Completion Report

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Subject of Research Project:Changes in online public sentiment in relation to natural disasters amid COVID-19, a study case of major floods in Japan.

Our research compared and analyzed the polarity of public sentiment leveraging Twitter data from two rainfall-related disasters in Japan. These disasters are associated with two record-breaking rainfall events: "平成 30 年 7 月豪雨" (Heavy rain of July, Heisei 30) and "令和2年 7月豪雨" (Heavy rain of July, Reiwa 2). The last-mentioned disaster occurred concurrently with the COVID-19 pandemic period. For simplicity, the disaster that occurred in Heisei 30 is referred to as the "Pre-Covid disaster," and the disaster that occurred in Reiwa 2 is referred to as the "Covid-19 disaster."

Using the same keywords ("平成 30 年 7 月豪雨," "令和2年 7月豪雨," "水害," "災害," "大雨警," "出水," "土砂災害"), our research found a significant increase in the number of tweets posted during the Covid-19 disaster. Specifically, during the pandemic period in Reiwa 2, about 212,481 tweets related to the disaster were posted. This number is 300% greater than the number of tweets recorded during the pre-Covid-19 disaster (Heisei 30), which had only 70,904 tweets.

About 20,000 tweets in each case were manually translated and classified as either Neutral, Positive, or Negative Sentiment. In critical conditions such as disasters, the number of positive sentiments is significantly lower than that of negative sentiments. Interestingly, there is no difference in the number of positive sentiments between these two cases. Out of the total 20,000 tweets, only about 11-12% were recognized as positive sentiments, while approximately 30% were identified as Neutral, and the remaining 58% of tweets were classified as Negative Sentiment.

We then purposively sampled 10,000 tweets for each case. All positive tweets were included in these sampled data due to their limited number. The data were proportionally divided into training and test datasets with a ratio of 0.7:0.3. We used Natural Language Processing and a Bayesian classifier to determine the polarity of tweets, and the results are presented in Table 1.

Table 1. The statistics for the sentiment analysis.

Variables	Pre COVID-19 disaster	COVID-19 disaster
Accuracy	0.76	0.8
P-Value	0.32	$2x10^{-16}$
Kappa	**0.34**	**0.54**
Sensitivity	**0.48**	**0.64**
Specificity	0.84	0.88
Positive Predictive values	**0.53**	**0.74**
Negative Predictive values	0.83	0.82

We found that it is easier to distinguish positive sentiment during the pandemic, as indicated by the Kappa and Sensitivity values. This is likely due to the increased communication among users for information exchange, safety, and support or encouragement during the COVID-19 disaster. Japanese people appear to be more resilient when exposed to challenging times, as we also observed an increase in positive sentiment tweets related to crowdfunding during the COVID-19 disaster compared to the pre-COVID-19 case.

We aim to increase the number of samples to develop a more robust predictive model and to conduct further research on the disaster resilience of Japanese people during the COVID-19 pandemic.

Publication of the Results of Research Project:

Verbal Presentation (Date, Venue, Name of Conference, Title of Presentation, Presenter, etc.)

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Presenter: Magfira Syarifuddin

Thesis (Name of Journal and its Date, Title and Author of Thesis, etc.)

We are currently preparing a manuscript for a publication on International Journal of Advances in Intelligent Informatics.

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NIL