Spatial Variations in COVID-19 Transmission Rates in UK

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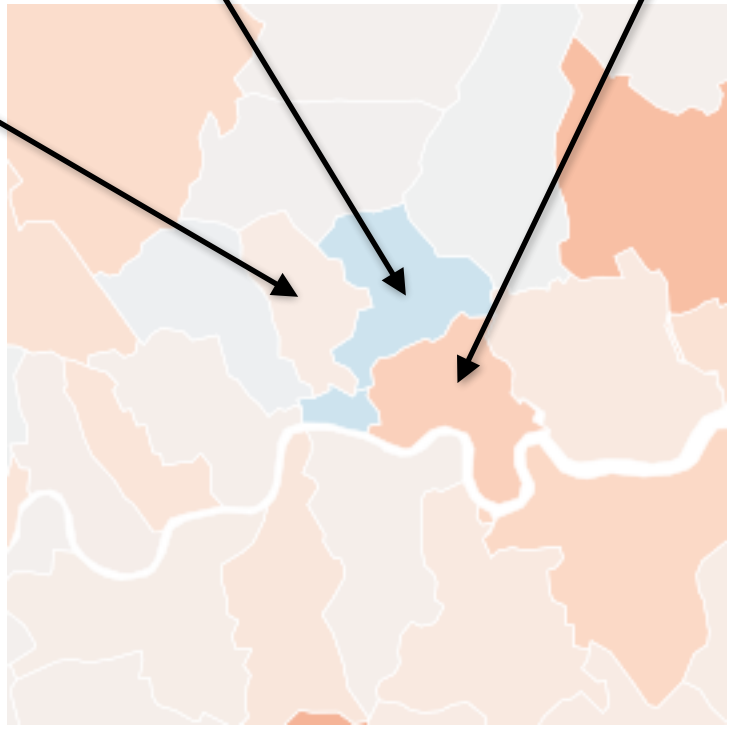
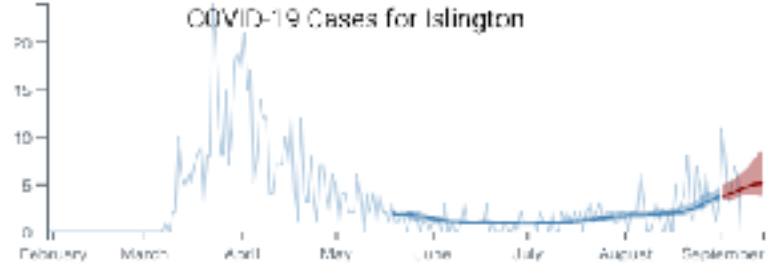
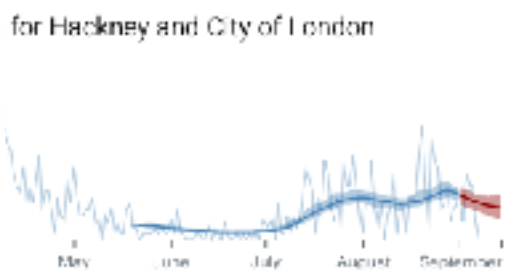
on behalf of Royal Society DELVE Initiative
https://rs-delve.github.io

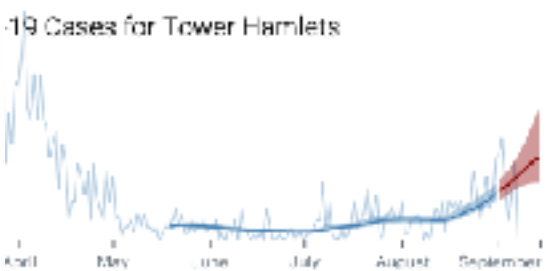
WORK IN PROGRESS. DO NOT DISTRIBUTE.
http://www.stats.ox.ac.uk/~teh/Rmap

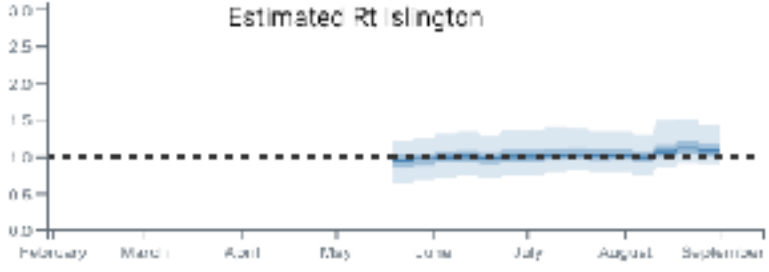
Islington, Hackney, Tower Hamlets

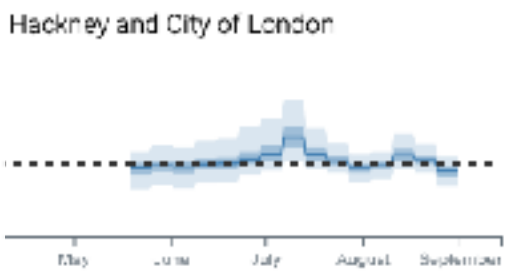


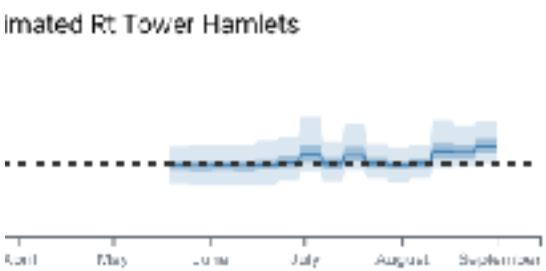

COVID-19 Cases for Islington
20
15
10
5
0
February
March
April
May
June
July
August
September


for Hackney and City of London
May
June
July
August
September


-19 Cases for Tower Hamlets
April
May
June
July
August
September


Estimated Rt Islington
3.0
2.5
2.0
1.5
1.0
0.5
0.0
February
March
April
May
June
July
August
September


Hackney and City of London
May
June
July
August
September


imated Rt Tower Hamlets
April
May
June
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September

Yee Whye Teh

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Spatial Variations

Spatial Variations
+
High Noise Levels and Outliers

Spatial Variations

+

High Noise Levels and Outliers

+

Cross Infections

Method

- Renewal equation based approach [Cori 2013, Flaxman 2020]
  - Analysis at LTLA level on public cases data (pillars 1+2)

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- Plus:
  - Spatiotemporal modelling of R_{ta} using Gaussian processes
  - Model overdispersion using negative binomial likelihoods
  - Modelling of cross infections using cross-coupled metapopulation approach

Work in Progress….

- Current analysis: http://www.stats.ox.ac.uk/~teh/Rmap

- Caveats and limitations:
  - Based only on reported cases (by specimen date, pillars 1+2)
  - No modelling of testing levels
  - Future projections assume same R_{ta} as last week modelled
  - Two stage analysis: data cleaning, then modelling
  - Performance not yet quantified

Yee Whye Teh

DELVE Initiative

https://rs-delve.github.io/


Overview

DELVE: Data Evaluation and Learning for Viral Epidemics is a **multi-disciplinary** group, convened by the Royal Society, to support a **data-driven** approach to learning from the different approaches countries are taking to managing the pandemic. This effort has been discussed with and welcomed by Government, who have arranged for it to provide input through SAGE, its scientific advisory group for emergencies.

Structure and Process

- Highly multidisciplinary, open and collaborative approach
  - Immunologists, virologists, public health, economists, behavioural scientists, statisticians, data scientists, ML engineers
- SciOps: Fast action science
  - Don't reinvent the wheel.
  - Supply chain of ideas.
- Avatar model:
  - Steering Committee (chaired by Venki Ramakrishnan)
    ⇔ Working Group (chaired by Nigel Field)
    ⇔ Action Team (lead by Neil Lawrence and Yee Whye Teh)

Works So Far

- Face Masks for the General Public
- Test, Trace, Isolate
  - Software: TTI-Explorer Simulation Software
- Hospital and Health Care Acquisition of COVID-19 and its Control
- Balancing the Risks of Pupils Returning to Schools
  - Blog: School is the Best Place for Children
- Economic Aspects of the COVID-19 Crisis in the UK

- Data/software: DELVE Global COVID-19 Dataset