

Review of Doctoral Thesis

Methods of Multi-Modal Data Exploration

by Tomáš Grošup

Overview

The thesis focuses on the problem of processing complex data in the way of providing tools for effective browsing the data – called data exploration. The thesis contributes with multi-modal search, which is not new, but rather makes such search accessible to users, i.e. providing an important user experience by proposing various techniques to combine modalities and visualization. The broader area of complex data compared by similarity is represented by tracks at main conferences, so it is definitely topical.

The thesis has been prepared as a collection of works with a 20-page introductory. The main papers are included in Chapters 2-9. On page 4, there is a list of co-authored papers starting from the candidate's bachelor studies. There is a quantification of candidate's contributions to individual papers, but it is quite coarse: (i) there are typically multiple authors of papers (incl. other students, excluding the supervisor and consultant), so the candidate's part is not clear; (ii) the candidate is the first author of [6], [7], [13], [14] and [15].

The level of English is good in overall. Sometimes the text is not very comprehensive. There are also grammar mistakes, typos (bulband) and inconsistencies (reranking vs. re-ranking) – please check my handwritten comments in the returned hardcopy.

Comments

Since the thesis is prepared as a collection of works much more attention should have been paid to the introductory chapter. It is not very easy to follow, and open problems are not always stated clearly. The introduction (Sec. 1.1) should summarize objectives comprehensively, but it is just the second paragraph that focuses that way. The others (3rd and 4th) do not point out any particular problem directly.

The formulations are also sometimes misleading. In Sec. 1.2, there is a claim that a range query cannot be applied due to complexity of data entities, but it is defined below for such data. Next, the feature extraction is not a problem, since it can be done offline. But in [2], you propose an optimization of it. Besides that the extraction must be done before any query is posed. Lastly, the recommendation of R-trees for vector spaces is invalid, since they perform acceptably up to 3 or 4 dimensions. In Sec. 1.2.2, it seems like the paper [3] introduces a new phenomenon of approximate search, which is not the case.

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Since the multi-modal search is the main topic, I consider Sec. 1.4 as too short, thus as a major disadvantage. There is no survey of existing approaches (not even in [6]) that would support the candidate's knowledge of this area. At least I would expect basics – the Fagin's and threshold algorithms.

References

Some references are incomplete: [6], [8] and [63]. Citing the same work twice – page 6, refs. [30] and [31].

Language points

The word “digitization” should have been used instead of “digitalization”. The phrase “car make” is the correct one.

Formatting

The idea of using graphics to point out candidate's contributions is nice, but it fails to help since the pages in Chapters 2-9 are not numbered. As a result, the text must be scanned sequentially to get to the beginning of a chapter.

Questions

In Sec. 1.3.1, after the page zero is displayed, the next results are downloaded in the background and added to the page displayed. How are the next results obtained, is it similarity search (different modality)? If not, how do you select the candidates to be included in the page zero?

Why is it impractical to create a labelled dataset in the second property in Sec. 1.5?

What is the relation of Fig. 1.12 to the text in Sec. 1.5.3?

What does a *similarity model* contain? How is it defined? I do understand it that a visual descriptor carrying color distribution in an image and SQFD distance function is an instance of similarity model rather than a new one. I follow the analogy with the relational model, where a database schema is an instance of relational model. At the end of page 6, you would like to apply relational databases to implement similarity search. How?

Publications

The candidate has co-authored 14 published conference papers at forums of good international quality. There are outstanding papers: a demo paper at CIKM (core A) [11], a short paper at EDBT (core A) [13], a survey-like paper at ICMR (core B) [14] and a paper at ADBIS (core B) [8].

From my point of view, the main contributions of candidates are in papers [6] at MMM (core C) and [13] at EDBT (core A).

Lastly, I would have expected to have a journal article published already. There is a submission of Elsevier's Information Systems which is under review to the date.

Summary

To conclude, the author in this application-oriented thesis has continued in the research to make the similarity searching accessible to general users. The most-promising part that the candidate has opened in [13] is selection of suitable descriptors. The publications definitely confirm the candidate's capability of independent scientific work. I recommend accepting this thesis as a PhD graduation work and award PhD degree to the author.

In Pompei, Italy, on August 17, 2019

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