



## **Causal Business Analytics: Uplift models and directed acyclic graphs**

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The area of causal inference has attracted considerable attention in recent years. Many statisticians are warned against confusions of correlation and causation, and all keep in mind quotes such as “I would rather discover one causal law than be King of Persia”, by Democritus ... A large body of literature, notably philosophical, is devoted to the topic, featuring many animated debates, hundreds of publications and conference talks. In 2011 Judea Pearl received the Turing prize “For fundamental contributions to artificial intelligence through the development of a calculus for probabilistic and causal reasoning”.

In this talk, we will cover the issue of where this discussion leaves the business analytics practitioner. We will first review the concept of lift in predictive modeling and will follow up with a discussion of uplift, which can be seen as a predictive modeling approach to randomization.

We will then continue with a discussion of directed acyclic graphs and their applications to business problems. We will illustrate the techniques with two examples, one related to churn in wireless telephone service, and one to gambling expenditures. We will provide an overview of the different tools for constructing directed acyclic graphs from non-experimental data and shed light on the various algorithms currently available.

**Keywords:** Causal Business Analytics; Uplift Models; Directed Acyclic Graphs.