NATIONAL SCIENCE FOUNDATION RESEARCH TRAINEESHIP

INTERDISCIPLINARY TRAINING IN COMPLEX NETWORKS AND SYSTEMS

Alessandro Vespignani

Northeastern University

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Data Science and Epidemiology: more than forecast

Abstract: The data science revolution is finally enabling the development of infectious disease models offering predictive tools in the area of health threats and emergencies. Analogous to meteorology, large-scale data-driven models of infectious diseases provide real- or near-real-time forecasts of the size of epidemics, their risk of spreading, and the dangers associated with uncontained disease outbreaks. These models are not only valuable because they predict where and how an epidemic might spread in the next few weeks, but also because they provide rationales and quantitative analysis to support public health decisions and intervention plans. At the same time, the non-incremental advance of the field presents a broad range challenges: algorithmic (multiscale constitutive equations, scalability, parallelization), real time integration of novel digital data stream (social networks, participatory platform for disease monitoring, human mobility etc.). I will review and discuss recent results and challenges in the area, ranging from applied analysis for public health practice to foundational computational and theoretical challenges.

Biography: Alessandro Vespignani is the Sternberg Family Distinguished University professor at Northeastern University. He is the founding director of the Network Science Institute and lead the Laboratory for the Modeling of Biological and Socio-technical Systems. Vespignani's recent work focuses on data-driven computational modeling and forecast of emerging infectious diseases; resilience of complex networks; and collective behavior of techno-social systems. Vespignani is elected fellow of the American Physical Society, member of the Academy of Europe, and fellow of the Institute for Quantitative Social Sciences at Harvard University. He has received the John Graunt award for extraordinary achievements in population sciences, the Senior Scientific award of the Complex Systems Society for outstanding contributions to Complex Systems & Network sciences, and the Aspen Institute Italia Award for scientific research.

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