

Improving Online Access to Drug-related Information

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Abstract—Seeking drug-related information is one of the top activities of today’s online health consumers. To facilitate consumers’ access to trustworthy drug information, we first improve the drug search effectiveness by adding a list of rich and up-to-date brand names to drug content that is typically classified with its active ingredients. Once the consumer finds a drug of interest, we further provide them with an integrated access to other relevant healthcare resources. The results of our computational methods are integrated into a production system and have been used by millions of health consumers.

Keywords - consumer health informatics; brand name assignment; RxNorm; drug-related diseases; ranking algorithm

I. BACKGROUND

Health consumers are increasingly relying on the Web for their drug-related information needs [1]. Despite some efforts in linking related resources, drug information is largely scattered in a variety of websites of different quality and credibility. As a step toward providing consumers with integrated access to various drug resources, this study aims to enrich the accessibility of drug monographs, and to link the drug monographs to other health resources.

II. METHODS

Due to advertising by the pharmaceutical companies, brand names of a drug (e.g. Motrin; Advil) are far more familiar to the general public than its active ingredients (e.g. Ibuprofen). As such, brand names are used very frequently when health consumers search for drug information on the Web. On the other hand, it is the active ingredients that are used to classify and represent a unique drug in most drug information resources such as the drug monographs in MedlinePlus [2]. Hence it is critical to close the gap between the user searches and target documents. In this regard, we developed an automatic approach for constructing drug brand names in full-text drug monographs using RxNorm—a standardized nomenclature for drugs [3]. In order to ensure most accurate and up-to-date brand name assignment, our method included automatic ingredient identification and dosage form verification [4]. Additional filtering process was implemented to remove outdated brand names, and drugs associated with veterinary use.

Once a health consumer finds a drug online, one of their immediate information needs is to identify its therapeutic uses and side effects. That is, they are seeking related information on diseases that are treated or caused by the searched drug. To facilitate access to such information, we developed a novel method to identify drug-disease relationships from four different resources: drug monographs

[5], disease monographs [6], PubMed users’ search queries [1], and the biomedical literature [7]. Moreover, we used both statistics and domain knowledge to filter and rank those automatically identified drug-disease associations.

III. RESULTS

We applied our methods to over 1,000 drug monographs in a health website hosted by the National Library of Medicine. As a result, up-to-date brand name information was successfully generated and assigned to over 90% of the drug monographs. Our results allow health consumers to use either brand names or generic names to search for their interested drugs. In addition, this work enables us to provide a single-point access to consolidate complementary drug information from multiple resources. We have also created 5,956 cross-links between 948 drug monographs and 857 disease articles. All the computed results have been integrated into a production system and accessed by millions of users since 2010.

IV. CONCLUSION

In this study, we provide integrated online access to drug-related information with novel computational approaches. Our study contributes to real-world informatics applications by facilitating access to (1) drug information through brand name searches, and (2) drug-related disease monographs based on evidence confidence and user interest. In the future, we plan to further classify the identified drug-disease relationships (e.g., treatment, prevention, etc), and to integrate other health resources such as clinical trial, drug-drug interaction and pharmacogenomics resources.

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