Natural Language Processing Techniques and FAIR Principles for Assisting Drug Prescription

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Abstract

Prescribing medicines for certain illnesses as correctly as possible is a challenge for all doctors and healthcare providers worldwide, and a big problem for the inexperienced ones. In this age of technology, we are confronted with a great deal of medical information from different sources. For physicians to have access to this ocean of information, structuring and compaction is needed. Many papers in the scientific literature propose the structuring and use of medical information from clinical texts or other sources. We want to develop a medical information system that extracts specific drug information from Romanian pill leaflets. We intend to create a structured database and raise the interoperability degree for the system to communicate with other medical applications. First, we collect as much information as possible about Romanian drugs from different free online sources, from the leaflets of medicines in Romanian from ANMDMR - Nomenclature of medicines for human use and from scientific publications. We clean and structure the collected data by using machine learning techniques, especially natural language processing techniques. Next, we create ontologies and a complex database with the drug information's and relationships between the information extracted about drugs (indications, contraindications, dosage according to age, side effects, etc.), and finally, we develop an application respecting the FAIR (Findability, Accessibility, Interoperability, and Reusability) principles that have as inputs the profile of a patient, and as outputs the drugs indicated for certain diseases, an explainable module for the drugs selected for physicians and an adverse drug reaction adding module. From the clinical perspective, this application will help improve the quality of prescriptions and provide a better knowledge database that can help physicians avoid prescription errors.

Keywords: Prescriptions; Natural language processing (NLP); Machine learning; Leaflets