

Review of Bachelor's Thesis

Student: Ondris Ladislav
Title: Depth-Based Determination of a 3D Hand Position (id 23384)
Reviewer: Tinka Jan, Ing., DITS FIT BUT

- 1. Assignment complexity** **more demanding assignment**
I consider the assignment of this thesis to be of above average difficulty due to the requirement of having to learn about, design and implement all three of the hand gesture recognition steps used in this approach: hand detection, pose estimation and gesture determination.
- 2. Completeness of assignment requirements** **assignment fulfilled**
All of the requirements of the assignment were met.
- 3. Length of technical report** **exceeds requirements**
The length of the thesis is above the usual range. However, it is rich in information. As all of it seems rather important and relevant to the topic, I do not consider the above average length to be a negative.
- 4. Presentation level of technical report** **95 p. (A)**
The thesis is very well written. It is pleasant to read, also due to the sensible logical structure of not only the whole thesis but also individual chapters. All pieces of information in the work are linked together in a logical succession. However, there are a few instances, where new, cited, information is introduced in the design and evaluation chapters, that could be more appropriate in some of the preceding theoretical chapters.
- 5. Formal aspects of technical report** **90 p. (A)**
The technical report is written in excellent English and mistakes are uncommon. In terms of typography, the thesis is also sufficient. From the point of view of a Czech reader I also appreciate the absence the indefinite articles "a" at the ends of lines. Although not extensive, there was still some unnecessary use of the first person point of view.
- 6. Literature usage** **90 p. (A)**
A great amount of references that are relevant to the topic of the thesis are used. They are used for the characterization and usability evaluation of existing approaches and data sets. A significant majority of them comprises of scientific articles, mostly from conference proceedings. Although I would generally appreciate to see more book references, which are almost absent, I consider the focus on articles to be justified by the almost exclusive focus of the thesis on the state of the art of a fast growing field of science. I found a slight deficiency in placing numerical references after the period even in cases where their placement before the period would be unambiguous and according to the standard.
- 7. Implementation results** **100 p. (A)**
The quality of both the implemented software and its evaluation are excellent. Mr Ondris presented the software to me and I had the opportunity to test it in real time using the depth camera that he also used for data collection. The result was very convincing as it manages to perform gesture recognition of a particular gesture quite reliably. The evaluation performed and documented in the thesis is meaningful and provides useful information. The submitted software, written in Python, is well structured, uses documentation strings and comments where necessary, and is also documented by a well written *README* file. Mr Ondris decided to use the MIT licence.
- 8. Utilizability of results**
The resulting software was supposed to find its use in a scientific biometric project where it would estimate and decide whether a hand is in the required position and orientation and whether it is fully open. While I do not know the exact requirements of this project I am familiar with it. In my opinion the resulting software is of such high quality that it might be possible to use it in the project directly without any modifications of its main logic parts.
- 9. Questions for defence**
 - Can you better explain the mean joint error metric used in your thesis?
 - Have you considered any other metrics that would be useful for pose estimation and gesture detection than those mentioned in the thesis?
- 10. Total assessment** **95 p. excellent (A)**
Mr Ondris did an excellent job in all aspects. He achieved great results and submitted a very convincing and well written thesis.

In Brno 4 June 2021

Tinka Jan, Ing.
reviewer