the intensity of information and τ represents how the convergence of information diffusion. We analyze these parameters, which are a compact representation of information diffusion characteristics.

We examine the speed of diffusion of each news by comparing the modeling parameters, using tweets with URL of news in two datasets. One is COVID-19 Japanese Tweet dataset consisting of tweets including keywords related to "COVID-19" and ranging from Jan 17 to Apr 30, 2020 [1]. Another is "Gakujutu" (Science Council) dataset consisting of tweets including "学術会議" and ranging from Sep 30 to Oct 20, 2020, which is one of the political topics in Japan. We analyze 12,289,740 tweets (9,000 URLs) from the COVID-19 dataset and 386,538 tweets (1000 URLs) from the 'Gakujutu" dataset.

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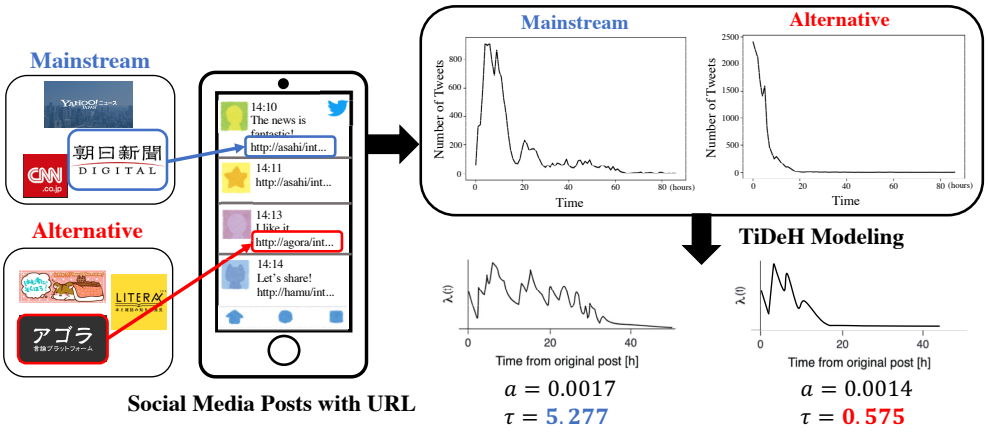

Figure 1: We investigate the characteristics of the diffusion of news media in Japan. We firstly get tweets attached with news in each media classified into mainstream or alternative. We then apply TiDeH modeling to these tweets and analysis the modeling parameters. For example, one parameter τ represents how the convergence of information diffusion. The large τ indicates the diffusion converges slowly, as shown in the mainstream example, which was still being shared 40 hours after the initial tweet. While the small τ indicates the opposite situation in the alternative example.

The analyzing results reveal as below; The convergence of diffusion is relatively faster for alternative than for mainstream media. In foreign (not Japanese) media and media not focusing on breaking news, belonging to mainstream media, the convergence is slow. We also confirm that each traditional newspaper has similar characteristics resulting from the similar speed of diffusion convergence. On the other hand, some media with political bias belonging to alternative media have a fast diffusion convergence speed. We consider it to be due to the Echo Chamber effect same as the situation in other countries.

Summarizing above, we have analyzed how each news media tend to spread on Twitter by Hawkes process. The analysis revealed the characteristics of diffusion in Japanese news media and the relevance to previous studies [2] related to the Echo chamber focusing on the U.S. news media. Understanding the diffusion characteristics for each news media is useful for detecting alternative media, comparing with those in other countries and understanding how people perceive the news.

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