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Editorial

Editorial to the Special Issue on Medical Image Annotation in ImageCLEF 2007

With date of May 2008, wikipedia.org defines: "*Automatic image annotation (also known as automatic image tagging) is the process by which a computer system automatically assigns meta-data in the form of captioning or keywords to a digital image. This application of computer vision techniques is used in image retrieval systems to organize and locate images of interest from a database. This method can be regarded as a type of multi-class image classification with a very large number of classes – as large as the vocabulary size*".

In this special issue, the best papers and the results of the Medical Image Annotation Evaluation in ImageCLEF 2007 are presented. However, not all groups that participated in the evaluation contributed a paper to this special issue, and – based on a thorough peer reviewing process – not all of the submissions were finally accepted for publication.

In the year 2007, a medical annotation task was run as part of the ImageCLEF image retrieval evaluations for the third time. The evaluations attracted growing participation despite the increased difficulty of the tasks over the three years. The number of classes increased each year. In 2007, for the first time, a hierarchical classification was attempted although not the entire hierarchy was populated.

The special issue starts with a paper describing the database and the task in detail and summarizing the results from the evaluation. The text also analyzes the submitted runs to identify well performing techniques to be able to improve results for future events. Main outcome was that using the supplied hierarchy was not necessary for the best-performing techniques as only 116 classes were actually present in the dataset and all were represented in the training data. Thus, the best techniques did not use the hierarchy. A few groups reported slightly improved results when using the hierarchy.

Subsequently, papers from the participating groups are presented in the same order as they are listed in the overview paper. First, the BLOOM Group from IDIAP in Martigny, Switzerland presents their methods, which achieved excellent results using an approach based on local representations and support vector machines with multi-cue kernels to fuse multiple descriptors. This group obtained the best overall error rates in the competition. Second, the medGIFT group from Geneva, Switzerland presents their approach, which is based on the GNU Image Finding Tool (GIFT) and participated in each of the three evaluations. The techniques employed are based on techniques from textual information retrieval applied to visual features. Third, the method from the Oregon Health and Science University (OHSU) is presented, which also makes use of support vector machines but instead of local descriptors, global 'gist of the scene' descriptors are used. Fourth, the methods from the Human Language Technology and Pattern Recognition Group from RWTH Aachen University in Aachen, Germany is presented, which achieved the best results in 2005 and 2006 and the second best results in 2007. They present various methods. Some techniques are based on local descriptors and others are based on non-linear deformations of the images. Then, the method from the Image Retrieval in Medical Applications (IRMA) group from RWTH Aachen University in Aachen, Germany is presented, which is the group which kindly provided the data and also participated in each year. Their method is based on modeling of non-linear deformations in the images and different texture descriptors. After this, the methods from Freiburg University in Freiburg, Germany are presented, which are similar to the method proposed by the BLOOM group based on local descriptors and based on a lighting invariant relational function and support vector machines. They equally achieve excellent results. The last method presented is from University Basel, Switzerland, which is an extension to the non-linear deformation models from the two groups from Aachen and mainly improves the speed of the methods. The special issue is concluded by a paper from Sheffield University studying user needs for image annotation in medical applications, and particularly a relevance model for medical image searchers.

Over the three years of the medical image annotation campaign in ImageCLEF, a clear improvement in techniques could be shown. The growing participation, an increasing difficulty of the tasks, and particularly the increasing performance of the participating systems show the necessity for the benchmark and the usefulness of these results. A large number of additional publications have used the employed methodology and data of the ImageCLEF medical image annotation task, further highlighting the impact and importance of this benchmark.

Those readers that – based on the collection of papers presented here – have become enthusiastic about the field of medical image annotation are referred to the ImageCLEF website at http://www.imageclef.org for further updates. In particular, we invite your contributions in the upcoming ImageCLEF campaigns.

Aachen and Geneva, May 2008

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