Motivations

• Understanding public sentiment towards different non-pharmaceutical interventions (NPIs) is important for combating the spread of COVID-19.
• As the situation developed, Twitter discussion became more diverse and fine-grained.
• Prior works on this subject lack a reliable statistical significance test when drawing connections between the public’s sentiment and various pandemic-related events.

Event Studies

Expected Return

\[ R_t = \mathbb{E}[R_t|X_t] + \xi_t \]

Market Model

\[ \mathbb{E}[R_t|X_t] = \alpha + \beta R_{m,t} \]

Cumulative Average Residual (CAR)

\[ \text{CAR}(t_1, t_2) = \sum_{t = t_1}^{t_2} \xi_t \]

• The actual return of a stock can be decomposed into its expected return plus an “abnormal” return.
• The price of a stock is analogous to the public’s sentiment towards a topic (NPI).
• The expected return is estimated by the market model.
• Upon time-series aggregation, we can test the significance of the impact of an event.

Experimental Setup

• 5,979,759 Canadian tweets were collected from Jan 21, 2020 to Aug 23, 2020.
• NPI-related tweets were extracted using NPI-related keywords (based on PMI).
• The daily average valence were calculated using NTUA-SLP (Baziotis et al., 2018) valence regression model.
• Event studies on different NPIs were performed using the daily averages.

Results: Individual NPI Studies

Wearing a mask sentiment analysis

Social Distancing Sentiment Analysis

Ontario

British Columbia

Alberta

• Wearing a mask event 1: Mask advisory revised
• Wearing a mask event 2: PHAC formally issued a recommendation
• Social Distancing: Initial recommendations of social distancing from the provincial government

Results: CAR and Survey Data Correlation

Wearing a mask

Social distancing

• Evaluated CAR against a traditional survey (covid19monitor.org).
• Wearing a mask (Canadian federal NPI) Pearson r=0.807, x-corr of 0.710 with a +5 lag.
• Social distancing (different provincial NPI) Pearson r=0.439, x-corr of 0.492 with a +5 lag.