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Optimal Adjacency Labels for Subgraphs of Cartesian Products

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Abstract: For any hereditary graph class F, we construct optimal adjacency labeling schemes for the classes of subgraphs and induced subgraphs of Cartesian products of graphs in F. As a consequence, we show that, if F admits efficient adjacency labels (or, equivalently, small induced-universal graphs) meeting the information-theoretic minimum, then the classes of subgraphs and induced subgraphs of Cartesian products of graphs in F do too. Our proof uses ideas from randomized communication complexity and hashing, and improves upon recent results of Chepoi, Labourel, and Ratel [Journal of Graph Theory, 2020].

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