



## Supervisor's statement of a final thesis

**Student:** Bc. Šimon Bařinka  
**Supervisor:** Ing. Tomáš Oberhuber, Ph.D.  
**Thesis title:** Vývoj paralelních algoritmů pro strojové učení na GPU  
**Branch of the study:** Computer Science

**Date:** 8. 1. 2021

<i>Evaluation criterion:</i>	<i>The evaluation scale: 1 to 4.</i>
<b>1. Fulfilment of the assignment</b>	<b><u>1 = assignment fulfilled,</u></b> <i>2 = assignment fulfilled with minor objections,</i> <i>3 = assignment fulfilled with major objections,</i> <i>4 = assignment not fulfilled</i>
<i>Criteria description:</i> 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.	
<i>Comments:</i> The author has fulfilled all parts of the assignment. In addition, the implemented neural network was tested on real datasets MNIST and CIFAR-10 instead on just points in space. On the other hand, the speed-up obtained on the GPU is rather small and it seems that this could be improved.	
<i>Evaluation criterion:</i>	<i>The evaluation scale: 0 to 100 points (grade A to F).</i>
<b>2. Main written part</b>	<b>60 (D)</b>
<i>Criteria description:</i> 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. 26/2017, 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.	
<i>Comments:</i> Due to Covid-19 restrictions, we were not able to meet each other regularly with the student. Unfortunately, the student did not send me any draft of his thesis, just the final version after submission. Because of this, I was not able to comment and point him to some issues that appeared in the text. The main issues are:  <ol style="list-style-type: none"><li>1. There is no description of GPU even though it is important part of the thesis.</li><li>2. There are several typographical issues like citations of references after end of sentences and wrong referring to formulas - like 1.6 instead of (1.6).</li><li>3. It is not clear how the formula (2.5) was obtained.</li><li>4. Wrong translation of chain rule as "řetízkové pravidlo" instead of "řetězové pravidlo".</li><li>5. It is not clear how the accuracy in the test part (Tables 5.1. - 5.4) was computed.</li><li>6. At the end, the author says, that the training is different in the same set-up. It is not clear why? This should be commented in the text.</li></ol>	
<i>Evaluation criterion:</i>	<i>The evaluation scale: 0 to 100 points (grade A to F).</i>
<b>3. Non-written part, attachments</b>	<b>70 (C)</b>
<i>Criteria description:</i> 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.	

*Comments:*

1. The source code and the design of the implemented library is very nice and clean.
2. The author used TNL library for the development of the neural network to profit from a unified interface for CPU and GPU which this library offers. The author did not have to implement everything from scratch in CUDA. However, the author was fixing implementation of dense matrices multiplication in TNL which is not mentioned in the thesis.
3. Unfortunately, the author does not say how he evaluates the accuracy of trained networks. So it is hard to re-evaluate the experiments.

*Evaluation criterion:*

*The evaluation scale: 0 to 100 points (grade A to F).*

**4. Evaluation of results, publication outputs and awards**

70 (C)

*Criteria description:*

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.

*Comments:*

The author created very basic implementation of neural networks. There is no new idea. However, we plan to use this implementation for future research of parallel algorithms for training neural networks.

*Evaluation criterion:*

*The evaluation scale: 1 to 5.*

**5. Activity and self-reliance of the student**

5a:  
1 = excellent activity,  
**2 = very good activity,**  
3 = average activity,  
4 = weaker, but still sufficient activity,  
5 = insufficient activity  
5b:  
**1 = excellent self-reliance,**  
2 = very good self-reliance,  
3 = average self-reliance,  
4 = weaker, but still sufficient self-reliance,  
5 = insufficient self-reliance.

*Criteria description:*

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 (5a). Assess the student's ability to develop independent creative work (5b).

*Comments:*

I was kindly surprised that the author studied all background from machine learning by himself. Also, due to Covid-19 restrictions this year, we were not able to meet on regular basis. Nevertheless the author was able to implement and test the neural network with only a little help from the supervisor.

*Evaluation criterion:*

*The evaluation scale: 0 to 100 points (grade A to F).*

**6. The overall evaluation**

70 (C)

*Criteria description:*

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.

*Comments:*

I especially appreciate that the author learned all necessary theory of machine learning by himself. He was able to create very nice, clean and easy to understand implementation of the neural network. He was able to work independently even after Covid-19 restrictions were imposed and he did not need any prolongation for the thesis submission. On the other hand, he did not send me the thesis before submission and so there are several issues in the text and in the experimental part. It would be much better to fix them and to submit the thesis later.

Signature of the supervisor: