Bachelor Thesis

Visualizing Dynamic Programming on Tree Decompositions

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Abstract

The present Bachelor thesis is about a practical and lightweight implementation of visualizing dynamic programming on tree decompositions. I created the python-package tdvisu for the purpose of visualizing, teaching and analyzing the solving process of MSOL-problems using dynamic programming. As reference implementations of dynamic programming on tree decompositions the projects GPUSAT and dpdb were chosen.

????????Who benefits from using

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1 Introduction

intro. mit motivation und related work, state of the art, advancements.
Idee für Projekt Wen interessiert es?
Probleme bei Umsetzung
Neue Zielstellung
Visualization Pipeline
Stand Umsetzung, Tools

2 Background

2.1 MSOL

2.2 Tree Decomposition

2.3 Courcelle's Theorem

> Every graph property definable in monadic second-order logic (MSO) is decidable in linear time on graphs of bounded treewidth.
> Courcelle, Bruno (1990)[1]

For all $k \in \mathbb{N}$ and MSO-sentences F is the decision problem for a given graph G, whether $G \models F$ is true, in time $2^{p(tw(G))} \cdot |G|$ with a polynom p decidable.

- *drawback:* still expensive ($2^{p(twG)}$, $2^{2^{(\#Q)}}$, large constants)

The workflow then looks like we see in figure 1.

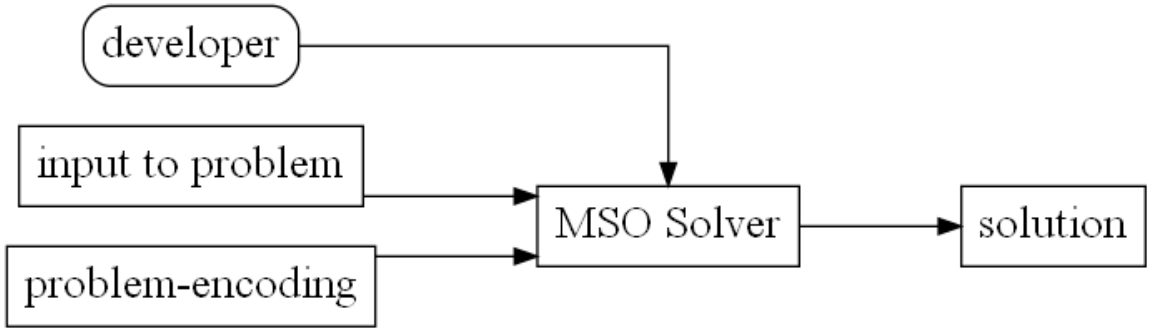

Figure 1: Implementation of the theorem

[1]Courcelle, Bruno "The monadic second-order logic of graphs. I. Recognizable sets of finite graphs", Information and Computation, 85 (1990) no. 1: 12-75

3 Concept

What I do and why I did it

4 My Visualization Project

Trello Github Slack Ziele Stand Beispiele Ausblick

4.1 Integration in GPUSAT

Programm Umsetzung Beispiel

4.2 Integration in dpdb

Programm Umsetzung Beispiel

5 Application and Images

beispiele und ergebnisse das vertex cover eignet sich dafür hervoragend Z.B. Fehler in VC ¡-¿ Visualization

6 Summary and Outline

References