THESIS SUPERVISOR'S REPORT

I. IDENTIFICATION DATA

Thesis title:	**Memory in Deep Learning**
Author's name:	**Bc. Tomáš Paleček**
Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Computer Science
Thesis reviewer:	Ing. Jaromír Janisch
Reviewer's department:	Department of Computer Science

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment — challenging

How demanding was the assigned project?

The successful fulfillment of the project involved a deep understanding of state-of-the-art methods in the domain of machine learning, further than the usual master-level curriculum. Moreover, it also required decent programming skills and invention. There was some freedom left in the topic, hence the student had to work in a trial-and-error manner, to work out what insights and results will make a good thesis.

Fulfilment of assignment — fulfilled

How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.

All the major points of the assignment were fulfilled. The student chose two types of memory in NN (recurrence and plasticity) and focused mainly on experiments in two separate environments. A lot of effort was put into comparing the memory types both quantitatively (based on their performance) and qualitatively (analysis of internal mechanics). The last objective (*explain the merits of the various memory types and the tasks they are suitable to*) proved to be out of scope of the thesis, the generalized conclusion could not be done with experiments from the two environments. Nevertheless, the student made reasonable effort to derive the qualities of the two memory variants (e.g., Figures 3.4, 3.7, 4.3, 4.6).

Activity and independence when creating final thesis — A - excellent.

Assess whether the student had a positive approach, whether the time limits were met, whether the conception was regularly consulted and whether the student was well prepared for the consultations. Assess the student's ability to work independently.

The student was active and steered the realization of the thesis with his own invention. The student regularly reported about the progress, his new ideas and results. During the process, some other topics were investigated only to turn out to be a dead-end. These results were not included, but it has to be mentioned that, especially at the beginning, the right direction was not clear and the student had to find his own way to complete the assignment.

Technical level — A - excellent.

Is the thesis technically sound? How well did the student employ expertise in his/her field of study? Does the student explain clearly what he/she has done?

The describes several state-of-the-art ML techniques in detail. The main experiments were inspired by the prior research; however, their realization, interpretation and qualitative analysis are student's own. The results are well reported, using the right tool (graphs, tables, etc.) the right way. Most of the numerical results comparing different methods include confidence intervals. The outcomes of thesis are clear.

Formal level and language level, scope of thesis	A - excellent.
Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?	
The thesis is well organized into logical sections, with sufficient scope. The style and English is sufficiently good, with only occasional and minor mistakes.	

Selection of sources, citation correctness	A - excellent.
Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?	
All the topics are meticulously referenced. There are total of 46 references, mostly to research published in journals, conferences or online archives (arxiv). The style is usual in the ML domain.	

Additional commentary and evaluation (optional)
Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.
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III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

Overall, the thesis is good. The student satisfactorily fulfilled the objectives, showed to be able to work independently, bring his own inventions and create a coherent manuscript.

The grade that I award for the thesis is   A - excellent.

Date: **19.8.2020**   Signature: