The Value of a Dollar: Optimizing Bidding Strategies for Suppliers

Problem Statement
How can we give visibility and insights to Wayfair suppliers to help them launch better advertising campaigns, while balancing Wayfair revenue and customer experience?

Dataset

Exploratory Data Analysis

Optimization
- With the trade-offs between interpretability, flexibility and feasibility, we propose two optimization models to solve for optimal bids given estimated rewards.
- The main objective of optimization is to maximize our targeted rewards (e.g., conversion rate) while ensuring other metrics (e.g., budget) still meet expectations.
- We further consider robust rewards to stabilize our recommendations and deal with the large amount of uncertainty in our data.

Results

Bids Recommendation
- Suppliers are short-term focused, mainly on immediate conversion. Recommended bids will tend to have higher conversion rates.
- Suppliers are long-term focused and concerned more about ads impression. Recommended bids will tend to have higher clicks.

Monte Carlo Simulation
- In the case above, imagine on June 15th, an on-page supplier with a focus on immediate conversion, wants to advertise her product. We provide a bid recommendation training on previous month’s data, then simulate, using data from the following month, the outcomes.
- Following our robust recommendations, we project an increase in conversion, roughly +20% over if she puts in the median bid of the previous month (current Wayfair recommendation).

Impacts

Future Considerations
- Improvement of dataset building
- The quality of our recommendations is largely determined by the quality of our rewards estimation. Our current approach, although a solid start, could benefit from more sophisticated ML models or causal analysis on the effects of bid on outcome metrics.
- Expansion on optimization
- Our framework is easily generalizable to consider more use cases (we currently have tens), or additional levers (we currently only use bid). Furthermore, our pipeline can be scaled up by increasing number of parallel processes for more robust curve fitting.
- Pilot testing with suppliers
- The next immediate step should be to run a pilot program with some suppliers to collect experimental data and concretely measure preliminary impacts.
- Auto-bidding
- Optimal bids from our recommendation engine can serve as the input to automatically adjust supplier bids to better reach supplier goals.