Detecting drug-drug interactions with a deep-learning algorithm

May 25 2022, by David Bradley

Credit: Unsplash/CC0 Public Domain

Research into neural networks could lead to the identification of unexpected and potentially hazardous interactions between different medications being taken at the same time. Details are provided in the

International Journal of Data Mining and Bioinformatics.

When a patient is taking several medications simultaneously, there is always the risk that any one of those drugs might interact with another and either inhibit or enhance its activity beyond that which is required for the prescribed benefits. Similarly, one drug may interfere with the normal processing in the body, and specifically, the liver of another drug being taken at the same time, leading to a drug circulating in the bloodstream for longer. Either way, drug-drug interactions can cause side effects that are not seen when any of the given drugs is taken individually.

Serena Rajakumar, G. Kavitha, and I. Sathik Ali of the Department of Information Technology, at the B.S.A. Crescent Institute of Science & Technology in Chennai, Tamil Nadu, India, point out that there is a vast literature on drug-drug-interactions but extracting the requisite information from countless disparate sources is an almost impossible task, especially under the daily time pressures in a healthcare setting. There are some databases that include drug-drug interactions for many common pharmaceuticals that are easier to search, but these are themselves compiled manually and do not offer a complete picture of all possible interactions and effects.

Healthcare practitioners prescribing multiple drugs for complex conditions in their patients do not necessarily have time to plow through databases. A deep learning algorithm based on a trained neural network could be used to quickly and precisely reveal potentially risky drug-drug interactions without the need for a manual search. The team has demonstrated how their system can automatically extract information from the biomedical literature discussing drug behavior and then compile a new growing database of potentially troublesome interactions.

The team adds that the current approach does not yet reveal whether any

given drug-drug interaction is antagonistic or synergistic, that step will be taken in a future iteration of the algorithm. For the time being, that distinction will need to be considered by the healthcare professional alerted to any interaction by the present system.

More information: Serena Rajakumar et al, Extraction of drug-drug interaction information using a deep neural network, *International Journal of Data Mining and Bioinformatics* (2022). DOI: 10.1504/IJDMB.2021.122855