Sequential Block Elimination for Dynamic Pricing

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- Joint work with Saleh Saleh Abdullah M Alfahad, Prof. Christos Anagnostopoulos, and Prof. Kostas Kolomvatsos.
- We consider a **feedback-driven dynamic pricing** problem.
- Operates under **pure exploration Bandit settings**.

- Standard pricing experiments use 'learn, then earn', whereas MAB adopts 'learn, while earn'.
- Classical MAB algorithms are impractical due to **countably infinite action spaces**.
- Pure exploration with a **limited budget** is a more practical approach.

- Existing pure exploration algorithms **require sampling all actions**.

- How to avoid sampling all actions efficiently?

- Coarse-grained discretisation risks **omitting near-optimal actions**.

Key challenge: Balancing sampling efficiency and accuracy in infinite action spaces.

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- Cluster actions into blocks and **eliminate suboptimal actions**.

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- All clusters with **upper confidence score is lower than lower confidence score** is eliminated

- Our goal: Identify optimal prices for **two logistic services**.
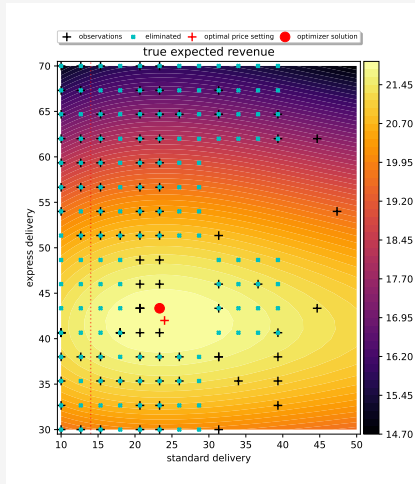- Data is provided by an airline industry partner.

Figure 1: Contour map after running algorithm for 100 rounds

- Proposed a **Thompson Sampling-Based Recursive Block Elimination Strategy** for Dynamic Pricing.
- **Promising experimental results** demonstrated effectiveness.
- Extended version of the work is under review.

Thank You!

Questions? Feel free to ask!