

Assessing the Predictive Power of Online Social Media to Analyze COVID-19 Outbreaks in the 50

U.S. States

– Supplementary Information

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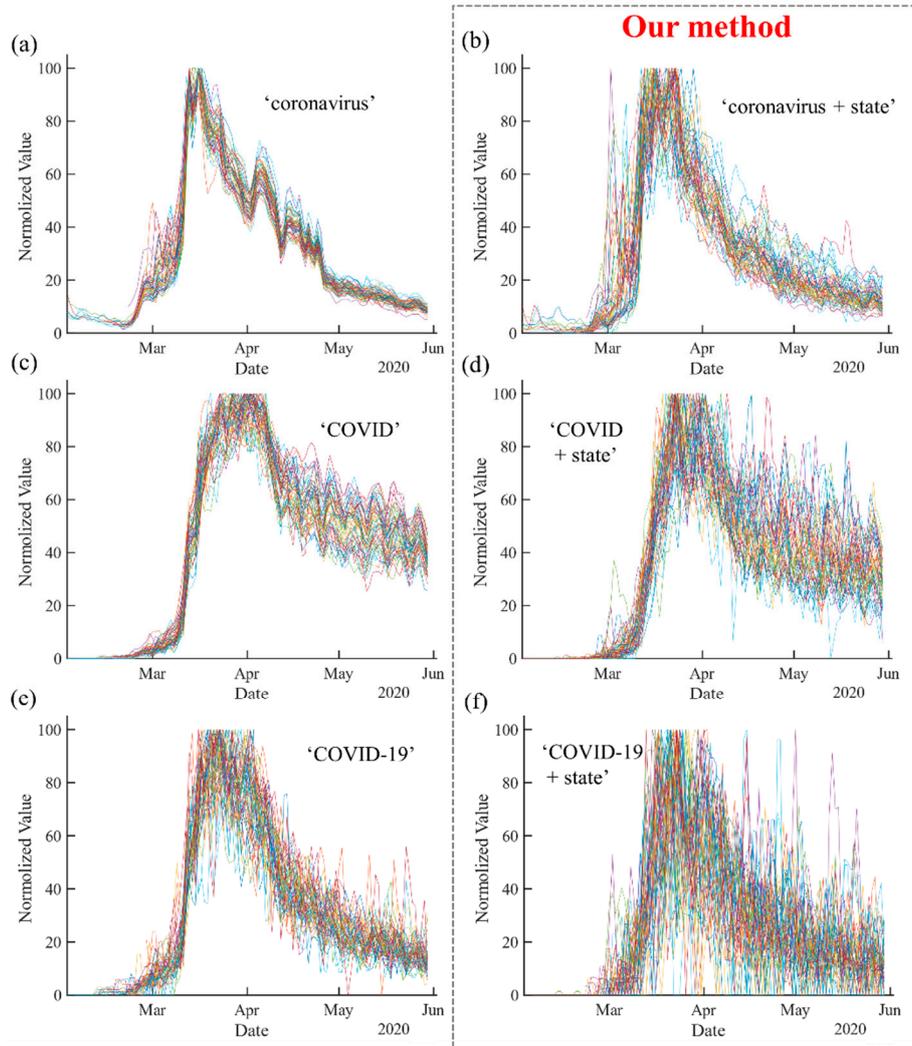


Figure S1. Comparison of Google Trends index with and without the state's full name in 50 U.S. states. Each curve corresponds to an individual state, with the values smoothed by a 3-day-average. (a-b) Using keyword 'coronavirus'. (c-d) Using keyword 'COVID'. (e-f) Using keyword 'COVID-19'.

Table S1. Spearman correlation coefficient between c^* and l^* ($N = 50$) from Twitter data and the Google search data. The significance level is denoted by stars in red: *** $p < 0.01$.

Twitter	Google Trend (coronavirus)	Google Trend (COVID)	Google Trend (COVID-19)
0.564 ***	-0.247	0.063	0.162

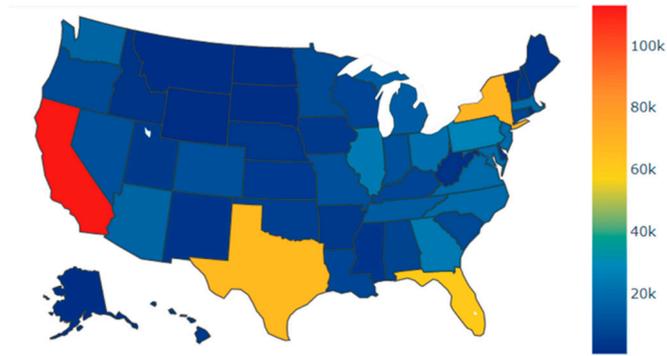


Figure S2. The number of COVID-19 related tweets in 50 U.S. states available in the used dataset from January 27, 2020 to May 30, 2020.

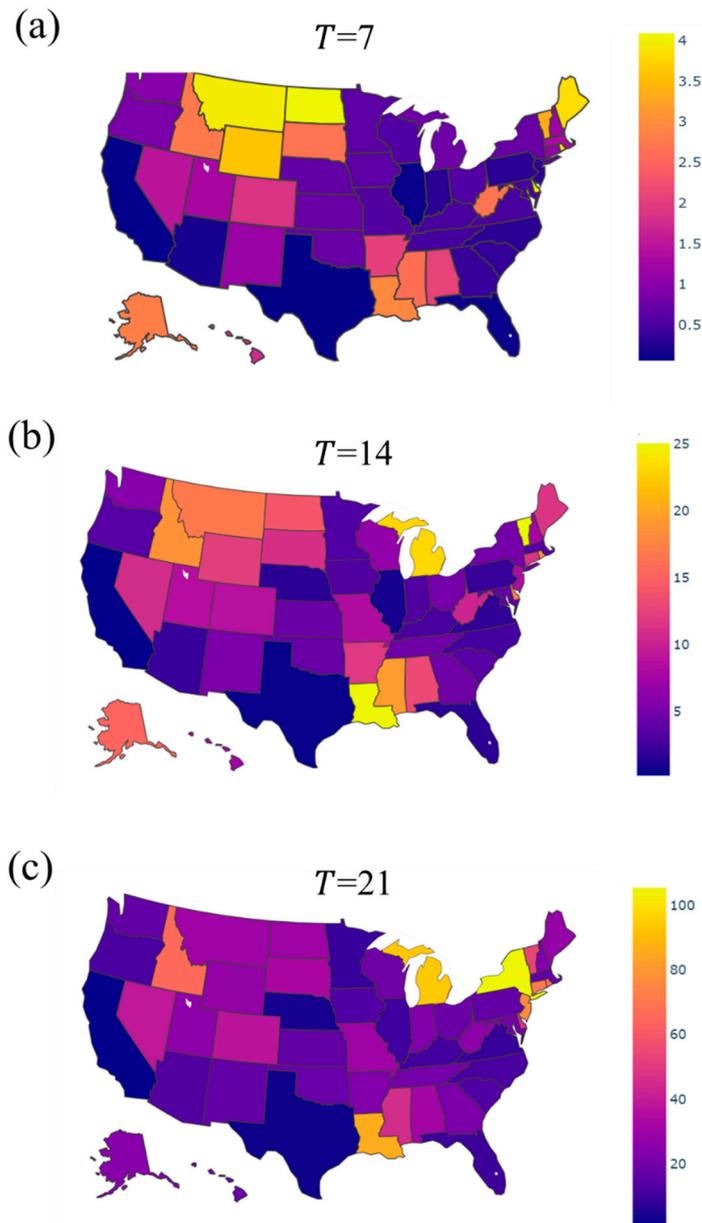


Figure S3. The state-level *early* infection rate calculated as the proportion of residents (per 100,000) being infected in the earliest T days.

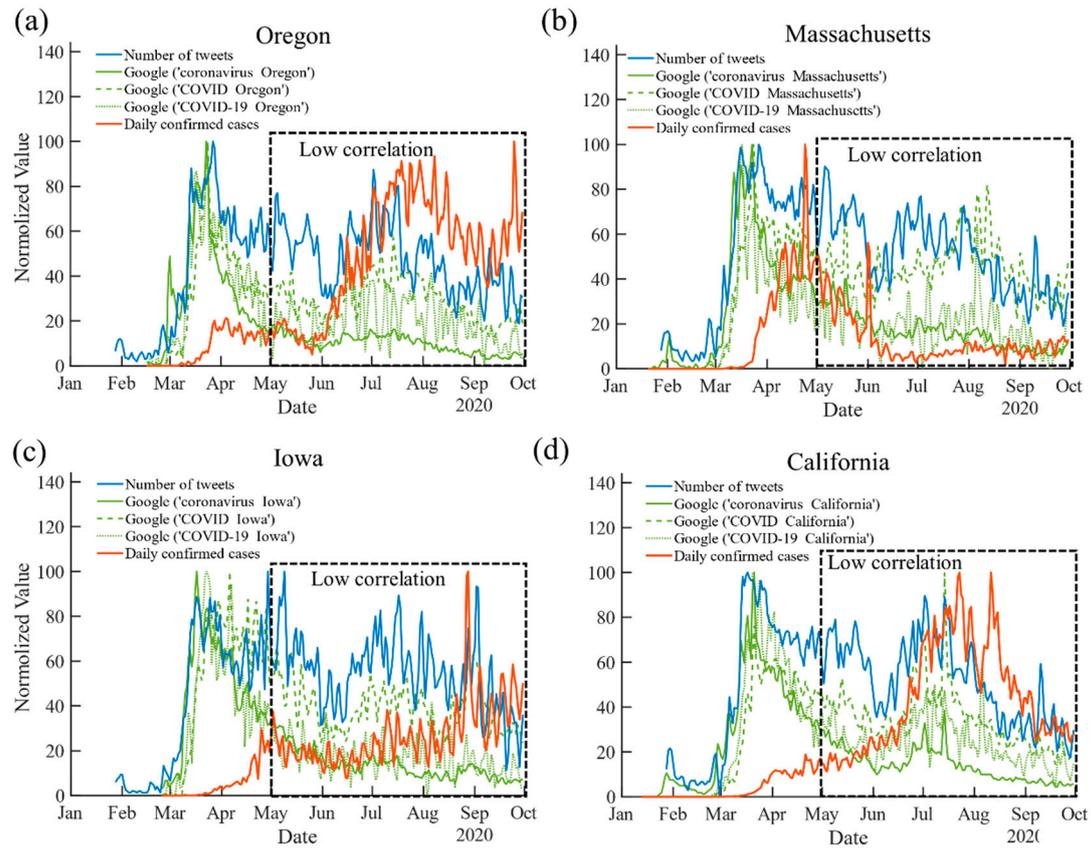


Figure S4. Number of COVID-19 related tweets, Google Trends index using different COVID-19 keywords (integrated with the state's full name) and daily infection numbers till September 30, 2020. The values of each curve are first smoothed by a 3-day-average to reduce the noise and are then normalized to $[0, 100]$ for comparison.

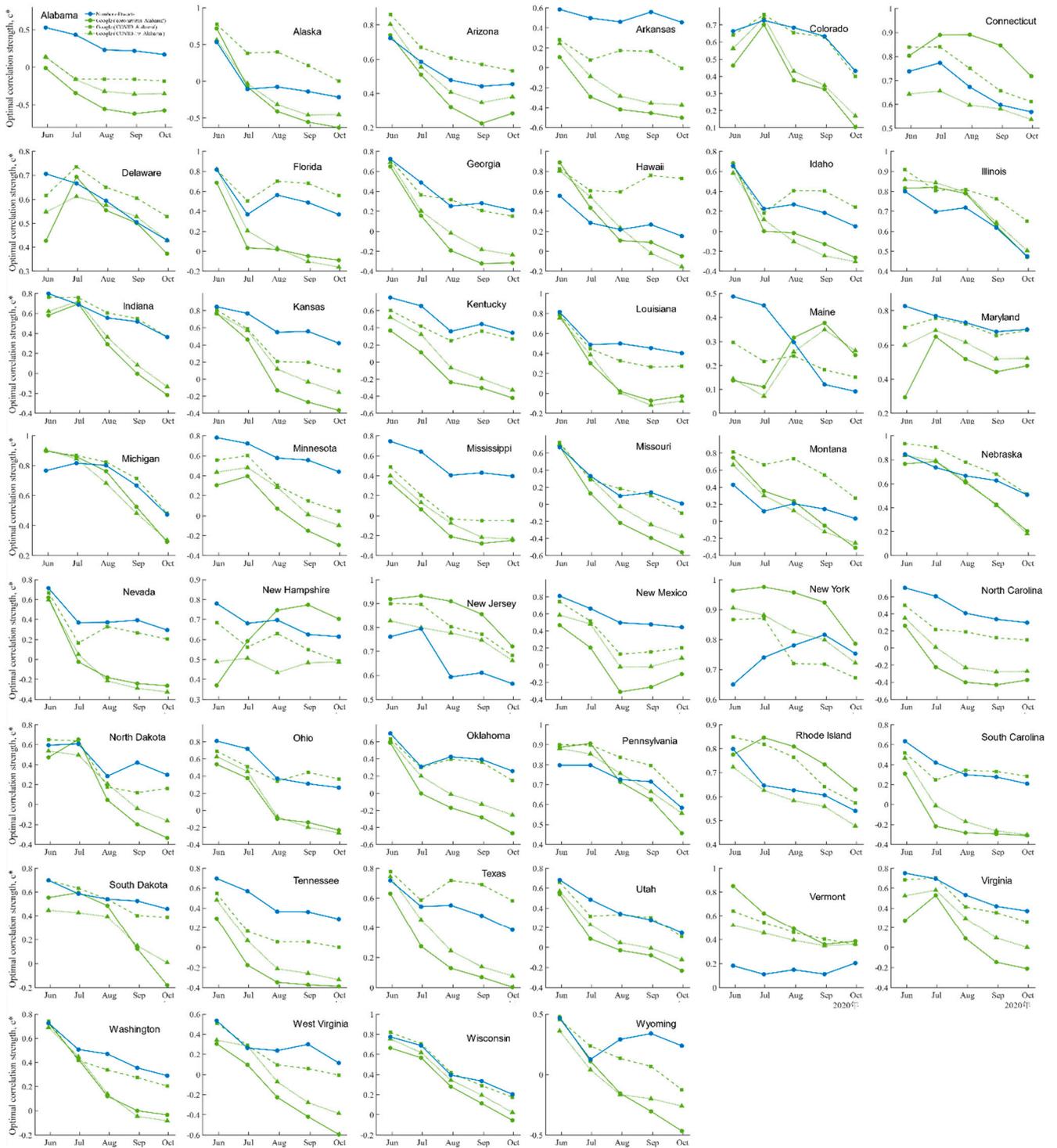


Figure S5. The highest correlation strength c^* between the COVID-19 daily infection and the Internet data vs. the studied period in 46 remaining states. The x-axis denotes the end date of the studied period for a given state, while the start date is chosen as the date when the first case was reported in this state. Each point of c^* is obtained by applying the lagged Spearman correlation analysis

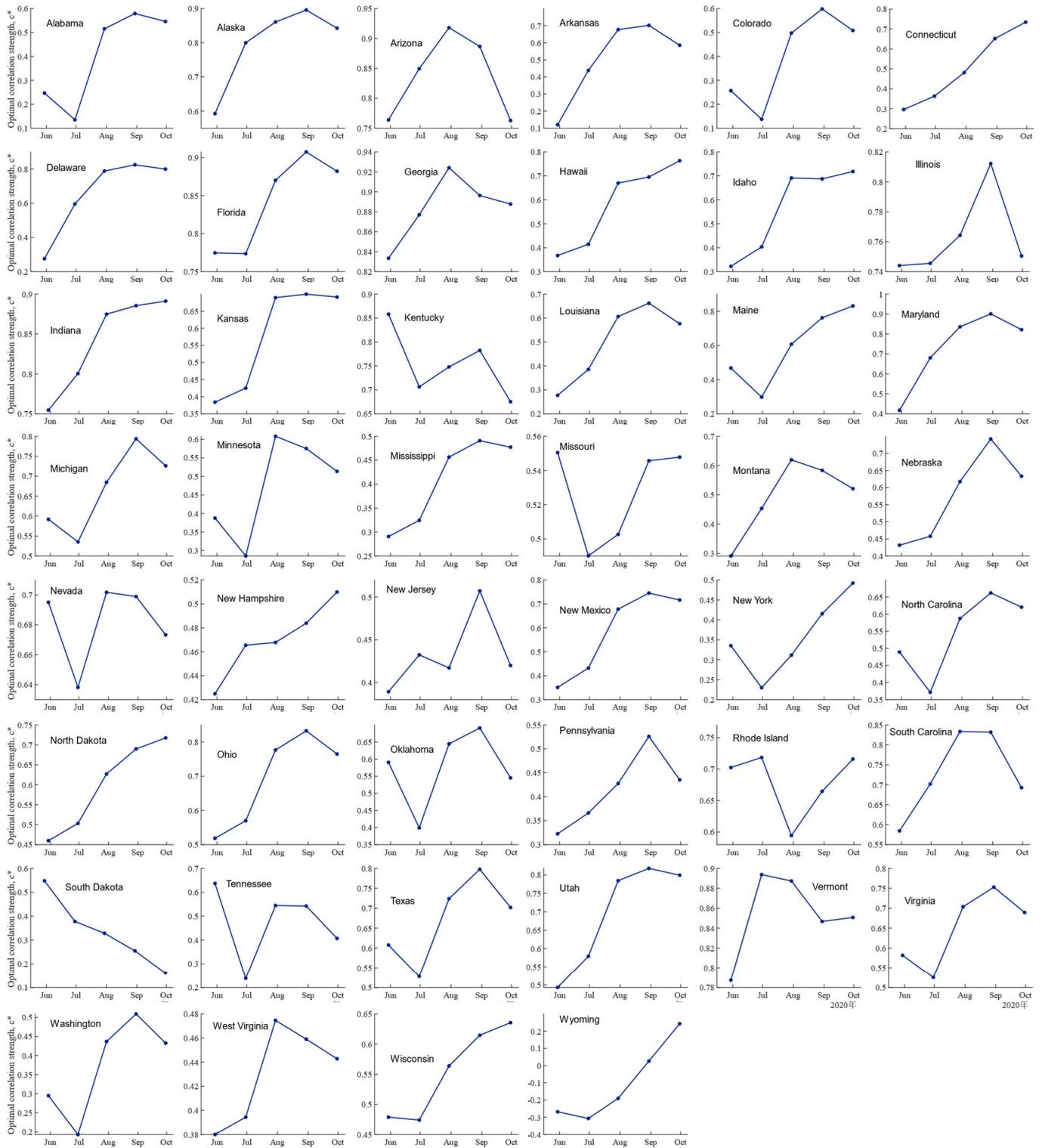


Figure S6. Value of the highest correlation strength c^* vs. the studied period for the COVID-19 daily testing number and the Google index using ‘COVID testing + state’s name’ in 46 states.