Review of the dissertation proposal:

Improving Quality of Content-Based Image Retrieval
by Petra Budíková

Reviewer: Dr. Giuseppe Amato
Istituto di Scienza e Tecnologie dell'Informazione
Consiglio Nazionale delle Ricerche
Via G. Moruzzi, 1, 56124, Pisa
Italy
Email: giuseppe.amato@isti.cnr.it
Phone: +39 050 315 2906
Fax: +39 050 315 2810

One of the problem typically faced by users of content based image retrieval system is that search results contain images that are visually similar, rather than conceptually similar, to queries. In fact, the issue of "bridging the semantic gap" between an image's visual content and its user perceived conceptual content is an important topic that the scientific community is currently actively investigating.

Accordingly, the candidate proposes to address this problem by investigating three research directions: 1) Post-processing of query results, 2) Multi-object queries for efficient relevance-feedback 3) Query language.

The candidate proposes to use techniques of interactive result post-processing as a mean of refining results displayed to the user by way of result re-raking. The interesting and promising aspect of this proposal is that the initial query returns a result much larger than needed, so that the re-ranking can be performed just on the obtained result, which is much smaller than the entire dataset.

Efficient multiple-object query execution is proposed as a solution to perform efficient relevance feedback. In fact, relevance feedback and learning strategies are often formulated as combination of results of multiple similarity queries. Multi-object query execution is indeed very relevant also in other contexts, like classification, multi-feature similarity searching, and image retrieval with local feature. Multi-object query execution is therefore, as the candidate observes, a very important and unsolved issue, which need to be investigated.
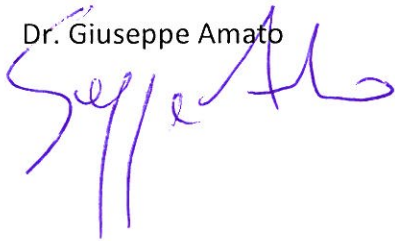
The candidate also proposes to investigate a new query language that supports multiple-object query and post processing. This, is an aspect that is generally overlooked and that, on the other hand, might help to widespread the use of these techniques by application developers. Having a query language that allows you to easily express queries on a image database is certainly a relevant added value of the thesis.

The dissertation proposal provides a brief survey of the techniques related to searching metric data, and a broader survey of techniques related to content based-retrieval Strategies. I have just some minor hints here. My suggestion is to slightly broaden the survey of the state of the art concerning the metric searching techniques. Especially, I believe that a survey of existing works related to multiple-object queries also needs to be done to check what the literature already offers and to compare the new proposed solutions. The survey on content based image retrieval strategies can be organized differently. My opinion is that what is in section 3.12 (Similarity Function Definition) and in section section 3.4 (Query Language), discusses techniques that are related to searching in general, not just content-based image retrieval, so they might be part of the survey related to similarity searching.

In conclusion, the candidate proposes a timely research program and promises to reach a very challenging objective. Consider that several existing approaches mainly disregard the scalability problem and offer solutions that are limited to small and specialized datasets. An unifying approach that jointly takes into consideration quality of results and efficiency is needed to realize methods applicable to the web scale. Thus, I believe that the topics that will be investigated in the thesis are of great importance. In fact, the thesis will address still unsolved issues related to high quality image search on a large scale. The research directions proposed by the candidate are convincing and constitute a good start toward the achieving of the final objectives. Therefore, I recommend the dissertation proposal to be accepted and to continue with the work along the planned directions.

Sincerely

Dr. Giuseppe Amato