OPTICAL BIOPSY WITH CONFOCAL ENDOSCOPY DIAGNOSED BY PATHOLOGIST

- Prof. Dr. O. Ferrer-Roca et al. 2009 at the 22nd European Congress of Pathology, Florence, Italy


The situation OB-CEM

- One of the main problems for endoscopists to use confocal endomicroscopy (CEM) are the optical biopsy (OB) images. Morphological images that belong to the domain of pathology-training and are far from endoscopy-training.

Endomicroscopy (CEM)

- Endomicroscopy is born—do we still need the pathologist?


OB-Pathology help

- For that reason the online pathology diagnosis (telepathology) is of paramount importance.
- Alternatively, an image data mining to extract the most-likely diagnosis to help endoscopists.

Image data mining

- We have developed the metadata structure and the ontology capable to be used by the query multimedia standard ISO/IEC 15938-12 and ISO/IEC 24800-3 to find the possible image and diagnosis using the technique of the "query by example".

Standardization to annotate, search and retrieve digital images

- MPEG Query Format (MPQF) and the JPEG’s JPSearch project. MPQF has already reached its last standardization level, the JPSearch (whose Part 3, named JPSearch Query Format or simply JPQF, is just a profile of MPQF) is still an ongoing work.
- The challenge is to provide an interoperable architecture for images’ metadata management.
Metadata structure & ontology

- MPQF expresses queries combining IR & DR
- IR: Information Retrieval systems (e.g. query-by-example and query-by-keywords)
- DR: the expressive style of XML Data Retrieval systems (e.g. XQuery), embracing a broad range of ways of expressing user information needs

IR-like criteria, MPQF

- MPQF include but not limited to QueryByDescription (query by example metadata description), QueryByFreeText, QueryByMedia (query by example media), QueryByROI (query by example region of interest), QueryByFeatureRange, QueryBySpatialRelationships, QueryByTemporalRelationships and QueryByRelevanceFeedback.

DR-like criteria, MPQF

- MPQF offers its own XML query algebra for expressing conditions over the multimedia related XML metadata (e.g. Dublin Core, MPEG-7 or any other XML-based metadata format) but also offers the possibility to embed XQuery expressions.

Web 2.0 images search

- GOOGLE SIMILAR IMAGES
  http://similarimages.googlelabs.com/
- GAZOPA- Hitachi
  http://www.gazopa.com/
- Lire- Lucene Image Retrieval
  http://www.semanticmetadata.net/lire/

CBIR= Content based image retrieval

MATERIAL & METHODS

- 25 OB-CEM images
- obtained with a FICE™ (Fujinon Intelligent Chromoendoscopy) & Pentax-CEM together.
- histological images were used in the training set.
- All were JPEG images annotated using standardized metadata for JPSearch ISO/IEC 24800

CBIR- QueryByDescription

- Content based image retrieval (CBIR) technique.
- Using QueryByDescription type to communicate to the server the specific metadata related to the example image fixed by the requester (e.g. pit size, distance and regularity of normal round pits, detection of stellate or papillary images, so on and so forth). These metadata were extracted whenever possible (by image analysis extraction) before submitting the query to the generic MPQF query processor.
CBIR-SpatialQuery

- SpatialQuery type allows requests in the spatial domain where one or two regions (e.g., MPEG-7 StillRegion, etc.).
- Relationships can be expressed by different relation types such as northOf, southOf, westOf, eastOf, contains, covers, overlaps, disjoint...
- No CBIR query processors offer this kind of functionality, being the present one an exception.

GOLD STANDARD OB-CEM

In surgical pathology six are the main techniques:

- (1) Experience better than evidence;
- (2) Literature knowledge;
- (3) Scientific relevance or eminence;
- (4) Interpretation;
- (6) Personal impression.

Therefore as soon as we collect sufficient experience with images available and accessed by pathologist, sooner the OB gold-standard will be settle and incorporated into routine diagnostic procedures.

Bibliography

   http://www.springerlink.com/content/0j1393l95242l5t5/fulltext.pdf?ac=1