

EFFICIENT GRAPH STRUCTURES FOR VERTEX IDENTIFICATION

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Given a graph G admitting no twins, the problem of finding an identifying code of G is known to be NP-complete. In addition, if G has n vertices, we know that the minimum cardinality of such a code lies within the interval $[\lceil \log_2(n+1) \rceil, n-1]$. In some sense, the graphs for which only $\lceil \log_2(n+1) \rceil$ vertices among n are required to perform vertex identification are efficient. Indeed, if we had the choice of a graph structure to perform vertex identification, then we would surely choose such a graph.

In this talk, we focus on graph structures for which the minimum cardinality of an identifying code is small, compared to the total number of vertices.

We first recall the results of Charon, Hudry and Lobstein, that show that for every number in the interval $[\lceil \log_2(n+1) \rceil, n-1]$ there exists a graph requiring exactly this number of vertices for vertex identification. This result is true even for identification at distance $r > 1$.

In the second part of the talk we discuss about the case of the identification of sets of vertices. In this more general setting, there still remains open questions. In particular, the interval within which lies the cardinality of an identifying code is not precisely known.

We will furthermore discuss the link between these codes and the so-called superimposed codes, introduced by Kautz and Singleton in the sixties. We will show how, in special cases, one can use superimposed codes to construct identifying codes. We will also address the question of providing explicit constructions of such codes.