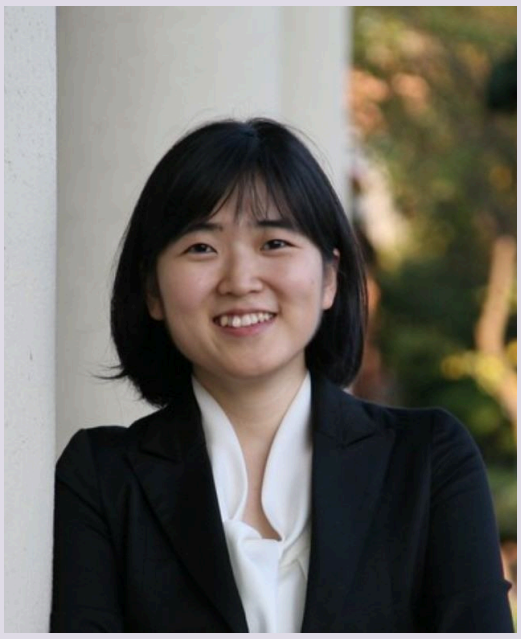
Causal inference under limited outcome observability: A case study with Pinterest Conversion Lift

BIOGRAPHY



Min is a Staff Data Scientist at Pinterest with a focus on causal inference and experimentation within the monetization organization. Previously she was an Applied Scientist at Amazon where she created a novel synthetic control method to evaluate the long-term impact of business application and led projects to improve search results on Amazon.com website. Min has a strong interest in leveraging scientific innovation for business applications and has actively pursued research and patent filings in her field of expertise and business. She has submitted multiple patent applications, with three currently publicly published with the U.S. Patent Office. Min earned her Ph.D. in Industrial and Systems Engineering and a Master's degree in Operations Research from the Georgia Institute of Technology.

ABSTRACT

This paper (https://dl.acm.org/doi/abs/10.1145/3715073.3715078) compares the performance of several established causal inference estimators in measuring conversion related metrics for advertising measurement applications. Conversion lift measurement in advertising industry presents unique challenges due to complex data collection process potential data losses and complex customer behaviors leading up to conversion. Case studies with both simulated and real-world data demonstrated that doubly robust estimators outperform regression adjustment estimators in variance reduction for ad measurement use-cases. To further understand the results we examine the impact of data loss on variance reduction by the estimators and find that the relationship between data loss and variance reduction performance varies by the estimators. Doubly robust estimators could effectively manage complex relationships introduced by data loss maintaining superior performance over the difference-in-means and regression adjustment estimator in terms of precision under various circumstances. We provide computational cost perspectives as practical considerations for implementing doubly robust estimators in advertising measurement business solutions.