



# Supervisor's statement of a final thesis

**Student:** Ondřej Perný  
**Supervisor:** Ing. Jakub Žitný  
**Thesis title:** Detecting abnormalities in X-Ray images using Neural Networks  
**Branch of the study:** Knowledge Engineering

**Date:** 31. 8. 2020

<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> 2 = assignment fulfilled with minor objections, 3 = assignment fulfilled with major objections, 4 = assignment not fulfilled</b>
<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 work has fulfilled all the expected requirements. The theoretical part summarizes medical imaging basics and covers all relevant principles from machine learning. The student has trained two models and added a comparison to a baseline model from the MURA competition. The comparison is not very thorough and lacks a proper discussion of experiments (details below).	
<i>Evaluation criterion:</i>	<i>The evaluation scale: 0 to 100 points (grade A to F).</i>
<b>2. Main written part</b>	<b>65 (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> The theoretical part covers all required topics, but contains some typos and lacks more exhaustive literature references. The logical structure is reasonable, and the text is clear. There is no "Discussion" section neither a proper discussion of the applied concepts, experiments, or differences with existing models. These parts are the most interesting ones in works such as this one.	
<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>85 (B)</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.	
<i>Comments:</i> The student attached several notebook files with all the necessary parts to reproduce his results. The code has a proper structure, comments, and uses all methods mentioned in the Practical part. It would also be nice to have the code available on GitHub or a similar code publishing platform.	
<i>Evaluation criterion:</i>	<i>The evaluation scale: 0 to 100 points (grade A to F).</i>
<b>4. Evaluation of results, publication outputs and awards</b>	<b>60 (D)</b>
<i>Criteria description:</i> 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 two trained models achieve good results, but much work can be done to improve them. Free GPUs in the Colaboratory environment are available for training ensembles or optimizing hyper-parameters and trying out more experiments. More preprocessing methods could also be used to fine-tune the results.

*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:*

The student was very self-reliant and averagely active.

*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:*

All parts of the assignment are addressed, but many of them lack proper depth. Experiments in machine learning projects are the essential part, and the extent of them in this work is insufficient. The quality of the attached code is excellent. The student knows all the concepts and methods that he uses. More time would be needed to make this thesis better.

Signature of the supervisor: