Overview

COVID-19: An
the Fight against
Technologies in
Digital Health

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Department of International Health
Program in Global Disease Epidemiology and Control
Johns Hopkins University
JHU Global mHealth Initiative

- Founded in 2010
- Membership of faculty from all 5 divisions
- Over 300 students supported in training, scholarships and research in Digital Health
- Center of Excellence for WHO and the Development Partner Ecosystem
- Leader in research, monitoring and evaluation and scale-up of technology

Innovation

Jhuglobalmhealth.org
Fighting COVID-19—and Future Outbreaks
The Tech That Could Be Our Best Hope for

never previously thought possible. “The connectivity we have today gives us
Case Reporting
Contact Tracing
Mental Health Support During Isolation
Helplines for COVID-19
Remote Training of HWS
Telemedicine / Teleconsultations
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Digital Health Strategies to Control COVID-19

Term: Summer Term

Class Time: Wednesday 1:00 - 11:50am
Academic Year: 2020 - 2021
Credits: 2 credits
Department: Informational Health
Location: East Baltimore

Diwaker Mohan
Avin Benad Labhique
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Course Instructor: Letter Grade or Pass/Fail
Auditors Allowed: Yes, with Instructor Consent
Grading Restriction:
Domains of Utility

- Communication
- Training / Telemedicine
- Information, Misinformation, Disinformation
- Prevention
- Symptom screening
- Mitigation
- Contact Tracing
- Epidemiologic Insight
- Clustering, Movement and Adherence to NPI’s
- Contact Tracing
- Mitigation
- Symptom screening
- Prevention
- Information, Misinformation, Disinformation
- Training / Telemedicine
- Communication

Domains of utility
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Domains of Utility
We are empowering medical providers to serve patients wherever they are during this national public health emergency.

COVID-19 Nationwide Public Health Emergency Telehealth Remote Communications During the Notification of Enforcement Discretion For
... Telemedicine adoption up ~ 22% ...
inside the virtual care boom: what happens when the point of care becomes anywhere?

19

teledhealth: delivering care safely during covid-19
General Tedros Adhanom Ghebreyesus

said WHO Director-General "an epidemic, we’re fighting an epidemic, we’re fighting
not just fighting an epidemic, we’re fighting
problem for public health. "We’re not
pros and other outlets—pass a serious
rapid through social media platforms
epidemic of misinformation—spreading
But a global
MISINFORMATION AND DISINFORMATION

CONTRIBUIING FACTORS TO THE SPREAD OF

COVID-19:
False Information About Help, Friends, and Family Avoid

Share Link
Go to Wikipedia

COVID-19

MISINFORMATION RELATED TO THE COVID-19 PANDEMIC

Read
Share

COVID-19 Pandemic

Wikipedia

...
New WhatsApp chatbot unleashes.tached to make its database of 4,000+ COVID-19 hoaxers easily accessible.

Founded’s International Fact-Checking Network led the creation of the platform to combat misinformation and organizations to fight COVID-19. The New World Health Organization (WHO) franchise service.

Contact: +1 (727) 291-2606
Provide people the cognitive / intellectual tools to fight future dis/misinformation. Pre-empt the negative messages, and lay out reasons the misinformation is flawed.
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Domains of Utility
Chatbot Symptom Trackers for COVID-19
Over 143 digital solutions for COVID-19

SURVEILLANCE
PREVENTION
TREATMENT
DIAGNOSIS

https://tinyurl.com/covidtechnology
Evaluation of Digital Solutions for COVID-19
Evaluation of Digital Solutions for COVID-19

Try out the DHIS2 Android App with our COVID-19 Demo

Identifying key use cases for deploying digital tools for COVID-19 response

Identifying functional requirements for each use case

Mapping existing functionality of the digital platforms to requirements

Data verification by platform stewards

Bill & Melinda Gates Foundation

World Health Organization
Digital Contact Tracing?

Smartphones can be used to quickly and automatically determine whether somebody has been in contact with an infected person.

Contact tracing aims to identify and alert people who have come into contact with a person infected with coronavirus.
What is TraceTogether?

A community-driven contact tracing app
to help stop the spread of COVID-19

FaceTogether. Safer together.

Tracking community-driven contact tracing.

COVID-19 tracking.

Stop the spread of COVID-19 through face detection.

Join 400,000 users in.

FaceTogether.

Safer together.

Download the app, enable Bluetooth, and report your own and your family members.

What is TraceTogether?

A community-driven contact tracing app.

No, TraceTogether does not collect or use physical location data (GPS, WiFi, fingerprinting, cell ID).

If only records proximity via Bluetooth. This means that it is impossible for us to identify or track a user’s location within Singapore.

The app doesn’t identify “where” the exposure to COVID-19 cases may have occurred. It only seeks to establish “who” else might have been exposed to the virus.

In support of our public health efforts, we ask for your permission to access your mobile phone’s Bluetooth and location data (GPS).
COVID-19 cases.

The ministry stressed that all the epidemiological data of known contacts is kept updated on the smartphone, which is only stored on the user’s information on the smartphone.

and how to register as going into self-quarantine.

The Health Ministry website for information on what to do next, and where to go for medical assistance are provided.

The app tracks a user’s movements and compares them to the known movements of those diagnosed with COVID-19. It checks if a user has crossed paths with someone who has been diagnosed.

The Health Ministry announced Sunday the launch of a new smartphone app to help prevent the spread of the deadly coronavirus — by ending
Alice and Bob meet each other for the first time and have a 10-minute conversation.

Their phones exchange anonymous identifier beacons (which change frequently).
Alice's phone periodically downloads the broadcast beacon keys of everyone who has tested positive for COVID-19 in her region. A match is found with the Bob’s anonymous identifier beacons.

Alice's health care provider notifies her about her exposure to the contagious person.
Contract tracking is the next big proposal for quelling COVID-19, while governments and tech giants face-off.

Decentralized data storage?

on Contract Tracking: Centralized or Decentralized Data Storage?

Approach. What's your take?
Partial text: "Percentage of U.S. smartphone users who would or wouldn't use a contact-tracing app for COVID-19..."
Ethical and Legal Challenges
The Lessons of MERS

Emerging COVID-19 success story: South Korea learned...
Strategies: citizens do not have smartphones or are not as willing to share their data may experience difficulties adapting such dependent on its ability to rapidly scale up technological solutions. Countries with less technology and where culturally and legally, South Korea is more tolerant of personal data-sharing, and its success has been heavily

Approach and Data Used to Monitor Contacts of COVID-19 Patients in South Korea
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- Clustering

Domains of Utility
COVID19 in the US: The Importance of Place

Pandemic Pulse
How can mobile phone data be used?
Networks have detailed data on users.
Deidentified, anonymous phone data can reveal valuable population behaviors.

- People in rural and conservative states in the South and West have reduced their movements less, and even increased them in some areas.
- Comparing to Friday, March 6, people in New York, movement was down 67 percent on Friday.
- Movement across the US was lowest on March 26, down by 45 percent.
- Movement in any state went into lockdown.
- The interactive map shows how people took 40 percent fewer trips on Saturday, April 11th.
- The map tracks changes since the pandemic began.

Map shows how millions of people's movements have dropped by 87% in parts of the US during the coronavirus lockdown.
Americans travel to Malls During COVID-19 Pandemic
See how your community is moving around differently due to COVID-19

As global communities respond to COVID-19, we’ve heard from public health officials that the same type of aggregated, anonymized insights we use in products such as Google Maps could be helpful as they make critical decisions to combat COVID-19.

These Community Mobility Reports aim to provide insights into what has changed in response to policies aimed at combating COVID-19. The reports chart movement trends over time by geography, across different categories of places such as retail and recreation, groceries and pharmacies, parks, transit stations, workplaces, and residential.
Brazil:

- Parks: -37%
- Grocery & pharmacy: +3%
- Retail & recreation: -48%

- Residential: +14%
- Workplaces: -31%
- Transit stations: -46%

Graphs show daily activity levels compared to baseline for each category from Mar 19 to Apr 30.
Home During Coronavirus Is a Luxury Location Data Says It All: Staying at

By Julie Wolfers
“Stay at home” on a national scale?
An integer from 0-100 that represents the extent residents and visitors are practicing social distancing. "0" indicates no social distancing is observed in the community, while "100" indicates all residents are staying at home and no visitors are entering the county.

It is computed by this equation:

$$ index = 0.8 \times \frac{\% \text{ reduction of out-of-county trips}}{\% \text{ reduction of travel distance}} + 0.4 \times \frac{\% \text{ reduction of non-work trips}}{\% \text{ reduction of work trips}} + 0.2 \times \frac{\% \text{ reduction of travel distance}}{\% \text{ reduction of at-home trips}} + 0.01 \times (100 - \% \text{ staying home}) $$
What about the movement of populations and the spread of COVID-19 across the country?
Specific, deidentified users can be tracked over time.
Beginning in March 2020, New Yorkers began to move out.

Top 50 metropolitan destinations outside New York City
• 5% of NYC left between March 1 and May 1
• ~420,000 people
• Upper East Side, West Village, SoHo, Brooklyn Heights
• Decrease in population by 40+%
• 5% of NYC left between March 1 and May 1
Cellular phone derived mobility data is remarkably consistent.
“This is a tried-and-true human strategy — that when you encounter trouble, run away.”

– Andy Horowitz, Tulane University
1625, Londoners fleeing the Black Death
What's Next?
Latinos and Native Americans, made up 70 percent of cases. Populations totaling around 16 percent of the population, including those represented 17 percent of coronavirus cases; other minority African Americans are less than 3 percent of the population, they accounted for 18 percent of deaths. And in South Dakota, where Native Americans — who make up about 5 percent of the population — the city's population but 74 percent of deaths. In Arizona, African Americans accounted for 46 percent of cases.
3 Projects

1. **RICH-LIFE**
   - Ancillary study to existing primary care patient study in MD and PA, looking at impact on family functioning and extent of unmet social needs within household

2. **PANDEMIC PULSE**
   - Short, repeated ‘pulse’ surveys across the US, with focused surveys in archetypal states to better understand population & policy response to COVID-19
   - Targeted geospatial analyses of population movement, clustering to reveal insights around socioeconomic disparities

3. **POLICY ANALYSIS (Health Intervention Tracker – HIT)**
   - Database of COVID-19 policy interventions across US states and globally, over time, linked to strength of implementation
Can we leverage mobile phone and online panels/networks to gauge the population's 'pulse' during different phases of the COVID-19 pandemic?

Demographics

1. Age
2. Gender
3. Race & Ethnicity
4. Income
5. Household Size
6. Zipcode/State
7. Education Level
8. Working "outside home"
9. Political Affiliation

Short Modules

1. Recent Exposures
2. Non-Pharmaceutical Interventions
3. General Testing
4. Antibody Testing
5. Vaccines
6. Treatment Perceptions
7. Risk Perceptions
8. Working "outside home"