UNIVERSITETET I BERGEN - UNIVERSITY OF BERGEN
Institutt for Informatikk - Department of Informatics

Referee report on the doctoral thesis:

Variants of Graph Labeling Problems

by RNDr. Tomas Masarik

1. Overall evaluation.

The thesis convincingly demonstrates that the author has the ability for creative scientific work, and for the formulation and articulation of long-term programs of research.

2. Originality.

The most original part of the body of work described in the thesis is that concerned with fair variations of fundamental combinatorial optimization problems, in my opinion. The heart of this work is reported and surveyed in Chapters Four and Five of the thesis. It is easy to imagine that from this start can be articulated in the future a significant grant proposal and research program. 'Fairness' essentially refers to the property of a graph modification being "spread around" evenly, which is both intuitively appealing and of likely practical value. The results of Chapter Three, in the more established area of graph coloring optimization problems, were presented at ISAAC 2018, an important international conference. The results of Chapter Five were presented at the 2019 MFCS conference, also an important forum for original research.

3. Importance.

Research on the twin themes of vertex and edge deletion to well behaved graph classes is well established and of proven practical significance in the framework of parameterized algorithms and complexity. What the parameter generally measures is the amount of "global disruption" involved in the transformation.

The theme of fairness, so nicely pioneered in the reported research, can be viewed as concerned with the amount of "local disruption" involved in the transformation. This promises to be a deep and lasting complementary research theme.

4. Applicability.

It seems to me that there may be applications to other themes in the area of combinatorial optimization problems on graphs, such as so-called dynamic problems and the FPT improvement of greedy heuristics— the latter being sometimes closely related to dynamic problems. Fairness can also be anticipated to have direct applications in modeling optimization in some settings.

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5. Some notes on the writing.

In some places the writing of the thesis could be substantially improved in terms of the English.

My recommendation is that the thesis be accepted.

Sincerely,

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