medGIFT – Using the GNU image finding tool for medical image retrieval

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Abstract

Content-based image retrieval is still in its infancy in the medical domain although often demanded by medical doctors [1,5] as a tool to manage the rising amount of visual data produced digitally in medical departments. Especially in the context of evidence-based medicine and case-based reasoning, the retrieval of similar medical cases to the one being diagnosed is important. Content-based visual information retrieval can supply visually similar. This can help in several domains where the diagnostics depend on the visual characteristics of medical images such as dermatology, pathology and also high-resolution computed tomography (HRCT) images of the lung [4].

The availability of the *GIFT* (GNU Image finding tool, http://www.gnu.org/software/gift/) as open source that permits content-based access to image databases reduces the effort to create content-based access to medical image databases because several components of the *GIFT* system can directly be used such as the query engine and the user interfaces. It is clear that the visual descriptors used in *GIFT* are insufficient for the retrieval of medical images but already small changes in the feature space such as the use of a smaller number of colours and a larger number of grey levels and the adaptation of the Gabor filters can lead to significantly better retrieval results. The availability of a communication interface to the retrieval engine called *MRML* (Multimedia Retrieval Markup Language, http://www.mrml.net/) allows for an easy integration of the visual retrieval techniques into other applications. Currently, the retrieval functionalities of *medGIFT* are being integrated into the medical case database system *casImage* (http://www.casimage.com/, [3]), an in-house radiological case database system that is used in daily practice and already counts more than 40,000 images in the radiology department alone.

More information about the *medGIFT* project can be found at (http://www.dim.hcuge.ch/medgift/, [2]). Program changes for the use with medical images and a new user interface that includes the display of diagnoses on screen and that includes *casImage* into the content-based retrieval system can be obtained directly by email from the author.

References

[1] E. El-Kwae, H. Xu, and M. R. Kabuka. Content-based retrieval in picture archiving and communication systems. *Journal of Digital Imaging*, 13(2):70-81, 2000.

[2] H. Müller, A. Rosset, J.-P. Vallée, and A. Geissbuhler. Integrating content-based visual access methods into a medical case database. In *Proceedings of the Medical Informatics Europe Conference* (MIE 2003), St. Malo, France, May 2003.

[3] A. Rosset, O. Ratib, A. Geissbuhler, and J.-P. Vallée. Integration of a multimedia teaching and reference database in a PACS environment. *RadioGraphics*, 22(6):1567-1577, 2002.

[4] C.-R. Shyu, C. E. Brodley, A. C. Kak ,A. Kosaka, A. M. Aisen, and L. S. Broderick. ASSERT: A physician-in-the-loop content-based retrieval system for HRCT image databases. *Computer Vision and Image Understanding* (special issue on content- based access for image and video libraries),75(1/2):111-132, July/August 1999.

[5] L. H. Tang, R. Hanka, H. H. S. Ip, and R. Lam. Extraction of semantic features of histological images for content-based retrieval of images. In *Proceedings of the IEEE Symposium on Computer-Based Medical Systems* (CBMS 2000), Houston, TX, USA, June 2000.