Innovative Uses of Machine Learning to Help Decision-Makers Build, Apply, and Interpret Simulation Models

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Abstract

Simulation models allow decision-makers (e.g., public health policymakers) to identify potential interventions to improve population health or analyze existing policies. Such models are developed in several consecutive steps. This talk will show that machine learning can improve each of these steps. In the first step, we will cover how conceptual models can be created or defined thanks to Natural Language Processing, leveraging the knowledge contained in unstructured (text) data. Then, we will examine how computational models can be created using simulation techniques such as Agent-Based Models (ABMs), thus opening exciting research avenues at the crossroad of Machine Learning and Simulation to automatically create ABMs or scale them to very large population sizes. Scaling models allows to answer questions such as "how will a subpopulation be affected", which is necessary to consider fairness and equity in decision-making. The final step of model deployment will emphasize the benefits of Natural Language Generation to create explanations on the fly and broaden participation to the modeling process.

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