An Improved Lower Bound on the Independence Number for Certain Graphs

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The problem of determining the independence number of a graph is a fundamental problem in graph theory and it is NP-hard for most classes of graphs. Thus, upper and lower bounds on the independence number are of specific interest. Such bounds are useful in many applications including map labeling, computer vision and molecular biology. We focus our attention on the lower bound by Murphy that can be derived from the degree sequence of a given graph. We analyze the quality of the bound for certain graph types. Further, we compare the parameter with other lower bounds and investigate degree sequences where the difference between the independence number and the Murphy-bound becomes arbitrarily large. Motivated by these results, we present an optimization of Murphy’s algorithm, using additional information of graphical sequences. This leads to an improvement for graphs which satisfied certain properties and still guarantees a lower bound on the independence number.

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