

NHS COVID-19 app

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Background



Trace

Get alerted if you've been near other app users who have tested positive for coronavirus



Alert

Lets you know the level of

coronavirus risk in your

postcode district



Check-in

Get alerted if you have recently visited a venue where you may have come into contact with coronavirus



Symptoms

Check if you have coronavirus symptoms and see if you need to order a free test



Test

Helps you book a test and get your result



Isolate

Keep track of your self-isolation countdown and access relevant advice

App usage

- There are ~48m eligible adults in England and Wales, of whom ~71% have smartphones that can run the Google Apple Exposure Notification system
- Of these, over 21 million have installed the app
- 16.5 million active users (lower bound)







App technical overview

Characterising transmission risk

- Five factors available to characterise transmission:
 - Weighting associated with potentially affected user (e.g. vaccine) currently =1
 - Context adjusting factor (e.g. indoors / outdoors, VOC) currently = 1
 - Infectiousness of index case at time of encounter
 - Distance related factor
 - Duration related factor
- Risk score is a combination of these factors (heuristic), as detailed in <u>https://arxiv.org/pdf/2005.11057.pdf</u>
- Full probabilistic model is developed, but not (yet) used

Statistical modelling of RSSI data

- Build a statistical model for BLE, representing the device state conditional uncertainty associated with Received Signal Strength Indicator (RSSI) data
- Process documented: https://arxiv.org/pdf/2007.05057.pdf
- Model latent (distance) characteristics of an encounter with an Ornstein-Uhlenbeck(OU) process, a semi-Markov property for device state, aligned to low / medium / high risk encounters

Exposure Windows with the UKS



Field tests

- Scenarios:
 - Outdoor BBQ
 - Pub
 - o Bus
 - Office
 - \circ Conference
- Up to 20 people, different device states, devices, OS, etc





Contact tracing: risk characterisation

- Mode 2 (EWs) gives much better performance than earlier versions
 - AUC ~0.84; discriminating between high and medium risk encounters
- Modelling and simulation work consistent with field tests
- Outdoor performance generally better than indoor



Insight: Exposure Notifications Per Index Case

Two local authorities, both with the same characteristics and the same case rate at a given point in time:



Which locality would you expect to experience the largest/fastest increase in cases, which should we be most worried about....?

Insight: Venue check-in differencing





Impact to-date

Has the app delivered impact?



Estimated number of cases prevented by using the app

600,000 cases prevented in 2020

95 % confidence interval 320,000-920,000

For every 1% increase in app users, cases decrease by 2.3%

95% confidence interval 1.5% to 3%

Statistical analysis focusses on differences between matched neighbouring local authorities





Future

Current / future activities

- Validating the veracity of the data through extensive EDA process
- Spatio-temporal modelling of B117, including wastewater data, etc
- Developing a Bayesian mechanism for Rx / Tx transmission pathways
- Developed a privacy-preserving mechanism for indoor/outdoor determination
- Developed a full probabilistic model of risk calculation
- Probabilistic model for reproduction number from ENPIC
- Variants of concern -> risk function
- Vaccination data -> risk function
- QR venue check-in data cluster analysis
- Analysis of all risky Exposure Window data
- New data fields



Questions / comments

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