Introduction. Computerized environment in Pathology should enable the storage of unambiguous histopathologic descriptions of images from a panel of pathologists. The largely reported inter- and intra-observer variability in the diagnosis process (which is mostly due to the lack of reproducibility in identifying, localizing and labeling relevant morphological features) could benefit from such environments if they can easily and continuously be maintained.

IDEM (Images and Diagnosis from Example in Medicine) software contributes to relevant indexing of images of unambiguous descriptions of morphologic features using both labeling functions and a glossary based on the international controlled vocabulary of the Systemized Nomenclature of MEDicine (SNOMED). Services that are integrated in IDEM include: 1) a description tool to acquire from experts the description of a case and 2) a computerized consensus building tool to get consensual structured descriptions. Such environment allows building efficient knowledge databases composed of a repository of cases and a repository of the knowledge of the domain (knowledge model). However, in practice, knowledge databases do not remain static. Changes in the knowledge databases are required as medical science evolves and it is a crucial issue that computerized environment takes into account the dynamicity and maintenance of knowledge in their design.

Objectives. We define a process to support the maintenance of IDEM with the two following objectives: 1) to allow domain experts to directly enter and modify existing knowledge and 2) to develop a consensus process to validate knowledge changes.

Methods. The knowledge acquisition tools are organized around 2 modules:
- The first module is a knowledge acquisition process where the expert can describe images by selecting terms and defining new ones if necessary. It allows the construction of the domain glossary, directly by the domain expert, from a selection of entities of an initial micro glossary provided by literature and present in the SNOMED classification. In order to support this process, we have developed a meta model that allows the expert to describe its domain with an object-oriented approach, which is the most natural way to turn real world concepts into data.
- The second module enables the validation of the domain knowledge of the environment. Domain experts are guided to modify the knowledge database they gradually build, either directly or using a consensus module. The development of the consensus module is an interesting attempt to validate the knowledge acquired in the precedent step and then to achieve sharing and reuse. The consensus module is written in JAVA on the top of the object-oriented database ObjectStore. It is a two steps sub-process: an automatic step and an interactive step. An automatic two-by-two comparison of each morphological features is first performed to evaluate description variation, which is classified as either geographic agreement, semantic agreement, global agreement (both geographic and semantic agreement), or no agreement. Once the consensus module had computed initial agreement between descriptions, the interactive session can start. The interactive session allows the expert to modify the computed agreements or to validate them.

Results. An initial micro glossary was defined to take into account descriptions of a collection of 38 diagnosis of breast pathology detailed in a histological atlas. Two pathologists described each case, a senior and junior pathologist. During the description phase, 671 objects were described by the pathologists and 67 terms of our micro glossary were used. During the description and the consensus sessions, 71 terms were added by the experts.

Conclusion and discussion. Within the IDEM project, we have developed a knowledge manager that offers the following functionalities: 1) review of the contents of knowledge database by domain experts, 2) update the knowledge database, 3) use the system and all previous cases despite the change in the knowledge database and 4) report of the knowledge version (history of changes). The methodology used could be applied to others highly evolving medical domains.

References.
- Le Bozec C., Jaulent MC., Zapletal E., Heudes D., Degoulet P. A visual coding system in histopathology and its consensual acquisition. AMIA, 1999 (Fall Symposium); 306-10
- Wigertz, O., et al., Knowledge representation and data model to support medical knowledge base transportability. Meth Inform Med, 1989

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