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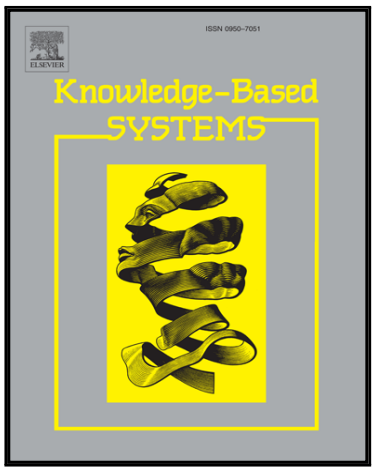

Multilevel approach for combinatorial optimization in bipartite network

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Highlights

- A novel multilevel optimization method applicable to problems modeled as bipartite networks. To the extent of our knowledge, the proposal is the first for bipartite network.
- The method has the capability of handling layers independently while executing the multilevel process.
- The implementation of the multilevel framework incorporates two novel efficient matching algorithms, as well as novel contracting and uncoarsening algorithms.
- Applications of the general-purpose method to solve two problems: community detection, in which the method is employed to scale a known algorithm, and dimensionality reduction, in which it is employed to define a novel algorithm.
- A comprehensive experimental evaluation of the proposed solution on real and synthetic bipartite networks that demonstrates it scales the original algorithm and preserves solution quality.
- A test case on dimensionality reduction in text classification, with promising results in terms of runtime and accuracy, is presented.
- A discussion on the underlying features of the framework and its applicability to solving various practical network problems are presented.

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