



Supervisor's statement of a final thesis

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Student: Bc. Eliška Krátká
Thesis title: Quantum computing methods for malware classification
Branch / specialization: Computer Security
Created on: 10 May 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

Eliška has performed excellent work well beyond what was specified in the assignment.

2. Main written part 100/100 (A)

The thesis has a clear structure and has been written in a language that is good to read and easy follow. Existing work and new results are clearly separated by having them arranged into separate chapters. Literature is correctly cited and results are referenced appropriately.

3. Non-written part, attachments 100/100 (A)

During the thesis, advanced programming techniques designed for quantum computers were used. Eliška has demonstrated to have mastered the use of these tools both from the theoretical as well as the practical side. The code is available on FIT gitlab.

4. Evaluation of results, publication outputs and awards 100/100 (A)

The piece of software developed during the thesis allows a general assessment of the applicability of the method onto malware classification, indicating that it is worthwhile to carry out further development, testing and optimization. The general findings corroborate and expand on existing results on the applicability of quantum computing for this task. The modifications to the qiskit codebase expand on the library used by tens of thousands of users.

5. Activity of the student

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

We had regular weekly meetings, to which she always came prepared.

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

Eliska performed her work with large degree of independence, including exploring literature beyond those specified in the assignment. Other than providing general guidance, discussions on strategies of next steps, I have provided only answers to specific questions.

The overall evaluation

100 /100 (A)

Eliska has delivered beyond what was specified in the assignment, and has achievements that I expect to be of benefit to the research community as well as the qiskit user community.

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.