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Patient Empowerment through Personal Medical Recommendations

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Abstract

Patients today have ample opportunities to inform themselves about their disease and possible treatments using the Internet. While this type of patient empowerment is widely regarded as having a positive influence on the treatment, there exists the problem that the quality of information that can be found on online is very diverse. This paper presents a platform which empowers patients by allowing searching in a high quality document repository. In addition, it automatically provides intelligent and personalized recommendations according to the individual preferences and medical conditions.

Introduction & Methods

During the last decade, the number of users who look for health and medical information online has dramatically increased. However, despite the increase in those numbers and the vast amount of information currently available online, it is very hard for a patient to accurately judge the relevance of information to his own case. Although there are already several approaches trying to provide patients with search engines containing high quality medical information such as WebMD, MayoClinic Patient Care, Medicine Plus, HONSearch etc., these engines provide a rather limited set of information, and they are not dynamically adapted according to patient's preferences or medical history.

This paper focuses on current research activities related to the implementation of a Personal Medical Information Recommender (PMIR). PMIR (an early version has already been presented [1]) is targeted at improving the opportunities that patients have to inform themselves using the Internet, about their disease and possible treatments, and providing them with personalized information and recommendations.

Results & Conclusions

The PMIR is integrated into a PHR as a set of individual apps and services shown in Figure 1. Using the *Semantic Annotator app,* an expert is able to register external, high-quality web documents that contain useful information. Those documents are then annotated using the *Semantic Annotator Service* with terms from the SNOMED-CT, the LOINC and the RXTerms ontologies. All terms and documents are stored in the *Terms Indexing DB.*

The patient is able to select the *PMIR search app* to look for useful information. Besides searching for relevant results, results can be rated according to the patient's opinion. The clicks and the ratings of each user are stored in the *Patient Preferences* database. In addition, interesting web documents are automatically recommended to patients using the *Automatic Recommendation App*.

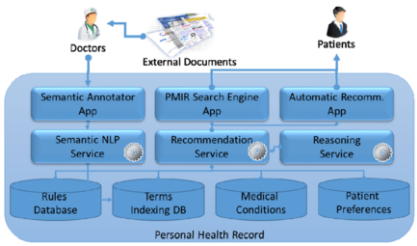

Figure 1 - PMIR Architecture

Both search results and automatic recommendations are provided through a *recommendation service* which uses a varation of the the vector space model. The service considers the following databases to make the results of the query as personalized as possible: (a) The *Patient Preferences Database* containing user preferences that are acquired as the patient browses the results presented to him; (b) The *Medical Conditions Database* including the medical conditions of the patient as they have been logged by the patient himself and annotated with the aforementioned ontologies; (c) The *Terms Indexing DB* with the annotations of the indexed documents; and (d) The *Rules Database* including rules that are used for generalizing patient queries. Rules are generated by experts (e.g. include specific subsumption relations) and are exploited in order to increase the recall of the user search.

To the best of our knowledge, PMIR is the only system exploiting patient's profiles to provide both automatic and non-automatic high quality information to patients employing semantics, reasoning and also exploiting user preferences.

References

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