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Normalizing Scientometric Indicators of Individual Publications Using Local Cluster Detection Methods on Citation Networks

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Abstract : One of the major shortcomings of widely used scientometric indicators is that different disciplines cannot be compared with each other. The issue of cross-disciplinary normalization has been long discussed, but even the classification of publications into scientific domains poses problems. Structural properties of citation networks offer new possibilities, however, the large size and constant growth of these networks asks for precaution. Here we present a new tool that in order to perform cross-field normalization of scientometric indicators of individual publications relays on the structural properties of citation networks. Due to the large size of the networks, a systematic procedure for identifying scientific domains based on a local community detection algorithm is proposed. The algorithm is tested with different benchmark and real-world networks. Then, by the use of this algorithm, the mechanism of the scientometric indicator normalization process is shown for a few indicators like the citation number, P-index and a local version of the PageRank indicator. The fat-tail trend of the article indicator distribution enables us to successfully perform the indicator normalization process.

Keywords : citation networks, cross-field normalization, local cluster detection, scientometric indicators
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