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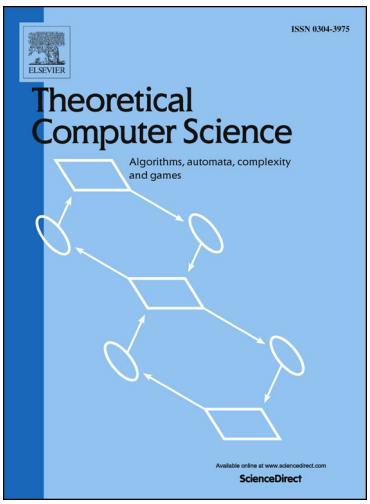

Graph editing to a given degree sequence

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Graph Editing to a Given Degree Sequence[☆,☆☆]

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Abstract

We investigate the parameterized complexity of the graph editing problem called Editing to a Graph with a Given Degree Sequence where the aim is to obtain a graph with a given degree sequence σ by at most k vertex deletions, edge deletions and edge additions. We show that the problem is W[1]-hard when parameterized by k for any combination of the allowed editing operations. From the positive side, we show that the problem can be solved in time $2^{O(k(\Delta^*+k)^2)}n^2 \log n$ for n-vertex graphs, where $\Delta^* = \max \sigma$, i.e., the problem is FPT when parameterized by $k + \Delta^*$. We also show that Editing to a Graph with a Given Degree Sequence has a polynomial kernel when parameterized by $k + \Delta^*$ if only edge additions are allowed, and there is no polynomial kernel unless NP $\subseteq$ co-NP /poly for all other combinations of the allowed editing operations.

Keywords: Parameterized complexity, graph editing, degree sequence

1. Introduction

The aim of graph editing (or graph modification) problems is to modify a given graph by applying a bounded number of permitted operations in order to satisfy a certain property. Typically, vertex deletions, edge deletions and edge additions are the considered as the permitted editing operations, but in some cases other operations like edge contractions and vertex additions are also permitted.

We are interested in graph editing problems where the aim is to obtain a graph satisfying some given degree constraints. These problems usually turn

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