iADRs: Towards a Web-based Interactive Adverse Drug Reaction Analyzing System

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1. INTRODUCTION
According to WHO, the definition of ADRs or ADEs is uncomfortable, noxious, unexpected, or potentially harmful reactions resulting from the use of given medications for patients [2]. Many of adverse drug reactions cannot be discovered through limited pre-marketing clinical trials; instead, they can only be recognized by a long term of post-marketing surveillance of drug usages. In light of this, most of developed countries have established spontaneous reporting systems to collect suspected adverse drug events for further analysis, e.g., the Adverse Event Reporting System (AERS) of the US Food and Drug Administration (FDA), the Canada Vigilance Adverse Reaction reporting system (MedEffect Canada), the Australian Adverse Drug Reaction Reporting System, etc. So, how to detect adverse drug reactions from such kinds of SRDBs has been an important research topic to the pharmaceutical industry.

In the past few years, many statistical or data mining based methods for detecting ADRs have been proposed. However, most of these stand-alone methods are tedious and inconvenient, and the processes of exploration are time-consuming. As such, our main goal is to develop an interactive platform for analyzing adverse drug reactions by hybridizing data warehousing and data mining technologies. Users can observe and analyze adverse drug reactions from different views of by employing OLAP-style tools. Furthermore, we develop two methods, including cube based mining and associative classification mining, through which users can exploit interesting association rules of drugs and symptoms from data warehouse interactively.

2. THE PROPOSED SYSTEM
As shown in Figure 1, the proposed system, iADRs, relies on a data warehouse repository to support OLAP analysis engine and mining engine. The data source we used is Adverse Event Reporting System (AERS) database of The US Food and Drug Administration (FDA) [1]; the addition of other public data sources such as MedEffect Canada is ongoing. The front-end of this system contains two main analysis tools for ADRs detection and analysis, the OLAP engine and drug-ADR association mining. The OLAP engine provides users to do multi-dimensional explorations from multidimensional data in data warehouse. The association mining engine is used to discover patterns-symptoms association rules of high risk through our proposed mining algorithms, a contingency cube based approach for drug reactions and an associative-classification based approach for drug-drug reactions. More complex drug reactions analysis algorithms will be developed in the near future. This system is portable and convenient because it is conformed to the web platform. Users do not have to install any additional software. This system is open to any user and planned to be launched by the end of this year.

3. REFERENCES

Figure 1. System architecture of the proposed iADRs.