Inverse Shortest Paths Problem on a Cycle

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Inverse Shortest Paths (ISP) problem as introduced by Moll [1] can be formulated as follows: Given a graph $G = (V, E)$ and a weighted distance graph $D = (U, F)$, $U \subseteq V$, with a non-negative weight function $w : F \to \mathbb{N}_0$, one needs to find the weights of the edges E, such that the given weights of the distance edges $w(F)$ provide the shortest paths between corresponding vertices in the graph.

It is known that ISP problems are generally $\mathcal{NP}$-complete. We consider the easiest subclass, for which the complexity is unknown, namely the ISP on a cycle graph, where each distance edge defines precisely two possible paths on the graph. In our current work we consider the ISP problem from the perspectives of linear programming and linear complementarity theory.

The project is a joint work with Saskia Grabinat, Prof. Winfried Hochstättler, and Adrian Sauer.

Literature

[1] C. Moll, Das inverse Kürzeste-Wege-Problem, Doctoral dissertation, Universität zu Köln, 1995.