On the Partition Dimension of Graphs

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The notion of partition dimension of graphs was initially studied by *G*. Chartrand, E. Salehi and P. Zhang (2000) to get a new insight in understanding the problem of determining the metric dimension of graphs. The graph metric dimension itself was introduced by Slater (1975) and Harary & Melter (1976).

For any connected graph $G(V,E)$ and an ordered partition $\Pi = \{L_1, L_2, \ldots, L_k\}$ of $V(G)$, the representation of any vertex v in G with respect to Π, denoted by $r(v, \Pi)$, is defined as the k-vector with the elements are all distances between v to the partition classes in Π, namely $r(v, \Pi) = (d(v, L_1), d(v, L_2), \ldots, d(v, L_k))$. The partition Π is called a resolving partition if all the representations of vertices in G are different. The partition dimension of graph G is the minimum integer t such that G has a resolving t-partition.

In general, for any given integer k and graph G, the decision problem of whether graph G has partition dimension is less than or equal to k is an NP-complete problem. There are only a few classes of graphs whose partition dimensions can be determined. For instance, for trees, we have known the partition dimensions of paths, stars, caterpillar, lobsters and other specific trees. However, the remaining 'huge' classes of trees are still unknown for their partition dimensions. The characterization study of all graphs with a certain partition dimension has been also conducted. In this talk, we will discuss the current progress of the partition dimension of graphs.