Understanding and Rewiring Epidemic Networks: A Data-driven Approach Towards Enabling Quarantine in-Motion

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COVID-19: From social sensing to contact tracing and to contact rewiring

Testing the ability to use GPS data to sense, track, and mitigate an infectious disease
Multiscale approach to rewire contact networks

Avoid crossing paths with infected people

Avoid local hotspots

Avoid regional hotspots
‘Always on’ approach as a closed control loop

- Contact Tracing
- Remote Health Sensing
- Density Hotspot
- Risk Assessment
- Individual trajectory prediction
- Individual Trajectory Adjustment

Time = t

Time = t + delta
Dynamic contact networks from real GPS data in Austin, TX

Austin, Texas Mobility at time 02/29/2020, 18:01:00
Monitoring interactions between people reveals multiscale temporal nuances
Remote health sensing through mobility
COVID-19 transmission outruns human contact tracers due to the scope of the undetected transmission.

How can we predict when secondary transmission occurs before primary contact is confirmed to be sick?
Building a risk model that upgrades aggressively and downgrades when safe

Risk Assess

Risk
- Removed
- Symptomatic
- Asymptomatic
- Contagious
- Incubating
- Susceptible

Inferred Health vs Time
- Confirmed infected
- Likely contagious
- Likely exposed
- No Risk

State of Health vs Time
- Time
- Real alarm
- False alarm
- False alarm

Time
Quarantine in Motion:
A new paradigm for the 21st century

- GPS data allow us to investigate large-scale human mobility
- SLD@UT Austin aims to discover how modern mobility can grow resilient to infectious disease
Thank you!

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