

Oberseminar Theoretische Informatik

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Graph-Based Data Clustering: A Quadratic-Vertex Problem-Kernel for s -PLEX CLUSTER VERTEX DELETION

Montag, 09.11.2009 14:00 (c.t.) Seminarraum 3319 (Ernst-Abbe-Platz 2, 3.
Stock).

We introduce the s -PLEX CLUSTER VERTEX DELETION problem. Like the CLUSTER VERTEX DELETION problem, it is NP-hard and motivated by graph-based data clustering. While the task in CLUSTER VERTEX DELETION is to delete vertices from a graph so that its connected components become *cliques*, the task in s -PLEX CLUSTER VERTEX DELETION is to delete vertices from a graph so that its connected components become *s -plexes*. An s -plex is a graph in which every vertex is nonadjacent to at most $s - 1$ other vertices; a clique is a 1-plex. In contrast to CLUSTER VERTEX DELETION, s -PLEX CLUSTER VERTEX DELETION allows to balance the number of vertex deletions against the sizes and the density of the resulting clusters, which are s -plexes instead of cliques. The focus of this work is the development of provably efficient and effective data reduction rules for s -PLEX CLUSTER VERTEX DELETION. In terms of fixed-parameter algorithmics, these yield a so-called *problem kernel*. A similar problem, s -PLEX EDITING, where the task is the insertion or the deletion of edges so that the connected components of a graph become s -plexes, has also been studied in terms of fixed-parameter algorithmics. Using the number of allowed graph modifications as parameter, we expect typical parameter values for s -PLEX CLUSTER VERTEX DELETION to be significantly lower than for s -PLEX EDITING, because one vertex deletion can lead to a high number of edge deletions. This holds out the prospect for faster fixed-parameter algorithms for s -PLEX CLUSTER VERTEX DELETION.

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