Abstract: Whether we want to know the cause of a stock's price movements (in order to trade on this information), the key phrases that can alter public opinion of a candidate (in order to optimize a politician's speeches), or which genes work together to regulate a disease causing process (so we may intervene and disrupt it), we want to understand the causes for an effect of interest. In order to use these relationships to alter or predict behavior, we also need to know the time over which the relationship takes place (for example, to know when to take a position in the market) as well as the other conditions needed for a cause to be effective (such as a genetic trait that interacts with a medication). My work addresses the problem of causal inference from observational time series data, with a particular focus on applications to biomedical data. With the growing adoption of electronic health records, there is a huge volume of data that may provide insight into the health of populations throughout their lives. Computational analysis of these data can enable more accurate definition of phenotypes, allowing a better understanding of complex diseases such as heart failure.

In this talk I will discuss how causal relationships can be inferred from observational data with minimal background knowledge and will describe experimental results, including validation of the approaches on simulated data and applications to electronic health record data to understand the progression of congestive heart failure.

Bio: Samantha Kleinberg is a Computing Innovation Fellow in the Department of Biomedical Informatics at Columbia University, and received her PhD in Computer Science from New York University in 2010. Her primary research interests are in the development of methods for inference and explanation from observational time series data. In particular, she focuses on causal inference from challenging data such as EHRs to solve critical biomedical problems in the early detection of disease.

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