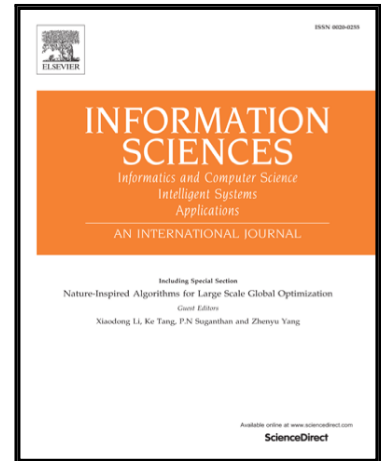


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# A Variable Neighborhood Search approach for the Vertex Bisection problem<sup>☆</sup>

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## Abstract

The Vertex Bisection Problem (VBP) belongs to the family of well-known graph partitioning problems, where the main goal is to find a partition of the vertices maximizing or minimizing a given objective function. These optimization problems have relevant application in the context of scientific computing, VLSI design circuit, or task scheduling in multi-processor systems. This family of problems has gained importance due to its application in clustering and detection of cliques in social, pathological, and biological networks.

In this paper we use Basic Variable Neighborhood Search (BVNS) methodology to solve the VBP. In particular, we propose three constructive procedures and six improvement methods. We introduce a novel scheme for calculating the objective function which substantially reduces the computing time as compared with the direct implementation. After a set of preliminary experiments, the best BVNS design is compared with the state-of-the-art over the same set of instances obtaining better results for both, quality of the solutions and execution time. These results are further confirmed by non-parametric statistical tests.

*Keywords:* Metaheuristics, Variable Neighborhood Search, Vertex Bisection, Graph problems

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