

## I. IDENTIFICATION DATA

<b>Thesis name:</b>	<b>Data Augmentation for Neural Networks Training</b>
<b>Author's name:</b>	<b>Bc. Antonín Vobecký</b>
<b>Type of thesis :</b>	master
<b>Faculty/Institute:</b>	Faculty of Electrical Engineering (FEE)
<b>Department:</b>	Department of Cybernetics
<b>Thesis supervisor:</b>	Mgr. Radoslav Škoviera, Ph.D.
<b>Supervisor's department:</b>	Department of Robotics and Machine Perception, CVUT CIIRC

## II. EVALUATION OF INDIVIDUAL CRITERIA

<b>Assignment</b>	<b>challenging</b>
<i>Evaluation of thesis difficulty of assignment.</i>	
The topic was quite difficult. Most of the core methods are very recent and thus the assignment required searching for and studying many novel scientific articles. That is, it was not possible to rely mostly on the knowledge gained during the study. It also required proposing own, valuable contribution in a very active research field.	

<b>Satisfaction of assignment</b>	<b>fulfilled</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 student fulfilled all of the points of the assignment. Even though there was a technical issue (a bug in the chosen software framework) which prevented him from testing fully trained network, the testing was still thorough and of satisfactory quality (though actually unfavorable towards the proposed method). Moreover, the student researched the topic associated with the main goal of the thesis in far greater depth and width and performed many more tests, that unfortunately couldn't be fitted into the text (otherwise it would be even longer than it already is).	

<b>Activity and independence when creating final thesis</b>	<b>A - excellent.</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>	
For the most part, Bc. Vobecký worked on the thesis independently and systematically, requiring very little guidance. With that said, he was always well prepared for the regular consultations.	

<b>Technical level</b>	<b>A - excellent.</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>	
Prior to his work on the proposed method, the student thoroughly researched the related literature and state of the art methods. Many of the used methods are not taught as a part of the university courses. Therefore, he heavily relied on the use of expert literature. This resulted in a fairly long and comprehensive theoretical introduction text.	

<b>Formal and language level, scope of thesis</b>	<b>A - excellent.</b>
<i>Assess correctness of usage of formal notation. Assess typographical and language arrangement of thesis.</i>	
There are some minor typographical errors but nothing of major notability. Otherwise the thesis is fittingly arranged into two main parts – theoretical and practical/experimental part – each of which is split into sections related to individual concepts.	

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

As mentioned above, Bc. Vobecký did a thorough job when researching the related state of the art methods. Most of the cited sources are from the recent years as the core methods are quite novel.

All the sources are properly cited throughout the thesis. While presenting his own method the student clearly distinguishes between his own contributions and the work of others by citing the corresponding scientific papers.

### **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 own conclusion, the student successfully achieved what was required in the assignment. He succeeded in improving, i.e. augmenting the training dataset for the tested artificial neural network. Even though the resulting images were not quite realistic (partly due to the mentioned technological issue), the results of the thesis shown a promising research direction. Finally, it is worth to mention that the thesis was done in cooperation with the Valeo company, showing that the topic is truly interesting for the autonomous driving industry (as mentioned in the motivation).

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

*To summarize, Bc. Antonín Vobecký worked on the thesis very independently and systematically. He properly started with thorough theoretical research and afterwards proposed his own method. He then did a good comparison against the baseline (no augmentation) and the standard augmentation techniques. He even managed to perform a user study to assess the visual quality and realism of the generated data.*

*This resulted in an excellent thesis with comprehensive theoretical introduction and extensive experimental evaluation.*

*My question for the defense: Could you briefly summarize the most crucial future improvements for your method and what would be your key suggestions to make it more general (i.e. work in similar way with other objects)?*

I evaluate handed thesis with classification grade **A - excellent**.

Date: **31.5.2019**

Signature: