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Finding induced detours in linear time on interval and circular-arc graphs

The problem of finding shortest paths in graphs is well explored. Meanwhile, finding detours, i.e. non-shortest paths, is an active area of research. We provide $O(n + m)$-time algorithms for finding induced non-shortest path on interval and circular-arc graphs with n vertices and m edges.

As to the state of the art, for interval graphs, a reduction to Ishizeki, Otachi, and Yamazaki's algorithm for finding longest induced paths in graphs of bounded chordality solves the problem in time $O(nm)$. For circular-arc graphs, the literature does not mention any algorithm improving on Chiu and Lu's $O(n^{4.75})$-time one for general graphs.

Moreover, we extend our techniques to the parametrised setting that asks for induced paths which are by at least k longer than a shortest one, and we show how to solve the problem on circular-arc graphs in time $O(n^2m)$.

Finally, we turn to finding detours in directed graphs. Here, we refute a win/win method that has been repeatedly suggested and unsuccessfully attempted in the literature.

This is joint work with Sandra Kiefer.