

Diploma Thesis Review:

Jan Fabián, Person Body Height Measurement by Using Surveillance Cameras

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The thesis presents an algorithm for measuring a body height of a person from an image or a sequence captured by a single monocular camera. The camera is assumed to be fully calibrated and the ground plane location is known. The thesis proposes two orthogonal methods to estimate the height: (1) a direct method that identifies both the lowest and the highest image point on a subject's body, and (2) a method that calculates the body height from the head pose estimate in the camera coordinate system by detecting facial landmarks in the image. For both methods, a possible error is predicted by sensitivity analysis and the variance of the estimate is given for each frame of the video sequence. Finally all the individual frame measurements are aggregated statistically by either the Maximum Likelihood or the Bayesian estimate to provide a single result for the sequence. The methods are experimentally tested in a real setup. For current test sequences of about 20 seconds, the algorithm returned the height of a subject with an average accuracy about 3 centimeters, where the camera was 3 to 5 meters away from a subject freely walking in the scene.

The topic of the thesis is not trivial. This is by far not an implementation-only type of work. The solution was not straightforward and required some research. Jan Fabián proved his ability to use his knowledge, understanding, and practical use of the computer vision geometry, of basic engineering tools as the sensitivity analysis, and of the statistical estimation. The candidate implemented the algorithm prototype in Matlab and designed a real-data experiment to evaluate the algorithm quantitatively.

The candidate worked on the topic continuously and systematically. We consulted almost every week regularly. My guidance had to be rather tight, nevertheless the final outcome, the algorithm and the experimentally tested Matlab prototype, suggests promising results and confirms the method validity.

However, the weakest point of the thesis is clearly a low quality of the presentation. The reason is probably that the candidate seriously underestimated the time needed to write the

thesis up. Obvious mistakes still remained in the final version of the text. Besides many typos and English grammar problems, there are also confusing textual errors, including flaws in equations and in a mathematical notation. The thesis is very brief, 35 pages only. Certain chapters would have required further extension, e.g. the experiment section. There is no discussion on the experiment outcomes. No comparison between the proposed methods is given.

I suggest evaluating the thesis as

C – Good.

Regrettably I believe that the evaluation would have been better by one or two degrees, if the text had been carefully revised.

Ing. Jan Čech, Ph.D.

Thesis Advisor