



Don't Simulate Twice!

One-Shot Sensitivity Analyses via Automatic Differentiation

Arnau Quera-Bofarull¹, Ayush Chopra², Anisoara Calinescu¹, Ramesh Raskar², Michael Wooldridge¹

University of Oxford¹; Massachusetts Institute of Technology²



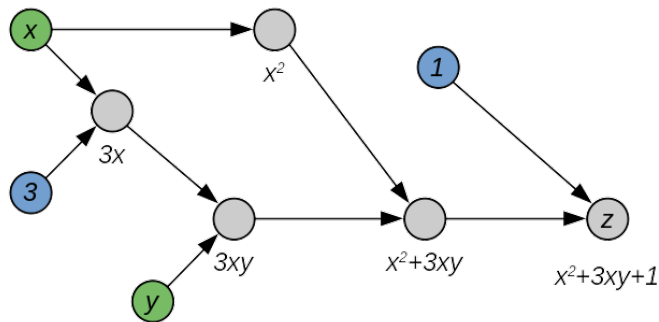
Differentiable Agent-Based Models (ABM) enable extremely fast and accurate sensitivity analyses

1. PROBLEM:

ABM need thorough sensitivity analyses (SA) for policy design and evaluation

2. SOLUTION:

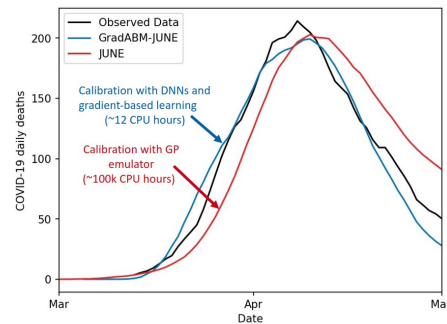
Automatic Differentiation (AD) enables extremely fast SA through differentiation



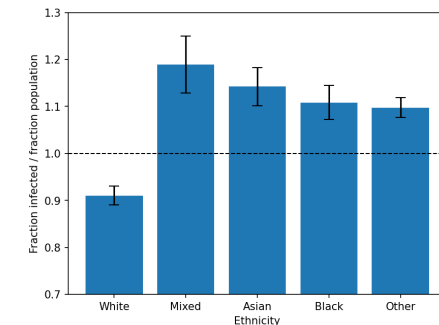
3. EXPERIMENT:

Understanding social inequalities in COVID-19 infections in London.

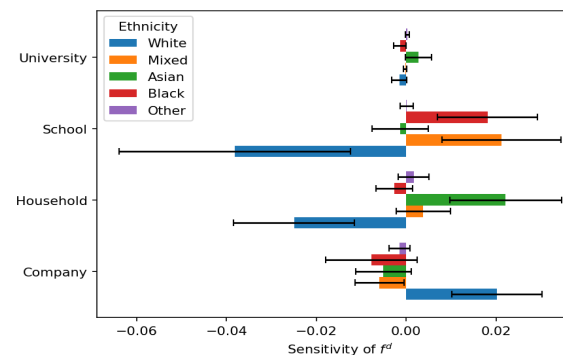
1. Fit 8 Million differentiable ABM to London's COVID-19 first wave



2. Reproduce infection disparities among different ethnicities



3. What happened? Use SA to interrogate the model



Read the paper!

