REVIEWER'S OPINION OF FINAL THESIS

I. IDENTIFICATION DATA

Thesis name:	**Data Augmentation for Neural Networks Training**
Author's name:	**Antonín Vobecký**
Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Cybernetics
Thesis reviewer:	Himalaya Jain
Reviewer's department:	Research scientist, Valeo AI, Paris

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	challenging

Evaluation of thesis difficulty of assignment.

Data augmentation beyond the currently used techniques of small *label-preserving* modifications is certainly challenging. The use of generative models have been explored for data augmentation but with only a limited success. The thesis addresses this particular issue for a specific task that is to augment images by painting people in it. The objective is to get larger and diverse datasets with images containing people; this has great application for autonomous driving.

Satisfaction of assignment	fulfilled

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.

The thesis work is very satisfactory. It covered the related literature very well, created dataset needed for the experiments, proposed novel approaches and tested them empirically.
The problem of augmenting images with people is very useful for self-driving technology. Although, the experimental results are not exceptionally good but it does improve over the baseline, which is encouraging. I do not see any shortcoming in this master thesis work.

Method of conception	outstanding

Assess that student has chosen correct approach or solution methods.

The thesis explores many approaches and then proceed with the most promising one. The proposed solution is plausible, it does work to some extent and is promising thus I would say it is a good approach to the problem.

Technical level	A - excellent.

Assess level of thesis specialty, use of knowledge gained by study and by expert literature, use of sources and data gained by experience.

The work explores generative approaches for images and does a good evaluation of existing methods. Also, it proposes a new approach which is improves over the existing for the person image generation task. This show good technical understanding and expertise acquired during this work.

Formal and language level, scope of thesis	A - excellent.

Assess correctness of usage of formal notation. Assess typographical and language arrangement of thesis.

It conforms to the typographical rules.

Selection of sources, citation correctness	A - excellent.

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.

The thesis covers the related work in detail and with satisfactory references to the previous works. It also clearly put the contributions of the proposed method and are not confused with the existing methods.

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, this thesis work excels in terms of literature coverage, understanding of current approaches for the task, novelty in proposed losses and network architecture and also, experimental evaluations. I believe the work is done well and it involves extraordinary efforts and dedication. **I would recommend considering this thesis for dean's award.**

III. OVERALL EVALUATION, QUESTIONS FOR DEFENSE, CLASSIFICATION SUGGESTION

Summarize thesis aspects that swayed your final evaluation. Please present apt questions which student should answer during defense.

The thesis explores the techniques for data augmentation to address the problem of limited data for training deep models. It particularly focuses on augmenting people in the images, which is an important problem in autonomous driving research.

The thesis briefly covers the basics of machine learning and deep learning in Chapter 2, which also sets the terminology for the manuscript. Then in Chapter 3, the state-of-the-art approaches for image generation and specifically person image generation is discussed. This also sets the tools required for understanding the proposed approach and its need.

For the approach to be tested it requires a proper dataset for the task, which is created for the thesis work by using two existing public datasets as described in Chaper 4.

The proposed approach for person images generation is introduced in Chapter 6, which describes the main idea and with novel loss for learning. Extensive experiments are done to test the person image generation, augmentation approach in Chapter 7.

Questions:

Context: Sometimes we find that while training a machine learning model, it helps to minimize the loss based on the metric that is used to evaluate the model. In the case of this thesis work, the evaluation metric is classification or detection.

So my question is have you tried to train your model to directly optimize the performance of a pre-trained and frozen classifier/detector? If not, do you think it could help learning a better generator?

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

Date: **3.6.2019**   Signature: