Automatic Calibration of Agent-Based Models using Deep Neural Networks

Authors : George Vega Yon, Sima Najafzadehkhoei

Abstract : We propose a distinct approach utilizing Convolutional Neural Networks (CNNs) and Long Short-Term Memory (LSTM) networks to calibrate Agent-Based Models (ABMs) efficiently. This application targets Susceptible-Infected-Recovered (SIR) models, a foundational framework in epidemiology. By leveraging machine learning, our approach replicates parameter values from observed trajectory curves, significantly improving accuracy over traditional methods. The method allows us to use simulated data to train the models. We explored two approaches: one in which we have all the information about the number of susceptible, infected, and recovered agents, and another in which we only use the number of infected cases. The method can be extended to other types of ABMs, for which calibration can be computationally expensive.