

Longitudinal Analysis of Collective Emotion in Online Social Media

Yukie Sano¹, Hideki Takayasu^{2,3}, Shlomo Havlin⁴, Misako Takayasu³

(1) Department of Policy and Planning Sciences, University of Tsukuba, Tsukuba, Ibaraki, Japan,
sano@sk.tsukuba.ac.jp.

(2) Sony Computer Science Laboratories, Inc., Tokyo, Japan,

(3) Institute of Innovative Research, Tokyo Institute of Technology, Yokohama, Kanagawa, Japan

(3) Department of Physics, Bar-Ilan University, Ramat-Gan, Israel

The social mood which we call collective emotion in the text, such as the self-restraint mood after the Great East Japan Earthquake in 2011 (the 3.11 earthquake) and the celebration mood of the auspicious occasions affects greatly the real economy. However, it is extremely difficult to capture it. Furthermore, because there is no ground-truth data of collective emotion, it is impossible to evaluate its validity. To tackle this problem, we use the Japanese blog data of about 3.6 billion articles for 10 years, and provide one of the answers by the simple and transparent method.

We find that collective emotion shows clear periodic cycles, i.e., weekly and seasonal behaviors, accompanied with pulses caused by natural disasters. We also identified long-term memory in the collective emotion that is characterized by the power-law decay of the autocorrelation function over several months. It means that collective emotion changes moderately overtime rather than sudden changes except for natural disasters. Finally, we will also discuss network structure among each emotion.

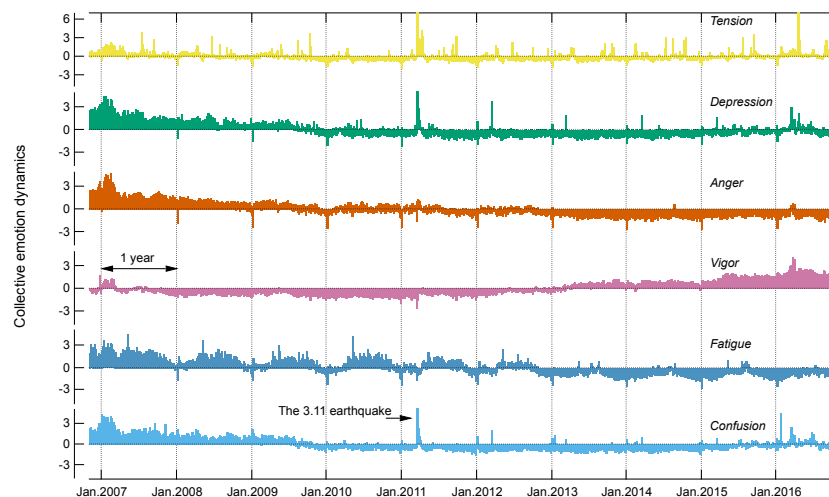


Figure 1: Daily dynamics of collective emotion for 10 years.

References

[1] Sano Y, Takayasu H, Havlin S, Takayasu M (2019) Identifying long-term periodic cycles and memories of collective emotion in online social media. *PLoS ONE* 14(3): e0213843.