Efficiency of human activity on information spreading on Twitter

Alfredo J Morales[1], *Javier Borondo*[2], *Juan Carlos Losada*[3] *and Rosa María Benito*[4]

Universidad Politécnica de Madrid, Madrid, Spain
[1]alfredo.moralesg@alumnos.upm.es
[2]fj.borondo@upm.es
[3]juancarlos.losada@upm.es
[4]rosamaria.benito@upm.es

Nowadays, the online social networks have become the ideal source of user generated data to characterize and model, human behavioral patterns [1]. On daily basis, several commercial, political and social organizations are increasingly exploiting these communication tools to disseminate updates on their respective fields. The deeply understanding of such spreading processes is crucial to design better strategies and get optimal outcomes from the network potential.
In this work, we propose a method to characterize and model the user efficiency to influence the emergence and growth of information cascades. The model we propose is based on a biased Independent Cascade Model [2] on networks. We use this model to study the impact of different factors on the spreading process, such as the individual behavior and the underlying substratum, as well as capturing and reproducing the main properties of the user efficiency to influence.
We capture these properties, by means of a quantitative analysis of the structural and dynamical patterns emergent from human interactions, during a Venezuelan political protest on Twitter, as a case of study. For this matter we have analyzed over 400,000 messages, downloaded from the Twitter severs, using the search API.
Our findings suggest that the user efficiency to transfer information is strongly conditioned to the underlying topology, where messages are propagated. In the sense, the highly connected nodes efficiently cause remarkable collective reactions, than the large majority of users, whose efforts are much higher than the results gained.
We conclude that although individuals may present psychological complexities and differences, the resulting patterns are a reflection of the dynamical rules behind the spreading process constrained to the available mechanisms.

[1] A.J. Morales, J.C. Losada and R.M. Benito. "Users structure and behavior on an online social network during a political protest". *Physica A* **391** 5244–5253 (2012).
[2] J. Goldenberg, B. Libaiand and E. Muller. "Talk of the Network: A Complex Systems Look at the Underlying Process of Word-of-Mouth". *Marketing Letters* **12:3** 209-221 (2001).