

Digital epidemiology framework for the surveillance of Subjective Well-being in open-source data: Information-Seeking during the COVID-19 outbreak in 10 countries

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In the current global environment, digital technologies mediate our relationships and experiences. People rely on digital services and devices to consume, communicate, be informed, and be entertained. Finely grained insights from the interplay between technologies and people's psychological, social, economic, political, and cultural digital lives are essential to understanding contemporary society. When equipped with cross-disciplinary knowledge, at the intersection of Social & Behavioural Sciences and Artificial Intelligence, researchers and practitioners will be better able to map connections between segments of our digital lives. There is an urgent need to translate the computational methods of analysis from data science and epidemiology to fields in the social sciences. The unfolding of the COVID-19 outbreak was an unprecedented and unanticipated opportunity to understand how sudden global shocks modulate people's online searches when seeking information about their emotional well-being.

The present paper explores multiple validations of a novel general Machine Learning framework designed to investigate how highly granular can augment social and media listening and population-scale well-being surveys.

I will first present how we uncovered and validated strong linkages between time-series in the digital surveillance of search engines during the pandemic and 1- a selection of social media feeds in the UK, Spain and the USA, and 2- large scale well-being surveys in the United Kingdom and Wales. Then I will show how high-frequency search-listening web analytics (sampled every 8-minutes) provide robust, finely grained, and replicable evidence on variation in aggregated mental health measures at the population level. Finally, I will review the evidence we gathered in international search-listening research that analysed the relationship between online search behaviour and an individual's immediate *need for knowledge* in Romania, France, Turkey, Italy, Germany, and the United Kingdom.

Results are discussed against the backdrop of creating transparent surveillance systems of open-source data, an essential component of a healthy, democratic digital society.

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