

Oberseminar Theoretische Informatik
Sommersemester 2009

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Deconstructing Intractability—A Case Study for Interval Constrained Coloring

Mo. 11.05.2009 um 14 Uhr (c.t.) im SR 3319 (Ernst-Abbe-Platz 2, 3. Stock).

The NP-hard INTERVAL CONSTRAINED COLORING problem appears in the interpretation of experimental data in biochemistry dealing with protein fragments. Given a set of m integer intervals in the range 1 to n and a set of m associated multisets of colors (specifying for each interval the colors to be used for its elements), one asks whether there is a “consistent” coloring for all integer points from $\{1, \dots, n\}$ that complies with the constraints specified by the color multisets. We initiate a study of INTERVAL CONSTRAINED COLORING from the viewpoint of combinatorial algorithmics, trying to avoid polyhedral and randomized rounding methods as used in previous work. To this end, we employ the method of systematically deconstructing intractability. It is based on a thorough analysis of the known NP-hardness proof for INTERVAL CONSTRAINED COLORING. In particular, we identify numerous parameters that naturally occur in the problem and strongly influence the problem’s practical solvability. Thus, we present several positive (fixed-parameter) tractability results and, moreover, identify a large spectrum of combinatorial research challenges for INTERVAL CONSTRAINED COLORING.

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