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Part of MS10 Max-Plus and Idempotent Methods in Control, Games and Optimization - Part I of II

Generalized, Multi-criteria, Shortest Path Problems on Graphs, Idempotent Semirings, Dualities and the Value of Information

Abstract. We investigate generalized shortest path problems on graphs with multiple path metrics, that are generalized functions of numerical or logical link "weights". We demonstrate that these problems can be formulated as "linear" optimization or tradeoff problems over partially ordered semirings. We establish conditions for the semirings that guarantee distributed solutions. Considering the information needed for these computations, leads to convexity and duality notions, that help quantify the Value of Information in these distributed optimization problems.

Authors

- *John Baras, University of Maryland, College Park, USA, baras@umd.edu*