Totally Δ-modular IPs with two non-zeros in most rows

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Abstract

Integer programs (IPs) on constraint matrices with bounded subdeterminants are conjectured to be solvable in polynomial time. We give a strongly polynomial time algorithm to solve IPs where the constraint matrix has bounded subdeterminants and at most two non-zeros per row after removing a constant number of rows and columns. This result extends the work by Fiorini, Joret, Weltge & Yuditsky (J. ACM 2024) by allowing for additional, unifying constraints and variables.

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