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Andrew van der Poel* (ajvande4@ncsu.edu). *Structural Rounding: Approximation Algorithms for Graphs Near an Algorithmically Tractable Class.*

We develop a new framework for generalizing approximation algorithms from the structural graph algorithm literature so that they apply to graphs somewhat close to that class (a scenario we expect is common when working with real-world networks) while still guaranteeing approximation ratios. The idea is to edit a given graph via vertex- or edge-deletions to put the graph into an algorithmically tractable class, apply known approximation algorithms for that class, and then lift the solution to apply to the original graph. We give a general characterization of when an optimization problem is amenable to this approach, and show that it includes many well-studied graph problems, such as Independent Set, Vertex Cover, Feedback Vertex Set, Minimum Maximal Matching, Chromatic Number, (1-)Dominating Set, Edge (1-)Dominating Set, and Connected Dominating Set. In addition, we develop new editing algorithms that find the approximately-fewest edits required to bring a given graph into one of several important graph classes (in some cases, also approximating the target parameter of the family).

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