



Using semantic web technologies to extract knowledge about adverse drug reactions from PubMed

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Using semantic web technologies to extract knowledge about adverse drug reactions from PubMed

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The national French VIGITERMS research project was funded to implement new methods for signal detection and analysis in pharmacovigilance. We present here the integration platform built to support the pharmacovigilance teams from industry and regulatory authorities by standardizing literature search on adverse drug reactions. The technical choices are based on Semantic Web technologies, including ontology development and Web services, and the new standards recently developed in natural language processing (UIMA).

INTRODUCTION

The medical literature is a major source of information on adverse drug reactions (ADR). In order to improve systematic reviews of adverse drug reactions, we developed a prototype that first reproduces and standardizes search strategies, then extracts information from the Medline abstracts which were retrieved and annotates them.

DESIGN AND IMPLEMENTATION

We reused and implemented the algorithm developed by Garcelon et al. for querying Medline [1] as a web service. The main entry is a pair of ADR – Active Ingredient (AI). Additional parameters may be added for filtering purposes, such as gender, age class, publication type and period. Luxid Annotation Factory (LAF) is a software component of Temis dedicated to document annotation and enrichment. The LAF takes as an input original documents and outputs enriched documents with additional metadata (categories, named entities and relationships). The Intelligent Topic Manager (ITM®) is an ontology-based solution developed by Mondeca for Knowledge

base Management that relies on the Semantic Web standards (RDF, OWL, SKOS).

RESULTS

The VIGITERMS platform provides a user interface to the pharmacovigilance expert so that he can submit a query with at least one ADR and one AI as in the reported case. The platform calls the web service that translates and enriches the user query in order to obtain a list of relevant PMIDs from Pubmed. This list of PMIDs is then transmitted to the Content Augmentation (CA) Manager tool of the ITM. It sends the abstract of each PMID to the LAF that annotates it using a specific Skill Cartridge developed for pharmacovigilance. This Skill Cartridge extracts the following medical entities: Diseases, Treatments, Symptoms, Patients; as well as relationships between entities: Diagnosis, Therapy, Drug use (Drug doses, Drug route, Drug frequency and Drug duration). The CA Manager controls the extractions based on the ontological resources loaded in ITM and sends back the annotated articles to the user interface.

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REFERENCES

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