

Posudek diplomové práce

Matematicko-fyzikální fakulta Univerzity Karlovy

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Název práce Construction of time-space trajectories from multimodal data
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Studijní program Informatika **Studijní obor** Softwarové a datové inženýrství

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Text posudku:

The author focuses on detection of trajectories of moving objects in videos. Assuming object detections with bounding boxes for each video frame obtained from a deep neural network, the thesis presents a configurable framework allowing to define a rich set of clustering algorithms to identify trajectories. Clustering methods are presented in section 3, while connectivity approaches are detailed in section 4 including various features. In addition, the author investigated interpolated detections as well as options to describe sub-trajectories. The methods are integrated into the Videolytics system as described in section 6. Furthermore, preliminary experimental evaluations are presented trying to provide detection precision estimates. The text allows to understand presented ideas, though it contains grammar mistakes sometimes (e.g., " for the algorithm is more efficient to select ", " algorithm use the ", " a chain of decision "). The text contains a lot of formal parts that help with clarification and I really appreciate many clarifying figures that visualize many ideas. Often there are arrows in the text which is sometimes confusing. For the defense, I have several questions:

- 1) page 33, structured categories - if $A = B$ then connectivity is 0? Or it is a typo?
- 2) Algorithms 1 and 3, why there is no threshold to stop the while loop? It is in sourcecodes.
- 3) Algorithm 3 - what is the semantics of # ? It seems that the comment executes a code.
- 4) page 31, time distance - " In cases where trajectories overlap the comparator can use two detections from overlapped detections." It is possible to merge overlapping trajectories?
- 5) Algorithm 4 is a trade-off approximation, was there some experiment to find parameters?
- 6) Algorithm 5 - why a tree structure was used? Why not a chain of configurable steps?
- 7) Figure 5.7, is it a tree or a more general graph? Or compressed visualization of 3 trees?
- 8) Is an OpenCV trajectory directly comparable with the result of clustering?
- 9) Is there some related work on detection of trajectories from a set of bounding-boxes? There was a previous work from the same group, why it was not considered and mentioned?

Práci doporučuji k obhajobě.

Práci nenavrhuji na zvláštní ocenění.

Pokud práci navrhuje na zvláštní ocenění (cena děkana apod.), prosím uveďte zde stručné zdůvodnění (vzniklé publikace, významnost tématu, inovativnost práce apod.).

Datum 19.5.2023

Podpis