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medGIFT – retrieving medical images based on their content

Abstract

The amount of visual medical data that is being produced in the form of images such as X-rays, computer tomographies but also videos such as in cardiology is rising strongly. A large part of these data is being produced and stored digitally, which allows new access methods to the visual data, other than currently used access by patient identification, only. As an example, the Geneva University Hospital's radiology department alone produces currently (2003) more than 13'000 images per day.
Access to a large number of the stored images by their visual content allows to exploit the information that is implicitly stored in the images and the electronic patient record that they are attached to. Although basically all current projects on image retrieval are scientific research and not used in clinical routine, they can already be of valuable help for teaching, research and also diagnostics.
For *teaching*, content-based access methods can allow medical student to browse through image collections on their own, learning about what visual similarity might tell or not tell. It can also help lecturers in finding better example images to show visually relevant or non-relevant characteristics.
For *research* it can also help to find images that are best-suited to show certain effects and it can even be imagined to include visual features into medical studies alongside other numerical values.
The use as a real *diagnostic aid* might still be a distance away but the technology can already be used in very specific domains for fields such as case-based reasoning and evidence-based medicine. Tests on computed tomography images of the lung show good results.

The *medGIFT* project is entirely based on open source software and is distributed under the GPL (GNU General public licence), as well. The software works on the Linux operating system and uses technologies such as the apache web server to run its php interface and to distribute the images that can all be identified by their URL. The main component of the image retrieval engine is the GIFT (GNU Image Finding Tool) that can be downloaded from http://www.gnu.org/software/gift/. The availability of the program as open source allows its use without financial constraints and the use of the Linux operating system permits to install the software on outdate hardware as well for the cost of speed.
As clients the open source Mozilla browser is used to access the php interface but it can as well be used with the Microsoft Internet Explorer that comes free with the windows operating system.

More information on medical image retrieval by visual content and on the medGIFT project can be found at http://www.sim.hcuge.ch/medgift/.