

Title for the poster presentation at the PGR symposium 2024:
Measuring Human Behaviour to Improve Pandemic Forecasts.

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Abstract:

The COVID-19 pandemic highlighted the urgent need for mathematical models to predict the trajectories of newly emerging infectious diseases and thus actively support policy decision making. For this purpose, we introduce a novel, data-driven modelling framework which integrates human behaviour responses to emerging disease threats into a traditional compartmental epidemiological model. Human behaviour is measured and modelled using mobile phone location data, from which we extract proxy metrics for face-to-face contacts. These metrics are intended to be used within a data-driven, individual-level S_{EE}IR model to express the behavioural dynamics during the mid 2020 until mid 2021 COVID-19 outbreak in England. The integration of behaviour into the epidemiological models allows us to capture the interplay of behaviour change and disease dynamics.

In this poster, we present how human behaviour metrics can be developed from large scale, individual level, passively collected, mobile phone location data. We will show how these metrics correspond to policy changes. Furthermore, we verify our data by demonstrating how to recreate an aggregated Google mobility index. Lastly, we will show a novel approach on how to evaluate if the data has a valid signal that can improve the forecasting ability of traditional models. Future work will include the development of a simulation based, stochastic model, that can separate the effects of behaviour change and disease dynamics.