The Role of Modern Social Media Data in Surveillance and Prediction of Infectious Diseases: from Time Series to Networks

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Abstract
The prompt detection and forecasting of infectious diseases with rapid transmission and high virulence are critical in the effective defense against these diseases. Despite many promising approaches in modern surveillance methodology, the lack of observations for near real-time forecasting is still the key challenge obstructing operational prediction and control of disease dynamics. For instance, even CDC data for well monitored areas in USA are two weeks behind, as it takes time to confirm influenza like illness (ILI) as flu, while two weeks is a substantial time in terms of flu transmission. These limitations have ignited the recent interest in searching for alternative near real-time data sources on the current epidemic state and, in particular, in the wealth of health-related information offered by modern social media. For example, Google Flu Trends uses flu-related searches to predict a future epidemiological state at a local level, and more recently, Twitter has also proven to be a very valuable resource for a wide spectrum of public health applications. In this talk we will review capabilities and limitations of such social media data as early warning indicator of influenza dynamics in conjunction with traditional time
series epidemiological models and with more recent random network approaches accounting for heterogeneous social interaction patterns.

**About the Speaker**

**Yulia R. Gel** obtained her PhD in Mathematics, with specialization in time series analysis, from Saint Petersburg State University, Russia, followed by a postdoctoral position in the Department of Statistics at the University of Washington. Yulia R. Gel is currently an Associate Professor in the Department of Mathematical Sciences at the University of Texas at Dallas and is on leave from her faculty position at the Department of Statistics and Actuarial Science of the University of Waterloo, Canada. She also held visiting positions at the University of California, Berkeley, George Washington University and Johns Hopkins University. Yulia’s main research interests stem around time series analysis, space-time processes, random networks and nonparametric statistics.

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