Doctoral thesis (hereinafter referred to as "thesis"), title of the thesis:

AUTOMATIC SURVEILLANCE CAMERA CALIBRATION BY OBSERVATION OF RIGID OBJECTS

Name of the doctoral student (hereinafter referred to as "student"), name and surname:

ING. VOJTĚCH BARTL

Name and institution of the reviewer (full name of the reviewer, full name and country of the institution):

Priv.-Doz. Dr.-Ing. Michael Buchholz

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Please state your opinion on the following aspects of (I) the student's thesis and (II) the student's overall achievements, and (III) state your conclusion (a minimum of approx. 300 characters for each item below is recommended):

I. Thesis

Appropriateness and relevance

Since data driven methods become more and more important, e.g., for intelligent transportation systems, which need calibrated cameras, the thesis under review is of high scientific and practical relevance is also appropriate for computer vision and information technology.

A summary of the contributions of the thesis

The thesis yields to automate the calibration process (initially and/or continuously) of cameras, avoiding the need of manual processing of the data or specific calibration objects/measurements. The main contribution towards this goal, described in Chapter 3 of the thesis, are three calibration methods developed by the student, which are evaluated and compared also on own datasets created and published for this purpose. The methods proposed indeed allow an automatic calibration, while the thesis also clearly states the accuracy and performance that can be achieved with the different methods.

In addition to this scientific core of the thesis, which is the main contribution in my point of view, the student has further contributions, partly as joint work with colleagues, in related fields of computer vision, which are presented in Chapters 4 and 5 of the thesis.

Novelty and significance:

The presented methods and achieved results go beyond the state of the art that existed before the respective publications by the student have been published. The work is a good basis for further scientific and practical developments, for which the student even ha sketched some ideas in Chapter 6 of his thesis.

Evaluation of the formal aspects of the thesis:

Since I am not familiar with the usual structure of theses at the Faculty of Information Technology of Brno University of Technology, and the structure is completely different from thesis in our faculty, I cannot assess this aspect in detail. Yet, the thesis summarizes well the state of the art, and the figures are meaningful and nicely selected. The language of the thesis, however, could have been improved, especially in parts not taken from previously published papers.

Quality of publications

Most parts of the thesis have been published before in appropriate international conferences and workshops, and one of the main contributions in a medium-ranked journal, however with high relevance in the field. The student has five publications (one of which is the mentioned journal paper) as a first author and the same number of publications, including another journal article in a well-ranked journal in the field of the thesis, as a co-author. Overall, the publications are appropriate for the area of the thesis.

II. Student's overall achievements

Overall R&D activities evaluation:

The thesis and the included results show that the student is able to work scientifically, including the research of new methods as well as the required critical discussions of not only the achievements but also the limits of the newly developed methods based on a thorough evaluation on publicly available data or data made publicly available by himself for this purpose. With his additional participations in international challenges together with colleagues, he also showed the important interest of comparing own ideas on a neutral and fair basis with other approaches as well as the ability to work in scientific teams with good results.

III. Conclusion

The thesis under review is a solid scientific work, which clearly states the student's scientific achievements after his master thesis. All main contributions have been appropriately published in advance of submitting the thesis. Thus, in my opinion, the thesis and the student's achievements until now meet the generally accepted requirements for the award of an academic degree in accordance with Section 47 of Act No. 111/1998 Coll., on higher education institution.

Ulm, 21.03.2024