

Artificial Intelligence Methods For a Bayesian Epistemology-Powered Evidence Evaluation

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May 19, 2020

Abstract

Rationale, aims and objectives: The diversity of safety signals (e.g., case reports, animal studies and observational studies) makes the assessment of the (un-)safety of a drug a formidable challenge. While frequentist viewpoints to uncertain inference struggle in aggregating these signals, the more flexible Bayesian approaches seem better suited for this quest. Artificial Intelligence (AI) offers great promise to these approaches for information retrieval, decision support and leaning probabilities from data. E-Synthesis is a Bayesian framework for drug safety assessments build on philosophical principles and considerations. It aims to aggregate all the available information, in order to provide a Bayesian probability of a drug causing an adverse reaction. We delineate and assess ways in which AI can support E-Synthesis. Results: We find that AI can help with information retrieval, usability (graphical decision making aids), learning Bayes factors from historical data, assessing quality of information and determining conditional probabilities for the so-called “indicators” of causation for E-Synthesis. Conclusions: Properly applied, AI can help the transition of philosophical principles and considerations concerning evidence aggregation for drug safety to a tool that can be used in practise.

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