Collective information processing in human rumor spreading networks: An experimental study of rumor content fusion and propagation

Aleksandra Alorić,[1] Javier Garcia-Bernardo,[2] Peter Krafft,[3] Allison Morgan,[4] Zohar Neu,[5] and Andrea Santoro[6]

[1] *Center for the Study of Complex Systems, Institute of Physics Belgrade, University of Belgrade, Serbia*
[2] *University of Amsterdam, Amsterdam Institute for Social Science Research (AISSR), The Netherlands*
[3] *Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology, USA*
[4] *Department of Computer Science, University of Colorado, Boulder, CO, USA*
[5] *Department of Engineering Mathematics, University of Bristol, Woodland Road, Bristol, BS8 1UB*
[6] *School of Mathematical Sciences, Queen Mary University of London, London, UK*

(Dated: November 1, 2018)

This study aims to address a gap in the literature related to the mechanisms which humans use to share and filter out information from an unknown original source, and of an unknown quality, in the context of rumor spreading. The findings of past studies on the fidelity and accuracy of propagation of rumors in the real world are at odds with laboratory experimental studies, which find that rumors often become wildly distorted as they pass between individuals. We posit that this difference is largely due to the fact that classical laboratory experiments do not take into account complex interaction mechanisms in human societies. Namely, ways in which groups can combine noisy information to reduce overall uncertainty. We design an experimental setup intended to allow the observation and quantification of such mechanisms, which have been shown to be important in other collective information processing systems. The effect of feedback introduced into the rumor spreading process through redundant transmission pathways in a network structure is investigated. The scale of our experiments is not large enough to give statistically significant results with regards to the importance of network structure However, motif analysis of our results shows that non-trivial information fusion mechanisms are employed by human participants when presented with conflicting accounts of a rumor. We hope that the work presented in this report will pave the way to future experiments and models of information fusion, which will allow us to quantify how human societies collectively process information in the form of rumors.

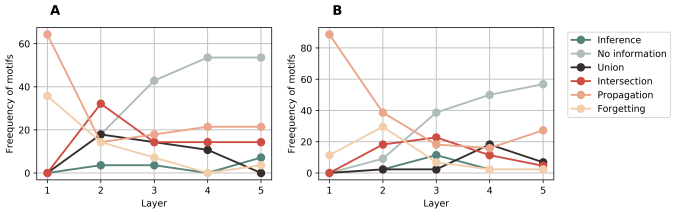

FIG. 1. Frequency of the motifs present in the proposition propagation network of story 1 (panel A) and 2 (panel B). Motifs denote different information processing mechanisms - forgetting, information transmission and fusion.