Self-organization in Social Media

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A salient dynamic property of social media is bursting behavior. In this paper, we study bursting behavior in relation to the structure of fluctuation, known as *fluctuation-response relation*, to reveal the origin of bursts. More specifically, we study the temporal relation between a preceding baseline fluctuation and the successive burst response using a frequency time series of 3,000 keywords on Twitter. We find three types of keyword time series in terms of the fluctuation-response relation. For the first type of keyword, the baseline fluctuation has a positive correlation with the burst size; as the preceding fluctuation increases, the burst size increases. These bursts are caused endogenously as a result of word-of-mouth interactions in a social network; the keyword is sensitive only to the internal context of the system. For the second type, there is a critical threshold in the fluctuation value up to which a positive correlation is observed. Beyond this value, the size of the bursts becomes independent from the fluctuation size. Our analysis shows that this critical threshold emerges because the bursts in the time series are endogenous and exogenous. This type of keyword is sensitive to internal and external stimuli. The third type is mainly bursts caused by exogenous bursts. This type of keyword is mostly sensitive only to external stimuli. These results are useful for characterizing how *excitable* a keyword is on Twitter and could be used, for example, for marketing purposes.

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