CaReRa
Case Retrieval in Radiology

Despite the recent progress in contemporary medicine towards a more deterministic discipline based on a bottom-to-top approach (ie. from causes to symptoms), a great deal of medical knowledge, has been, for centuries, and is still based on a top-to-bottom approach (ie. from symptoms to causes and thus to a treatment decision). Consequently, the clinical experience that we can directly map to the number and variety of cases that a medical professional has seen and/or treated, plays a key role in diagnostic decision making.
The clinical experience sharing (CES) refers to minimizing the negative effects of this situation on the clinical diagnostic decision making process by means of providing a searchable collective clinical experience knowledge-base to a large community of medical professionals. The past and collective clinical experience in this knowledge-base is represented as past cases/patients where a case/patient is composed of a wide variety of multi-modal information, such as patient demographics, medical history, lab test results, physical examination, genetics, drugs used, radiological images and image based observations/findings, etc.

We envision that using a CES platform,

- MDs will be able to search for and retrieve the relevant past cases from the collective specialized knowledge-base that would help them to give better diagnostic decisions via comparative diagnosis,
- Medical students will be able to search for cases with similar characteristics but different diagnoses or vice versa, highlighting the subtle differences that play a key role in accuracy of the diagnosis in many cases,
- Patient specific diagnostic decision support systems will be developed that searches for and uses past similar cases (of compositions of past similar cases) as a patient specific model.

Building an all-inclusive CES system is intractable, if not impossible, as it requires modeling whole field of medicine. We have chosen “liver” as the application domain due to its importance, as well as relative ease of data collection, and defined the extent of this domain in collaboration with medical experts. The goal of the project is to rank the liver cases in a medical knowledge-base according to their relevancy to a query case, by means of image preprocessing, multi-modal semantic representation and similarity analysis. The cases are semantically described by meta-data at 4 levels organized in a hierarchy as Patient:Study:Series:Pathology. The query case is expected to have much less meta-data as it represents a current case for which a diagnosis is sought. The meta- data at the Series and Pathology levels are associated with the novel ONLIRA ontology that is linked to the RadLex lexicon as much as possible. Relevancy is not apriori defined, except the domain knowledge embedded in ONLIRA. The system is aimed to learn from user feedback and steer the search by means of query processing and/or search engine manipulations.
Project Web Page:
http://www.vavlab.ee.boun.edu.tr/pages.php?p=research/CARERA/carera.html