

## I. IDENTIFICATION DATA

<b>Thesis name:</b>	<b>Image Captioning with Convolutional Neural Network</b>
<b>Author's name:</b>	<b>Michal Najman</b>
<b>Type of thesis :</b>	Choose an item.
<b>Faculty/Institute:</b>	Choose an item.
<b>Department:</b>	Department of Cybernetics
<b>Thesis supervisor:</b>	Juho Kannala
<b>Supervisor's department:</b>	Department of Computer Science, Aalto University, Finland

## II. EVALUATION OF INDIVIDUAL CRITERIA

<b>Assignment</b>	<b>Choose an item.</b>
<i>Evaluation of thesis difficulty of assignment.</i>	
The topic of the thesis, automatic image captioning, is very challenging and broad topic for a Bachelor project. Completing the assignment has required studying plenty of recent research literature and understanding many recent state-of-the-art methods for automatic image and text analysis. Therefore I would grade this part with the best grade <b>A</b> .	

<b>Satisfaction of assignment</b>	<b>Choose an item.</b>
<i>Assess that handed thesis meets assignment. Present points of assignment that fell short or were extended. Try to assess importance, impact or cause of each shortcoming.</i>	
The assignment meets all the relevant requirements. The author has made comprehensive and thorough work evaluating the recent "DenseCap" image captioning method and studying the problem area through his own independent work. I grade this part with grade <b>A</b> .	

<b>Activity and independence when creating final thesis</b>	<b>Choose an item.</b>
<i>Assess that student had positive approach, time limits were met, conception was regularly consulted and was well prepared for consultations. Assess student's ability to work independently.</i>	
The author has been very active, and he has done significantly more work than typically is required for a Bachelor thesis (for example at Aalto University). He has shown his ability to work independently. In fact, during his study he has been able to independently find, study and understand recent research results of the field so that I myself have been able to learn many new things from the student. Thus, the collaboration has been an educating and fruitful experience to me as well. In addition, Mr. Najman has actively maintained a good collaboration with me and the local supervisor Prof. Matas. I grade this part with grade <b>A</b> .	

<b>Technical level</b>	<b>Choose an item.</b>
<i>Assess level of thesis specialty, use of knowledge gained by study and by expert literature, use of sources and data gained by experience.</i>	
Like mentioned above the topic is quite broad and challenging for a Bachelor student but Mr. Najman has completed the assignment with great attitude and skill, and he has been able to familiarize himself with the technical topic and the research literature very well. The technical level of the work is very good. I grade this part with grade <b>A</b> .	

<b>Formal and language level, scope of thesis</b>	<b>Choose an item.</b>
<i>Assess correctness of usage of formal notation. Assess typographical and language arrangement of thesis.</i>	
The thesis is well written and clear and the author has managed to describe the broad and complicated research area well. In some small details one might notice that the English is not the native language of the author, but overall the language is very good. I grade this part with grade <b>B</b> .	

<b>Selection of sources, citation correctness</b>	<b>Choose an item.</b>
<i>Present your opinion to student's activity when obtaining and using study materials for thesis creation. Characterize selection</i>	

*of sources. Assess that student used all relevant sources. Verify that all used elements are correctly distinguished from own results and thoughts. Assess that citation ethics has not been breached and that all bibliographic citations are complete and in accordance with citation convention and standards.*

Mr. Najman has done very good job in finding recent research literature that is relevant regarding his thesis topic. The citations are complete and in accordance with the conventions. I grade this part with grade **A**.

### **Additional commentary and evaluation**

*Present your opinion to achieved primary goals of thesis, e.g. level of theoretical results, level and functionality of technical or software conception, publication performance, experimental dexterity etc.*

In my opinion the thesis meets the requirements set for a Bachelor project in an excellent manner.

### **III. OVERALL EVALUATION, QUESTIONS FOR DEFENSE, CLASSIFICATION SUGGESTION**

*Summarize thesis aspects that swayed your final evaluation.*

In his Bachelor thesis Mr. Michal Najman describes the problem of automatic image captioning. This is a broad area involving learnt image representations, based on convolutional neural networks, and language modeling via recurrent neural networks. Mr. Najman gives a good overview of the basic concepts. In addition, he gives a detailed description and analysis of one particular approach to the problem, namely the work "DenseCap: Fully Convolutional Localization Networks for Dense Captioning" by Johnson and co-authors. The thesis contains an experimental part where the DenseCap system is evaluated in an image captioning problem and the results are analysed thoroughly. Mr. Najman makes an interesting observation that many of the produced captions for new previously unseen test images are identical to some of the training captions. However, at the same time it is shown that the system is able to select the relevant captions and associate them correctly with the new test images so that further improvements of the existing system are not easy to obtain, despite some reported shortcomings of the current automatically generated captions. Finally, the thesis discusses issues and challenges related to the evaluation of automatic image captioning systems, and describes the SPICE metric, which is a recent measure developed for this task.

Overall, in my opinion, the thesis by Mr. Michal Najman is an excellent thesis which clearly presents the topical but broad and challenging problem area of image captioning.

I evaluate handed thesis with classification grade **A (Excellent)** Choose an item.

Date: **1.1.2017**

Signature: