

Abstract

The causal impact of a treatment can be defined as the difference between the observed value of a chosen response variable and the unobserved value that would have been obtained had the treatment not taken place. An area where this plays a key role is in the field of marketing, where the main objective is to incur some form of positive effect on a chosen business metric in order to increase revenue in the short or long term. Inferring the causal impact of marketing events is a critical yet imperfect science in the business world. This thesis investigates the application of Bayesian structural time series (BSTS) models to isolate the impact of marketing campaigns launched during the 2017 Super Bowl. The model combines multiple control markets and prior knowledge on trends to produce a synthetic counterfactual of the desired response metric, had the Super Bowl ad never occurred. The difference between the counterfactual and the true observed values is taken as the causal impact. Being Bayesian in nature, the final posterior density depends only on the actual observations, while accounting for all other states and parameters. The objectives of this thesis include (a) demonstrating the application of BSTS in the marketing setting, (b) investigating the effects of parameter choices and covariate inclusion, (c) comparing the BSTS model to a traditional difference-in-differences algorithm, and (d) illustrating the usefulness of the BSTS model in gaining business insights regarding Super Bowl marketing.