Summary: A normal Helly circular-arc graph is the intersection graph of a set of arcs on a circle of which no three or less arcs cover the whole circle. M. C. Lin et al. [ibid. 161, No. 7–8, 1037–1059 (2013; Zbl 1263.05064)] characterized circular-arc graphs that are not normal Helly circular-arc graphs, and used them to develop the first recognition algorithm for this graph class. As open problems, they ask for the forbidden subgraph characterization and a direct recognition algorithm for normal Helly circular-arc graphs, both of which are resolved by the current paper. Moreover, when the input is not a normal Helly circular-arc graph, our recognition algorithm finds in linear time a minimal forbidden induced subgraph as a certificate. Our approach yields also a considerably simpler algorithm for the certifying recognition of proper Helly circular-arc graphs, a subclass of normal Helly circular-arc graphs.

MSC:

05C60 Isomorphism problems in graph theory (reconstruction conjecture, etc.) and homomorphisms (subgraph embedding, etc.)

05C85 Graph algorithms (graph-theoretic aspects)

Keywords: certifying algorithms; linear-time; proper interval graphs; chordal graphs; minimal forbidden induced subgraphs; holes; normal Helly proper circular-arc graphs

Full Text: DOI

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