

## 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. Here we discuss a general ranking method to simultaneously compute reputation of users and quality of scientific artifacts in an online scientific community where researchers share relevant papers. The method is based on an iterative procedure built on the network representation of the community, and relies on the different kinds of actions that 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. In particular, top papers have higher citation count and are published on more prestigious journals, and top authors have higher h-index than top papers and top authors chosen by other algorithms. Note that 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. We finally discuss the application of reputation metrics to social recommender systems, namely automated tools that cope with the problem of information overload relying on the social environment of the users. Using an adaptive recommender model based on epidemic-like spreading of news on a social network, we show that incorporating user reputation in the recommendation process do not necessarily harm the personalization of recommendations and thus the users' satisfaction. Instead, such an add on can substantially improve the outcome of the system—both in terms of filtering efficiency of the model as well as of its robustness against malicious and spamming behavior.

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[3] Cimini, Medo, Wei, Zhou, Zhang, *EPJ B* **80**, 201 (2011).