

An electromagnetism metaheuristic for solving the Maximum Betweenness Problem

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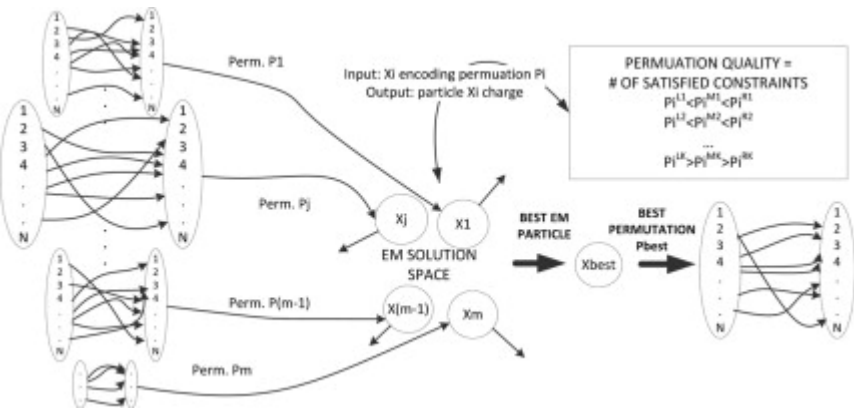
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Abstract

In this paper we present an electromagnetism (EM) metaheuristic for solving NP hard Maximum Betweenness Problem (MBP). A new encoding scheme with appropriate objective functions is implemented. Specific representation of the individuals enables the EM operators to explore the searching space in a way that search procedure improved by the specific caching technique. The algorithm is tested on real and artificial instances from the literature. Experimental results show that the proposed algorithm finds known optimal solutions, except one, and achieves the best results on artificial instances, except two. Provided statistical analysis indicates the superiority of the EM approach.

Graphical abstract



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Highlights

- We presented an electromagnetism-like algorithm for solving the MBP.
- An effective 1-swap local search is successfully applied on each EM point.
- Overall running time is improved by a caching technique.
- Experiments are performed both on real and artificial instances known in literature.
- Statistical analysis indicates the superiority of EM approach.

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Keywords

Betweenness problem; Electromagnetism-like mechanism; Combinatorial optimization

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