

Supervisor's statement of a final thesis

Czech Technical University in Prague

Faculty of Information Technology

Student: Bc. Miroslav Lhoťan
Supervisor: Dr. Ing. Sven Ubik
Thesis title: Vytváření hloubkové mapy pro 3D zobrazení
Branch of the study: Computer Systems and Networks

Date: 8. 6. 2016

<p><i>Evaluation criterion:</i></p> <p>1. Difficulty and other comments on the assignment</p> <p><i>Criteria description:</i> Characterize this final thesis in detail and its relationships to previous or current projects. Comment what is difficult about this thesis (in case of a more difficult thesis, you may overlook some shortcomings that you would not in case of an easy assignment, and on the contrary, with an easy assignment those shortcomings should be evaluated more strictly.)</p> <p><i>Comments:</i> The assignment required a solid problem analysis, software programming and extensive evaluation using specialized hardware.</p>	<p><i>The evaluation scale: 1 to 5.</i></p> <p>1 = extremely challenging assignment, 2 = rather difficult assignment, 3 = assignment of average difficulty, 4 = easier, but still sufficient assignment, 5 = insufficient assignment</p>
<p><i>Evaluation criterion:</i></p> <p>2. Fulfilment of the assignment</p> <p><i>Criteria description:</i> Assess whether the thesis meets the assignment statement. In Comments indicate parts of the assignment that have not been fulfilled, completely or partially, or extensions of the thesis beyond the original assignment. If the assignment was not completely fulfilled, try to assess the importance, impact, and possibly also the reason of the insufficiencies.</p> <p><i>Comments:</i> The assignment was completely fulfilled.</p>	<p><i>The evaluation scale: 1 to 4.</i></p> <p>1 = assignment fulfilled, 2 = assignment fulfilled with minor objections, 3 = assignment fulfilled with major objections, 4 = assignment not fulfilled</p>
<p><i>Evaluation criterion:</i></p> <p>3. Size of the main written part</p> <p><i>Criteria description:</i> Evaluate the adequacy of the extent of the final thesis, considering its content and the size of the written part, i.e. that all parts of the thesis are rich on information and the text does not contain unnecessary parts.</p> <p><i>Comments:</i> The length of the main part is within the expected limits and includes detailed description of the work.</p>	<p><i>The evaluation scale: 1 to 4.</i></p> <p>1 = meets the criteria, 2 = meets the criteria with minor objections, 3 = meets the criteria with major objections, 4 = does not meet the criteria</p>
<p><i>Evaluation criterion:</i></p> <p>4. Factual and logical level of the thesis</p> <p><i>Criteria description:</i> Assess whether the thesis is correct as to the facts or if there are factual errors and inaccuracies. Evaluate further the logical structure of the thesis, links among the chapters, and the comprehensibility of the text for a reader.</p> <p><i>Comments:</i> The written part is clearly structured. The analysis section describes four alternative algorithms for disparity maps with their advantages and limitations, which are the most important currently used local methods for creation of disparity maps. The author identified these algorithms himself. The implementation section explains the main technical aspects of each software module, rather than just copying their declarative parts from the code, which helps understand the implementation. Modules for implementation of disparity map methods refer to their respective analysis subsections. The evaluation section is extensive, approx. one third of the thesis text.</p>	<p><i>The evaluation scale: 0 to 100 points (grade A to F).</i></p> <p>90 (A)</p>
<p><i>Evaluation criterion:</i></p> <p>5. Formal level of the thesis</p> <p><i>Criteria description:</i> Assess the correctness of formalisms used in the thesis, the typographical and linguistic aspects, see Dean's Directive No. 12/2014, Article 3.</p> <p><i>Comments:</i> The work includes all required parts. The text is easy to read, there are only very few typographic errors. The analysis part provides enough details.</p>	<p><i>The evaluation scale: 0 to 100 points (grade A to F).</i></p> <p>90 (A)</p>
<p><i>Evaluation criterion:</i></p> <p>6. Bibliography</p>	<p><i>The evaluation scale: 0 to 100 points (grade A to F).</i></p> <p>85 (B)</p>

Criteria description:
Evaluate the student's activity in acquisition and use of studying materials in his thesis. Characterize the choice of the sources. Discuss whether the student used all relevant sources, or whether he tried to solve problems that were already solved. Verify that all elements taken from other sources are properly differentiated from his own results and contributions. Comment if there was a possible violation of the citation ethics and if the bibliographical references are complete and in compliance with citation standards.

Comments:
The reference section is average in length, but includes the relevant literature, which the author mostly identified himself. The referenced work is clearly distinguished from the own work. The student worked highly independently.

Evaluation criterion: *The evaluation scale: 0 to 100 points (grade A to F).*

7. Evaluation of results, publication outputs and awards **90 (A)**

Criteria description:
Comment on the achieved level of major results of the thesis and indicate whether the main results of the thesis extend published state-of-the-art results and/or bring completely new findings. Assess the quality and functionality of hardware or software solutions. Alternatively, evaluate whether the software or source code that was not created by the student himself was used in accordance with the license terms and copyright. Comment on possible publication output or awards related to the thesis.

Comments:
The evaluation section is extensive. Three important factors of alternative methods for disparity map creation have been evaluated - precision, speed and stability. The student identified good source of reference images used for evaluation. The evaluation was both subjective based on image inspection and objective based on computing PSNR metric to the reference images or a selected frame in stability measurements. Although the best methods have been identified for each of precision, speed and stability, the most important finding was that differences between methods were actually small. This result however served a secondary purpose in confirming the correctness of implementations. The real-time streaming is working and has been tested with two cameras from a mobile robot and a lenticular autostereo 3D monitor.

Evaluation criterion: *No evaluation scale.*

8. Applicability of the results

Criteria description:
Indicate the potential of using the results of the thesis in practice.

Comments:
The results are highly applicable for practical purposes. The motivation behind the thesis was to improve real-time stereoscopic image transmissions from industrial devices, particularly from mobile robots. The previously used solution based on OpenCV library functions produced highly unstable video signals in terms of depth fluctuation. The solution developed by the student significantly improved the obtained video signal.

Evaluation criterion: *The evaluation scale: 1 to 5.*

9. Activity and self-reliance of the student

9a:
1 = excellent activity,
2 = very good activity,
3 = average activity,
4 = weaker, but still sufficient activity,
5 = insufficient activity

9b:
1 = excellent self-reliance,
2 = very good self-reliance,
3 = average self-reliance,
4 = weaker, but still sufficient self-reliance,
5 = insufficient self-reliance.

Criteria description:
Review student's activity while working on this final thesis, student's punctuality when meeting the deadlines and consulting continuously and also, student's preparedness for these consultations. Furthermore, review student's independency.

Comments:
The student created several draft versions of both the software and the written part on his own, discussed them with the supervisor and gradually improved.

Evaluation criterion: *The evaluation scale: 0 to 100 points (grade A to F).*

10. The overall evaluation **90 (A)**

Criteria description:
Summarize the parts of the thesis that had major impact on your evaluation. The overall evaluation **does not** have to be the arithmetic mean or any other formula with the values from the previous evaluation criteria 1 to 9.

Comments:
The thesis is consistent in the level of completeness, theory analysis, implementation, evaluation and results applicability.

Signature of the supervisor: