

Multiple Partitioning of Multiplex Signed Networks

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For more than a decade, graphs have been used to model the voting behavior taking place in parliaments. However, the methods described in the literature suffer from several limitations. The two main ones are that 1) they rely on some temporal integration of the raw data, which causes some information loss; and/or 2) they identify groups of antagonistic voters, but not the context associated to their occurrence. In this article, we propose a novel method taking advantage of multiplex signed graphs to solve both these issues. It consists in first partitioning separately each layer, before grouping these partitions by similarity. We show the interest of our approach by applying it to a European Parliament dataset.

By comparison to existing approaches, our method has the following advantages. First, it undergoes much less of the information loss appearing when integrating the raw voting data to extract the voting similarity networks. Second, in addition to antagonistic groups of voters, it allows identifying sets of legislative propositions causing the same polarization among these groups. Third, it does not require to filter out (quasi-)unanimous propositions, or to discard weak links appearing in the model for interpretation or computational purposes. Fourth, it explicitly represents abstention in each roll-call vote layer, which allows detecting relevant groups of abstentionists.