

# Posudek diplomové práce

Matematicko-fyzikální fakulta Univerzity Karlovy

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**Název práce** Predicting accuracy in Multiple Object Tracking tasks from trajectory statistics  
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**Studijní program** Informatika

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**Pracoviště** KSVI

## Text posudku:

The goal of the thesis was to test the hypothesis that two types of phenomena impact accuracy in multiple object tracking (MOT) task. The thesis first identified two metrics that seem to have the most significant impact on MOT task accuracy from previous data, and then proceeds to conduct new experiments where original object trajectories and the same trajectories but modified to reduce the two selected metrics are presented to experimental subjects. The thesis performs statistical analysis on resulting data to decide on the hypothesis that the trajectory modification improves subjects' performance on the task. The study finds that while one of the metrics does not, the other metric – the one quantifying crowding – has a moderate impact on accuracy.

The overall structure of the thesis is good, but it is very clear it was written in extreme hurry, with some important sections extremely short or several key pieces of information missing. Aside from the frequent typos, the thesis is written in good English. A major issue is a completely mixed numbering of tables and figures from certain point in the thesis, which is probably shifted by one chapter. The writing style is very economic, which I on one hand appreciate – where sufficient time was devoted, it reads very well and presents the topics in a very concise but clear and readable manner. On the other hand in many places the brevity turns into providing insufficient information (see below).

The introduction is written briefly but well, and provides clear concise context for the thesis. However, a major omission is a clear motivation for the specific experiments done in the thesis. This omission unfortunately not rectified later in the thesis.

The next chapter introducing the psychophysics background relevant to the thesis is again rather brief, but does actually good job at describing relevant concepts for the thesis. It is possibly least problematic part of the thesis.

The next chapter on modeling is mostly just a very brief textbook style repetition of basic principles of statistical analysis and linear regression. Some parts, such as detailed description of linear regression, seemingly superfluous, while others like section 2.3 to short and shallow.

The third chapter describing the experiments is full of tables demonstrating data that are not very helpful, seemingly put together to bloat up the thesis, but overall it does the job of

explaining the experimental paradigm with few caveats (see below). It also contains description of the analysis of previous data, which could have gone to the results section (which happens to be extremely short). Caveats:

1. One page 20 author talks about 'remaining 21 trajectories' and another 450 trajectories that were used in experiment. One previous page it is stated overall there were 500 trajectories. This does not add up.
2. It is unclear to me what difference between 3.2 and 3.3 is. Overall all figures and tables in the thesis we benefit from more detailed captions.
3. What the individual 6 tested metrics are should be explain earlier (around pages 18 or 19)
4. Statement at the bottom of page 21 needs statistical testing.
5. Probably the most important question: what was the point of testing metric 5 if it was then anyway excluded based on some secondary arguments despite turning out statistically significant in the analysis.
6. Figure 3.3 is pointless.
7. Suddenly on page 27 the author decides to use metric 4 even though it was rejected few pages before. Again in this context, what was the point of the previous data analysis when at the end its results are ignored?

The results section is extremely short, but it does clearly explain the main result of the thesis showing that the metric 6 has a moderate impact on the accuracy of the MOT task while metric 4 does not. If I allow for the fact that probably parts of chapter 3 could have been moved to the results chapter, this is the absolute bare minimum amount of content I would expect from a thesis.

Overall this is rather poorly put together thesis with a bare minimum amount of work presented. It is at the very edge of what I would consider an acceptable thesis. I am reluctantly accepting the thesis for defense, but I will be carefully evaluating the oral presentation for my final verdict.

**Práci doporučuji k obhajobě.**

**Datum** 25.1.2023

**Podpis**