

An AI-based System for Discovering Potential Adverse Drug Events Using Open Data

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According to the U.S. Department of Health and Human Services, adverse drug events (ADEs) account for one-third of total hospital adverse side effects every year. The increasing prevalence of health social media platforms—such as WebMD, HealthBoard, Drugs.com, DrugBank, openFDA, and Unified Medical Language Service (UMLS)—offers a promising direction for ADE identification and extraction from online patient self-reports that usually predate Federal Drug Administration reports and notices. However, prior ADE extraction models, attempting to utilize this data source, often utilize a lexicon-based keyword matching approach, which cannot accurately and comprehensively extract ADE information in social media data from online medical forums and reviews. In addition to the ADE problem persists in the problem of classification. Not only do ADEs need to be properly extracted, but also properly classified for doctors and physicians to produce an accurate assessment of drug performance. This research proposes a novel AI-based system for ADE identification, extraction, and classification, properly called DrugAID+. By using comprehensive multi-source features from both word embeddings and pre-trained models as input, the ADE extraction approach learns useful features for ADE recognition. The ADE classification model combines the power of machine learning coupled with an n-gram analyzer to beat state of the art classification techniques. The experimental evaluations demonstrate that both models can outperform existing models by a large margin. This system can be applied to multiple healthcare tasks and ultimately solve the problem that doctors face when prescribing drugs. In addition, this system introduces a novel method for medical democratization across physicians.

Awards Won:

Second Award of \$1,500

Oracle Academy: Award of \$5,000 for outstanding project in the systems software category.