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Supervisor's statement

Hereby I confirm that the presented thesis was prepared under my supervision and that it fulfils the requirements for the degree of Master of Computer Science.

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Author's statement

Hereby I declare that the presented thesis was prepared by me and none of its contents was obtained by means that are against the law.

The thesis has never before been a subject of any procedure of obtaining an academic degree.

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Abstract

W pracy przedstawiono prototypową implementację blabalizatora różnicowego bazującą na teorii fetorów σ-ρ profesora Fifaka. Wykorzystanie teorii Fifaka daje wreszcie możliwość efektywnego wykonania blabalizy numerycznej. Fakt ten stanowi przełom technologiczny, którego konsekwencje trudno z góry przewidzieć.

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Subject classification

D. Software
D.127. Blabalgorithms
D.127.6. Numerical blabalysis

Tytuł pracy w języku polskim

Tytuł po polsku

Contents

Introduction

Blabalizator różnicowy jest podstawowym narzędziem blabalii fetorycznej. Dlatego naukowcy z całego świata prześcigają się w próbach efektywnej implementacji. Opracowana przez prof. Fifaka teoria fetorów σ-ρ otwiera w tej dziedzinie nowe możliwości. Wykorzystujemy je w niniejszej pracy.

Chapter 1

Basic definitions

1.1. Structures

Definition 1.1 *Graph*

Definition 1.2 *Star*

Definition 1.3 *Spanning tree*

+Additional notation: e.g. $deg_G(v)$

1.2. Parameterized complexity

Definition 1.4 *Parameterized problem*

Definition 1.5 *FPT algorithm*

Definition 1.6 *Kernel*

Definition 1.7 *Kernelization algorithm*

1.3. Graph decomposition

Definition 1.8 *Path decomposition and pathwidth*

Definition 1.9 *Tree decomposition and treewidth*

Definition 1.10 *Nice tree decomposition*

Chapter 2

Spanning Star Forest Problem

For a given graph G, we say that G' is a *Spanning Star Forest* S if every connected component C is a star. In the *Spanning Star Forest Problem* given a graph G, the objective is to determine whether there exists a *Spanning Star Forest*. It turns out that the problem formulated in such a way is relatively simple. Although, various parametrizations described in this paper make it more complex.

Lemma 2.1 *A graph G has a Spanning Star Forest if and only if it does not contain any isolated vertices.*

Theorem 2.1 *Decision version of Spanning Star Forest Problem can be solved in linear time.*

2.1. Obtaining a solution

In this section the focus will be set on obtaining an arbitrary solution for a given instance of the *Spanning Star Forest Problem*.

Theorem 2.2 *A solution for a Spanning Star Forest Problem can be found in linear time.*

2.2. Spanning Star Forest parameterized by the number of stars

In the *Spanning Star Forest Problem* parameterized by the number of stars, given a graph G and a natural number k, the objective is to determine whether there exists a *Spanning Star Forest* S such that the number of components is less than k.

It is natural to ask whether one can find a solution that minimizes the number of connected components. Even though the problem looks slightly different than the previous one, *Spanning Star Forest* parameterized by the number of stars is NP-Complete. The following theorem proves the statement:

Theorem 2.3 *Spanning Star Forest Parameterized by the number of stars is NP-Complete.*

Lemma 2.2 *There exists a reduction from Spanning Star Forest parameterized by the number of stars to Dominating Set.*

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