



# Supervisor's statement of a final thesis

**Supervisor:** doc. RNDr. Dušan Knop, Ph.D.  
**Student:** Daria Objeleanscaia  
**Thesis title:** Balancing Lemmata in Kernelization  
**Branch / specialization:** Computer Science 2021  
**Created on:** 10 June 2024

## Evaluation criteria

### 1. Fulfillment of the assignment

- [1] assignment fulfilled
- ▶ [2] assignment fulfilled with minor objections
- [3] assignment fulfilled with major objections
- [4] assignment not fulfilled

The original aim was to use balancing lemmata (which, in general, one cannot use; I believe). This should yield the first set of results then leading to the use of N-fold IPs (which is present in the thesis).

### 2. Main written part

76/100 (C)

This thesis explores the emerging topic of balancing lemmata and balanced connected graph partitioning, which has garnered significant interest within (theoretical) computer science. The primary aim of this research is to provide a foundational understanding of balancing and its implications and limitations for this kind of problem in graphs of bounded vertex cover number. This study seeks to fill the notable gap in existing research concerning connected partitioning by conducting a rather shallow literature review and employing an N-fold IP.

The findings of this research indicate that it might be possible to use N-fold IPs for his problem, however, the existence of a polynomial kernel remained unresolved.

The thesis is, given the circumstances, rather well written. Many parts could benefit from further polishing and proofreading. The results are theoretical (proofs/algorithms) and somewhat interesting.

In conclusion, this thesis makes a meaningful contribution to the understanding of balanced connected graph partitioning. Although the research is preliminary, it establishes a solid foundation for future studies and offers valuable insights that yield further interesting results. The encouragement for ongoing research and the potential

applications of the findings underscore the significance of this work, despite its modest scope.

### **3. Non-written part, attachments** 55 /100 (E)

There are some meaningful results contained in the thesis.

### **4. Evaluation of results, publication outputs and awards** 60 /100 (D)

The topic was selected as one of those with high publication potential; sadly, there was not enough time invested in pursuing the research deep enough.

### **5. Activity of the student**

- [1] excellent activity
- ▶ [2] **very good activity**
- [3] average activity
- [4] weaker, but still sufficient activity
- [5] insufficient activity

The activity was very good (even reaching excellent) when Daria was fully focused on the thesis and the selected topic. Sadly, many stops and restarts could have been done in a more pleasant way if there had been a better implementation of the TDP subject (or if I was aware of the way it is driven).

### **6. Self-reliance of the student**

- [1] excellent self-reliance
- [2] very good self-reliance
- ▶ [3] **average self-reliance**
- [4] weaker, but still sufficient self-reliance
- [5] insufficient self-reliance

In fact, the aim of self-reliance seems to be the one killing this thesis the most. Daria is a clever student who, like anyone else, needs some guidance in the beginning of her research career. As far as I can tell, she was too much afraid to ask for more meetings (which I would like to do).

## **The overall evaluation** 62 /100 (D)

All in all, the thesis is decent. I believe Daria learned a lot not only about the core topic -- the connected equitable graph partitioning -- but about herself and theoretical research in general. The thesis indeed could be polished and improved but it clearly deserves to pass.

## **Instructions**

### **Fulfillment of the assignment**

Assess whether the submitted FT defines the objectives sufficiently and in line with the assignment; whether the objectives are formulated correctly and fulfilled sufficiently. In the comment, specify the points of the assignment that have not been met, assess the severity, impact, and, if appropriate, also the cause of the deficiencies. If the assignment differs substantially from the standards for the FT or if the student has developed the FT beyond the assignment, describe the way it got reflected on the quality of the assignment's fulfilment and the way it affected your final evaluation.

### **Main written part**

Evaluate whether the extent of the FT is adequate to its content and scope: are all the parts of the FT contentful and necessary? Next, consider whether the submitted FT is actually correct – are there factual errors or inaccuracies?

Evaluate the logical structure of the FT, the thematic flow between chapters and whether the text is comprehensible to the reader. Assess whether the formal notations in the FT are used correctly. Assess the typographic and language aspects of the FT, follow the Dean's Directive No. 52/2021, Art. 3.

Evaluate whether the relevant sources are properly used, quoted and cited. Verify that all quotes are properly distinguished from the results achieved in the FT, thus, that the citation ethics has not been violated and that the citations are complete and in accordance with citation practices and standards. Finally, evaluate whether the software and other copyrighted works have been used in accordance with their license terms.

### **Non-written part, attachments**

Depending on the nature of the FT, comment on the non-written part of the thesis. For example: SW work – the overall quality of the program. Is the technology used (from the development to deployment) suitable and adequate? HW – functional sample. Evaluate the technology and tools used. Research and experimental work – repeatability of the experiment.

### **Evaluation of results, publication outputs and awards**

Depending on the nature of the thesis, estimate whether the thesis results could be deployed in practice; alternatively, evaluate whether the results of the FT extend the already published/known results or whether they bring in completely new findings.

### **Activity of the student**

From your experience with the course of the work on the thesis and its outcome, review the student's activity while working on the thesis, his/her punctuality when meeting the deadlines and whether he/she consulted you as he/she went along and also, whether he/she was well prepared for these consultations.

### **Self-reliance of the student**

From your experience with the course of the work on the thesis and its outcome, assess the student's ability to develop independent creative work.

### **The overall evaluation**

Summarize which of the aspects of the FT affected your grading process the most. The overall grade does not need to be an arithmetic mean (or other value) calculated from the evaluation in the previous criteria. Generally, a well-fulfilled assignment is assessed by grade A.