

Abstract: We consider network revenue management with customer choice on a huge scale, which is a central question for many industries including transportation, retailing, and healthcare. The solution to a choice-based linear program can usually be used to guide managers in determining sales volumes to different types of customers to maximize revenue. However, traditional methods typically fail to solve such a linear program at a huge scale due to a lack of tailoring the algorithm to consider the extremely big scale. To address the computational issue, we introduce a first-order primal-dual method SPFOM. Our algorithm requires only a small computational cost in each iteration and enjoys a provably near-optimal convergence rate. Extensive computational experiments are conducted to display the numerical supremacy of SPFOM compared to the most advanced state-of-the-art solvers for solving large-scale linear programs.

This research is advancing toward a data-driven approach, with a particular focus on designing recommendation strategies for users and products when user attributes and labels are unknown. Additionally, we will briefly explore the applications of queuing theory and matching theory in service platforms to further investigate pathways for data-driven development.