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EXTENDED-ABSTRACT

## A Unified Algorithmic Framework for Dynamic Assortment Optimization under MNL Choice

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# A Unified Algorithmic Framework for Dynamic Assortment Optimization under MNL Choice

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CCS Concepts: • **Applied computing** → **Operations research**.

Additional Key Words and Phrases: Dynamic optimization, Inventory management, Assortment optimization, Approximation algorithms

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We consider assortment and inventory planning problems with dynamic stockout-based substitution effects, and without replenishment, in two different settings: (1) Customers can see all available products when they arrive, a typical scenario in physical stores. (2) The seller can choose to offer a subset of available products to each customer, which is more common on online platforms. Both settings are known to be computationally challenging, and the current approximation algorithms for the two settings are quite different. We develop a unified algorithm framework under the MNL choice model for both settings. Our algorithms improve on the state-of-the-art algorithms in terms of approximation guarantee and runtime, and the ability to manage uncertainty in the total number of customers and handle more complex constraints. In the process, we establish various novel properties of dynamic assortment planning (for the MNL choice model) that may be useful more broadly. A full version of this paper can be found at <https://arxiv.org/abs/2404.03604>.

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