

Review of Bachelor's Thesis

Student: Odvárka Daniel
Title: A Library for Computing Simulation Relations over Büchi Automata (id 24439)
Reviewer: Holík Lukáš, doc. Mgr., Ph.D., DITS FIT BUT

- 1. Assignment complexity** **considerably demanding assignment**
Minimization / size reduction of Buchi automata is a notoriously complex problem and the related problematic is very difficult, especially for an undergrad student.
- 2. Completeness of assignment requirements** **assignment fulfilled**
The student fulfilled all points of the assignment.
On top of that, he fixed minor bugs in existing algorithms. This may be considered a non-trivial extension. Although the bugs are minor, the algorithms are very complex and so finding a bug-fix is a nice work for an undergrad student.
- 3. Length of technical report** **in usual extent**
- 4. Presentation level of technical report** **79 p. (C)**
The English is ok for an undergrad student in that it is understandable and readable. However, grammar mistakes and mistakes in the choice of words occur very often. This is a work on a mathematically very heavy subject, which is much beyond capabilities of a usual bachelor student. The student managed to cope with the difficult subject partially. The writing is mostly "locally correct", meaning that single sentences, logical formulas, paragraphs, do make sense, and are sometimes even quite good. However, the bigger picture tends to get blurred or confused. Examples of that are a missing definition of simulation relation, a missing formal explanation of how games correspond to simulation, vague description of the source of benchmark in the experimental evaluation, missing comprehensive discussion of related work, etc. (I did not read everything in detail but the quality seems consistent).
Some apparent mistakes that could be fixed by one more careful pass through the text are also present, such as broken item numbering on page 17, tables with titles including standard deviation but without the values of the standard deviation... Overall, it would seem that much more intensive collaboration with the advisor would be needed to turn the text into something good. Yet, again, the topic is very difficult and writing about it sensibly even more so. The student worked independently and made relatively good efforts, but likely somewhat underestimated how hard it is to write about this topic.
- 5. Formal aspects of technical report** **85 p. (B)**
Mostly ok.
- 6. Literature usage** **70 p. (C)**
The work contains the main references, but lacks a coherent discussion of the related work and does not clearly attribute the results it is based on (it should have said clearly what work defines what concept, algorithm, formulated what theorem etc.).
- 7. Implementation results** **85 p. (B)**
The prototype tool seems to be quite good, it implements complex algorithms, it contains some fixes of the bugs that the student found in the algorithms, and it served its purpose in the comparison.
- 8. Utilizability of results**
The experimental results shed some light on how the concerned algorithms compare to each other, but they are rather negative, the tool Rabbit seems faster (if I am not mistaken) and it is not clear what causes the differences in the efficiency of the compared implementations.
- 9. Questions for defence**
 1. What is the primary source of your benchmarks? I.e., are they practically relevant? How? Or are they random? ...
 2. Why is Rabbit so much faster on larger automata? Is it the algorithms themselves or the implementation?

10. Total assessment**79 p. good (C)**

This is a work on a quite difficult topic. The student did a very good job in understanding the algorithms, even fixing some bugs in them. The prototype implementation seems ok, but it is slow, often slower than the tool Rabbit it was compared with, and it is not clear why it is the case. The text is locally all right, but otherwise messy, it is clear that student lacks experience with writing about a topic like this one. Still, the student fought the difficult topic independently and quite bravely, and the achieved results are reasonable. I would still place this work above the average, overall C or possibly even B.

In Brno 2 June 2022

Holík Lukáš, doc. Mgr., Ph.D.
reviewer