Partial Representation Extension Problem of Interval Graphs

Pavel Klavík – Charles University in Prague

Abstract:

The recognition problems were studied for many graph classes, e.g., for interval graphs several linear-time algorithms are known. In this talk, I will describe a generalization of recognition called *partial representation extension*, introduced in [1]. For interval graphs, the input also gives several intervals which are *pre-drawn*, forming a partial representation. We ask whether we can add the remaining intervals to create an extending interval representation; see Figure 1.

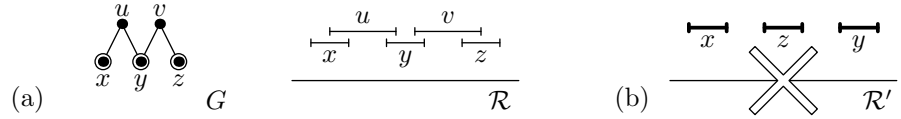

Figure 1: (a) An interval graph G with one of its interval representations. (b) A partial representation with pre-drawn intervals x, y and z. It is non-extendible since u cannot be placed.

I will give an overview of known results and techniques. For interval graphs, there are two linear-time algorithms solving partial representation extension [2, 3]. Extendible representations were characterized by partial orderings of maximal cliques [1, 3]. Also minimal obstructions are known [5], generalizing minimal induced subgraphs of interval graphs of Lekkerkerker and Boland. We will also discuss other variations of the problem [4].

References

[1] P. Klavík, J. Kratochvíl, and T. Vyskočil. Extending partial representations of interval graphs. In *TAMC*, volume 6648 of *Lecture Notes in Computer Science*, pages 276–285. Springer, 2011.

[2] T. Bläsius and I. Rutter. Simultaneous PQ-ordering with applications to constrained embedding problems. In *SODA'13*, pages 1030–1043, 2013.

[3] P. Klavík, J. Kratochvíl, Y. Otachi, T. Saitoh, and T. Vyskočil. Extending partial representations of interval graphs. *CoRR*, abs/1306.2182, 2013.

[4] P. Klavík, J. Kratochvíl, Y. Otachi, I. Rutter, T. Saitoh, M. Saumell, and T. Vyskočil. Extending partial representations of proper and unit interval graphs. In *SWAT*, volume 8503 of *Lecture Notes in Computer Science*, pages 253–264. Springer, 2014.

[5] P. Klavík and M. Saumell. Minimal obstructions for partial representations of interval graphs. In *ISAAC*, volume 8889 of *Lecture Notes in Computer Science*, pages 401–413, 2014.