



# MACHINE LEARNING

Emerging infectious diseases are among the most destructive and costly natural forces, ranking among major natural disasters such as earthquakes and tsunamis in terms of human and monetary losses. The best countermeasure to these threats is an early warning system that gives communities more time to prepare for the impact of impending outbreaks. CEID scientists are harnessing the power of machine learning and big data to identify areas where disease risk is high and identify which policies and actions could prevent outbreaks or contain epidemics at the outset.

## HOW DOES CEID USE MACHINE LEARNING?

CEID scientists use statistical learning algorithms to identify relationships among interacting variables in large datasets, generating models that identify areas in which outbreaks are likely to occur. Through decision support analysis, scientists incorporate these models into decision making processes that align possible outcomes, such as deaths averted, with possible actions. By modeling the social, epidemiologic, and evolutionary dynamics of disease transmission, scientists can help to identify the best course of action for disease prevention, surveillance, or response to an outbreak.

## MAJOR DEVELOPMENTS & FINDINGS

- Predict 35 species of mosquito capable of transmitting Zika, enabling identification of the populations most at risk for transmission
- Scenario analysis for the 2014 Ebola outbreak in West Africa
- New theory on statistical early warning signals for anticipating disease emergence and elimination
- Space-time model for predicting spillover of Yellow Fever virus in Brazil
- Reinforcement learning algorithms for optimizing containment of disease outbreaks

## CEID MISSION

The Center for the Ecology of Infectious Diseases brings together social and natural scientists through synthetic thinking, data science, and basic biology to solve pressing questions in the understanding of infectious diseases. As an intellectual community, we value scientific curiosity, seek rigorous solutions to the problems posed by ecology and infectious diseases, and prepare a rising generation of scientists with the technical skills needed to advance scientific inquiry and translational practice.

“ANTICIPATING AND RESPONDING TO DISEASE RISK REQUIRES INTERPRETING DISEASE EVENTS AS EMERGENT PROPERTIES OF A COMPLEX SYSTEM FROM WHICH TO GATHER INFECTIOUS DISEASE INTELLIGENCE.”

- JOHN DRAKE & BARBARA HAN, *EMBO REPORTS*



## SUPPORT CEID

Financial support from individual, foundation, and corporate partners is crucial for CEID to continue driving research and educating the next generation of scientists. To learn more about how we're using big data and machine learning to reduce infectious disease threats, visit us at <https://t.uga.edu/4xa> or e-mail us at [ceid@uga.edu](mailto:ceid@uga.edu)