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Signed Edge Domination Number of Interval Graphs

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Abstract

Let $G = (V, E)$ be an undirected graph with vertex set V and edge set E. The open neighborhood $N(e)$ of an edge $e \in E$ is the set of all edges adjacent to e. The closed neighborhood of e is denoted by $N[e]$ and $N[e] = N(e) \cup \{e\}$. A function $f : E \to \{1, -1\}$ is said to be a signed edge dominating function (SEDF), if f satisfies the condition $\sum_{e' \in N[e]} f(e') \geq 1$ for every $e \in E$. The minimum of the values of $\sum_{e \in E} f(e)$, taken over all signed edge dominating functions f on G, is called the

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signed edge domination number (SEDN) of G and is denoted by $\gamma_s'(G)$. In this paper, an $O(n^2)$ time algorithm is designed to compute the signed edge domination number of interval graphs.

Keywords:
Design of algorithms, interval graphs, signed edge domination number.

1 Introduction

Let $G(V, E)$ be a simple, finite and undirected graph with vertex set V and edge set E. A subset D of V is called a dominating set of G, if every vertex $v \in V \setminus D$ is adjacent to at least one vertex of D.

A function $f : E \to \{1, -1\}$ is said to be a signed edge dominating function (SEDF, for short), if f satisfies the condition $\sum_{e' \in N[e]} f(e') \geq 1$ for every $e \in E$. The minimum of the values of $\sum_{e \in E} f(e)$, taken over all signed edge dominating functions f on G, is called the signed edge domination number (SEDN, for short) of G and is denoted by $\gamma_s'(G)$.

The signed edge domination number was introduced by Xu [5]. Then several authors have studied the signed edge and signed star domination of the graph[1],[4], [5], [6] .

An undirected graph $G = (V, E)$ is an interval graph, if the vertex set V can be put into one-to-one correspondence with a set of intervals I on the real line R such that two vertices are adjacent in G if and only if their corresponding intervals have non-empty intersection. If G is an interval graph, then it contains no cycles with more than three edges. Interval graphs have been extensively discussed in the literature [2],[3].

2 Notations and preliminaries

Consider the set of intervals $I = \{I_1, I_2, ..., I_n\}$. Let B denote the set of intersecting intervals (I_i, I_j), i.e., $B = \{(I_i, I_j) : I_i \cap I_j \neq \emptyset, I_i, I_j \in I\}$. Next we arrange the elements of B in ascending order of left end point of first interval

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