

I. IDENTIFICATION DATA

Thesis name:	Reprezentace motorických akcí pro imitační učení v robotice
Author's name:	Kateřina Kubecová
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Katedra počítačů
Thesis reviewer:	RNDr. Kristína Malinovská, PhD.
Reviewer's department:	Faculty of Mathematics, Physics and Informatics, Comenius University Bratislava

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	challenging
<i>Evaluation of thesis difficulty of assignment.</i>	
The assignment is very practical given the field of use in (cognitive) robotics. The actions that will be produced by the robotic arm can be found in various related works. The last point (4) is rather challenging, especially the choice of a proper evaluation method(s) and interpretations of results.	

Satisfaction of assignment	fulfilled
<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>	
<p>Most certainly, the practical part of the assignment was developed very well. The dataset creation procedure we carefully planned, validated and evaluated. Modern methods are used and given that the code is functioning and reusable the thesis is generally a valid contribution to future research. The data generator made of the modern VAE architecture is carefully evaluated and as a proof of concept for its future use. Even though the use of VAE in robotic action generation has been proposed before, I presume this model will be of good use for the concrete research with the research group in which the thesis was made. The adaptation of the concrete neural model for such a task is quite intriguing and together with the data-generator the work could be a nice contribution in a related conference or a workshop.</p> <p>The most important questions to be asked and not answered precisely in the thesis is what is the representation as such and which representation(s) are suitable for imitation (demonstration) learning. Yet, in my point of view, answering the question of representation and developing a full methodology to answer it would require much broader overview and much more work which would put it to a range of rigorous or dissertation thesis. For the purpose of this bachelor thesis I hereby evaluate the assignment as satisfied.</p>	

Method of conception	correct
<i>Assess that student has chosen correct approach or solution methods.</i>	
The choice of methods used and the concrete procedures for data collection as well as use of deep neural networks renders the thesis as quite elaborate, even though the text is quite short and not very rich in descriptions or explanations. The experimental results are quite rich, yet only very briefly discussed. The discussion in the thesis is more like a technical recommendation for the future, which is also a kind of a contribution, from the practical point of view.	

Technical level	C - good.
<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>	
As mentioned above and below I can summarize that the thesis stands on some selected sources and that the practical part is well elaborated and useful. Also the idea to reuse the ACTOR model for robots is nice. On the other hand, comparison with the existing related work is only slightly discussed or mentioned in the literature, yet research using VAE can be found for instance in robot skill learning (e.g. Pahič et al., 2021) or in RL-trained robotic pushing behavior (Cong et al., 2022). The methods for evaluation of the system are more or less clear, yet I do miss the justification of such methods for the evaluation and overall insight into what the concrete research results suggest within the discussion.	

Formal and language level, scope of thesis**C - good.**

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

Generally, the thesis is quite short, but still sufficient for a bachelor thesis. Content-wise it is quite rich, but as shortly written as it is it leaves the reader to figure out a lot on their own. The level of language used sometimes lacks academic rigor. Some incomplete sentences or small errors can be found which may be a result of time pressure while writing. Typography-wise the thesis looks good. I would welcome more links between the text chapters to make it more easily tractable, including remarks on how all the chapters of the work connect together.

Selection of sources, citation correctness**C - good.**

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 list of literature contains a selection of some out of the abundance of sources in the domain of the thesis (14). Despite the small number, the sources are of sufficient quality and I find it fit for a bachelor thesis. I must note, none of the sources in the assignment are mentioned in the thesis. Still, all of the cited sources are relatively new and the thesis follows the latest trends. In some cases I would prefer to see a connection between the author's choice and related work, e.g. when defining the criteria for evaluating the actions. The references are not well placed or formally introduced multiple times in the thesis, which makes it harder to read and understand. Last, but not least, I would welcome broader understanding and literature on what representation actually is and what it stands for within the field of robotics.

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.

Please insert your commentary (voluntary evaluation).

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.

I evaluate handed thesis with classification grade **B - very good**.

Date: **3.6.2019**

Signature: