Introduction

- Digital economy has changed the advertising industry drastically
- Rise of algorithmic decision-making for buying online ads
- Digital marketing: ~USD 100 billion market size
- Users exposed to multiple ads (interaction effects)
- To take such actions, advertisers need to understand the value of an ad
- How can an advertiser attribute value to showing a targeted ad?

Customers usually interact with various ad channels in a sequential fashion before making a purchase and attribution involves mapping the value generated back to such channels

Network of targeted ads generates value

Question: How much value do we assign to each targeted ad?

 Challenges: (1) cooperative effect and (2) counterfactual value

Failure of Existing Heuristics

Running example: User behavior as a function of ad and no-ad

Markovian Model for User Behavior

Central problem in advertising: attribution

Why do we call it counterfactual adjusted Shapley value?

CASV equals the “expected” value-add over counterfactual

But is CASV tractable? (Sum over an exponential number of terms!)