Guaranteed Sales

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INTRODUCTION

StubHub is the world’s largest ticket resale platform. In this online marketplace, sellers have the flexibility to set their own prices. However, determining the ‘best’ price for a ticket is a non-trivial task, since each individual ticket is unique and the value of the ticket can fluctuate depending on a multitude of factors.

Problem Statement: How can we develop a (i) bidding and (ii) diversification strategy for an off-market bidding platform where sellers can instantly sell their tickets?

DATA

We primarily used:
A. Marketplace data for NBA, MLB 2018
B. Proprietary Internal Models for Price Recommendation & Seat Quality

KEY RESULTS

Significant improvements Relative to Baseline. Based on simulation results, our proposed data-driven optimization approach could increase operating income by ~200% and return on investment by ~4 compared to the heuristic baseline strategy.

METHODOLOGY

We propose an ensemble of models that use historical transactions to estimate the probability of a ticket selling at price $p_i$ and historical listings to estimate the probability of a bid $b_i$ being accepted. Using these probability estimates, we formulate an optimization model to decide whether to make an offer at all ($z_i$).

Key Challenges: Absence of counterfactuals for $P(accept)$ and $P(sell)$ for validation

PROJECT TIMELINE

JAN Matched with StubHub
FEB Project Scoping; Literature Review
MAR Data Extraction, Cleaning & EDA
APR Predictive Model for initial listing price
MAY Causal inference model to estimate price sensitivity
JUNE Generative Models; Price and Bid Optimization; Simulation Model
AUG Optimal Policy Prediction; Variance Estimation & Risk Diversification