MAR17-2016-001013

Algorithms for reputation and quality in scientific e-communities

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The ever-increasing quantity and complexity of scientific production have made it difficult for researchers to keep track of advances in their own fields. This, together with growing popularity of online scientific communities, calls for the development of effective information filtering tools. We discuss a method to simultaneously compute reputation of users and quality of scientific artifacts in an online scientific community where researchers share relevant papers, which outperforms existing algorithms. The method is grounded on network theory, and relies on the different kinds of actions the members of the community can undertake. Evaluation on artificially-generated data and real data from the Econophysics Forum is used to determine the method's best-performing variants. We show that when the method is extended by considering author credit, its performance improves on multiple levels. The range of applicability of the algorithm is not strictly limited to scientific online communities, as it can be used in any environment where i) shared perceptions of quality can emerge, ii) quality induces popularity, and iii) individual artifacts have multiple authors.