

Subject

Semantic Similarities in Content-Base Image Retrieval (CBIR)

Supervisors, contact, place of research

dr eng. Tatiana Jaworska (Tatiana.Jaworska@ibspan.waw.pl, tel. 223810223), SRI PAS, 6 Newelska Str, Warsaw, Poland.

Project Description

One of the fundamental functionalities of a content-based image retrieval system (CBIR) is answering user queries in order to retrieve the proper information. However, the proper information it does not mean a return of an exact similar image, but rather semantically similar. In the recent years, many researchers have intensively analysed similarity evaluations between whole images, their fragments, or some image elements, such as contours. Content-based similarity models have been developed [1] so as to comply with the system needs and user requirements regarding semantic multimedia retrieval.

Convolutional neural networks (CNN), which rapidly developed at present, can easily recognize particular objects in an images [2], such as cars, people, etc., but cannot retrieve more complex notions, for instance a city, or tropics.

Semantic similarity of images contains the associated semantic concept even though is visually dissimilar. Hence, the multiple semantic interpretation results in a retrieval problem because it needs to take into account simultaneously: image complexity, number of objects, low-level features, object layout and human associations which an image evokes. For this reason, recently in the SRI PAS the CBIR system offering to the user some elements of semantic retrieval based on some criteria has been developing [3]. However, there is much work to do in this area, for example there is not exist a quantitative method (methods) for an image similarity evaluation even though researchers tried to introduce some image similarity metrics [4].

When we give a query to a CNN, we receive a value of probability with which the CNN found a reply, but this probability is rather an aggregated measure of similarity to all images on which this network was trained. Whereas, it is more interesting for the user a similarity between a pair of images – her/his query and a particular system answer which are, additionally, similar in a semantic way.

Bibliography

- [1] C. Beecks, M. S. Uysal and T. Seidl, “A Comparative Study of Similarity Measures for Content-Based Multimedia Retrieval,” in *Multimedia and Expo (ICME)*, Suntec City, 19-23 July, 2010.
- [2] Q. Abbas, M. E. A. Ibrahim and M. A. Jaffar, “A comprehensive review of recent advances on deep vision systems,” *Artificial Intelligence Review*, vol. 52, pp. 39-76, May on-line 2018.
- [3] T. Jaworska, “How to Compare Search Engines in CBIR?,” in *Proceedings of the SAI COMPUTING CONFERENCE 2016*, London, UK, 2016.
- [4] T. Jaworska, “An Asymmetric Approach to Signature Matching,” in *Multimedia and Network Information Systems*, vol. 506, A. Zgrzywa, K. Choraś and A. Siemiński, Eds., Wrocław, Springer, 2016, pp. 27-37.