We show how to automatically transform any existing population-based simulator into a probabilistic program, without re-writing the simulator, enabling the simulator to be analysed for interpretable inference.

**Background**
- Simulators arise in a number of industrial and scientific domains, encoding sophisticated generative models.
- Probabilistic programming provides a way to perform statistical inference over simulations of events in a programmatic way.
- Thus, by design, simulators are ideal programs for probabilistic programming.
- However, within existing probabilistic programming systems (PPSs), one would have to re-implement the simulator via the PPS language specification, which is inefficient and often not feasible due to the complexity of such scientific and industrial simulators.
- Recent work by Baydin et al. demonstrated a pathway to turn a particular type of event-based simulator into a probabilistic program, without having to re-implement the simulator in the existing probabilistic programming systems (PPS).
- But, this still meant that a large class of critically important population-based simulators could not be turned into probabilistic programs and as such could not be used within a probabilistic programming framework.

**What we do**
- In this work, we extend that framework to encompass population-based simulators, a very large class of simulators that are used extensively across epidemiology, multi-agent and financial modeling.
- We demonstrate how we can extract interpretable outcomes from that, which can then be used by decision makers in the fight against Malaria.

**References**

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