Northeastern University
College of Engineering

Harnessing Data

COVID-19 INITIATIVES

DR. AUROOP GANGULY is mapping post-disruption recovery of networked systems to study the ability of businesses and supply chains to recover effectively, reliably, and in a timely fashion from the current closure, ultimately to determine how well communities at large bounce back from COVID-19.

DRS. SARAH OSTADABBAS, RAYMOND FU, and DENIZ ERDOGMUS are exploring the development of a COVID-19 symptom monitoring framework that uses machine learning and RGB and passive infrared IR modalities to analyze video data of individuals quarantined inside a building (e.g., at home, in nursing facilities, or in hospital rooms) to provide ongoing remote risk assessment, early warning, and actionable information to medical service providers using markers of illness such as activity levels and sleep conditions (see image). The framework is also capable of tracking individuals in public indoor areas (e.g., at store checkout lines, in front of doctor's office reception desks) and alerting them when social distancing is violated among people. This framework could easily be integrated to a wide variety of existing and emerging products including mobile apps, security systems, and special-purpose monitoring devices.

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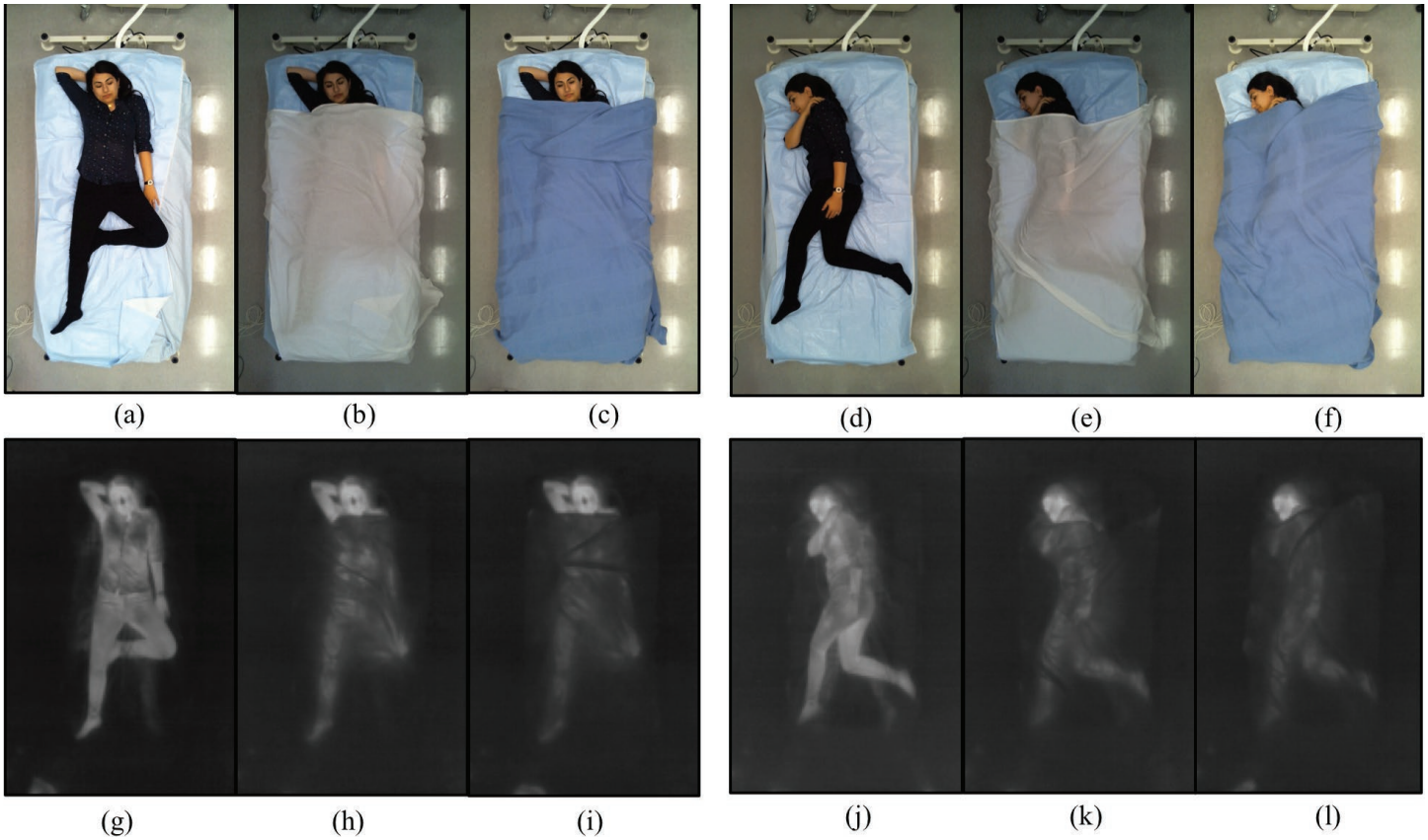

DRS. MICHAEL KANE, OZLEM ERGUN, and others are extending their previous work funded by the National Science Foundation to understand how the COVID-19 pandemic will impact the algorithmic workplace, i.e., the gig economy.

DR. RYAN WANG is looking at mobility-related social distancing and dynamic travel decision-modeling to understand how pandemics can impact people's mobility and energy resilience, particularly during power outages.

DR. BABAK HEYDARI is analyzing COVID-19 data with colleagues to see which social distancing policies are the most effective. Using the dates that states implemented various policies, the first thing he spotted was that people started staying home in early March, even before they were told to. Algorithmically separating out voluntary actions from policies, his results showed that some policies worked much better than others–the stay-at-home order was six times more effective at reducing mobility than not doing it. Policies mandating the closure of non-essential businesses, as well as restaurants and bars, showed a smaller, but still significant, impact.

DR. HARIS KOUTSOPOULOS is working on research relating to public transportation and disease spread. Public transportation plays an important role in urban mobility. However, various studies have indicated that it can also contribute to the spread of viruses. Dr. Koutsopoulos has begun combining models that have been proposed for infection transmission in indoor environments, using his own agent-based urban rail simulation model to study the relationship between operations and transmission risks.

DR. EDUARDO SONTAG and collaborators have developed a variation of the standard mathematical model of infections, so as to incorporate social distancing. This model is being calibrated to data, and will be used to make recommendations regarding the relaxation of shelter-in-place directives, as well as analyzing alternative scenarios of periodic (open loop) or adaptive (feedback) quarantine directives.

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