

Useful tools for the Digital Virtual Microscope – Implementation of the Diagnostic Path

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Background: The routine use of a virtual microscope will be a paradigm shift comparable with the introduction of the digital radiology. For the first time all histological glass slides will be scanned and digitalised and can be viewed by a specialised browser without any delay. In a medium-sized institution every day more than 100 cases with approximately 1500 images will be processed and stored. The main advantage of a virtual microscope is the reuse of the images to compare, for decision support and education.

The intention of this project is the extension of the functional range of the Digital Virtual Microscope (DVM) by the development of the so called diagnostic path, which is the connection from observation path (path of the examiner through the histological slide) and the dictation path (sequence of the pathology report).

Methods: The DVM stores and processes the images and the observation path in a relational database (SQL-Server, Microsoft). Basis of the project is the structural analysis of present pathology reports. The reports were transferred into an XML structure including an extension to be able to register to each text fragment the time and the slide fragment the pathologist is currently analysing. Based on this structure, an editor was implemented in Microsoft Active Server Pages (ASP). An additional tool is able to compile the “diagnostic path”, which is the connection from the “observation path” and the “dictation path” (sequence of the pathological report) and to code the content of the dictation to the Concept code of the Unified Medical Language System (UMLS). The coding and search software is programmed in Java (version 1.4).

Results: An editor window was integrated into the Digital Virtual Microscope. The description of the slide, in the prototype version entered by the pathologist, is stored in the database. A specialised tool generates a Health Level Seven (HL7) compatible XML document including the dictation path. For coding and search the histological description four software modules were developed. Module 1 for the processing of the pathology report files, the compilation of the diagnostic path and the UMLS encoding of report text. Thereby the report files could be automatically encoded on the average to 13%. Module 2 for editing the encoded terms and Module 3 and 4 for search and administration.

Conclusions: The integration of the diagnostic path functionality represents a valuable extension of the Digital Virtual Microscope and offers the possibility, to find again histological structures in the image as described in the pathology report. The small count of automatically coded words is very valuable concerning the further usage of the UMLS concept codes. But the study shows that UMLS is not so specific for terms of histopathology. For a more specific search it is necessary to add the missing concepts and create new type of relation. Besides the search for a specific region in the virtual slide the dictation and observation path can be used for a quality assurance system.