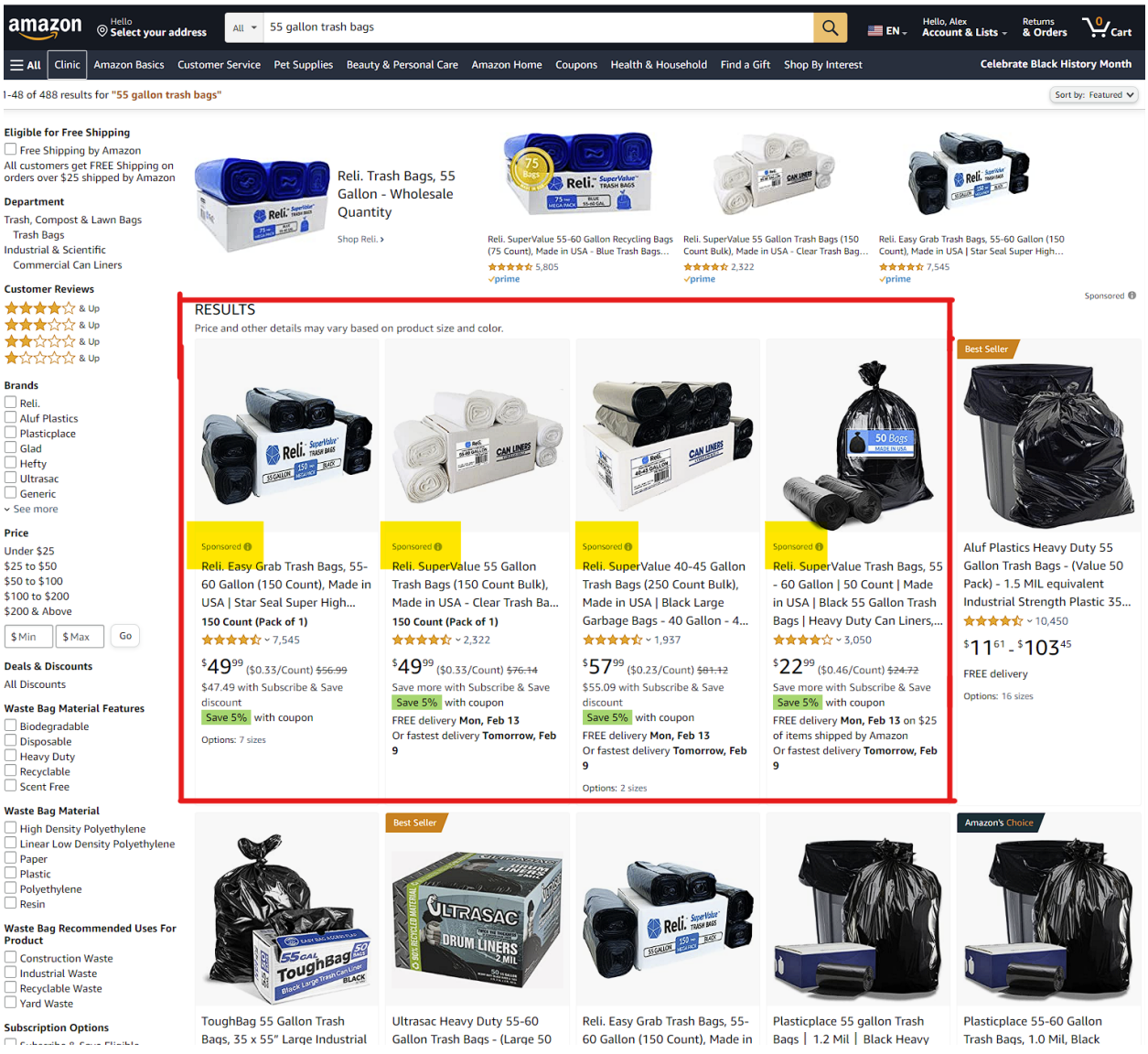
Optimal Placement Configurations (OPC)

Requirements:

- Python
- Pandas Library - please use Pandas where applicable for the data processing

Purpose/Motivation

We manage advertising campaigns for each product we sell. Some of the advertising campaigns target keywords. Each keyword has a bid and one keyword may exist in campaigns for different products (having distinct bids within each campaign). The image below shows the search engine results page for “55 gallon trash bags”; the red rectangle contains four Sponsored Product Ads (SPA). We’d say the Reli. Easy Grab Trash Bags, 55-60 Gallon (150 Count) is at the first SPA spot or has an SPA Rank of 1 and Reli. SuperValue 40-45 Gallon Trash Bags (250 Count Bulk) is at the third SPA spot.



For some keywords, we have an ideal order which we’d like to see reflected in SPA spots. In the screenshot above, for example, the search term is “55 gallon trash bags” but a 40-45 gallon product is

advertised before the 55-60 gallon (50 Count) product; yet we'd prefer to see 55-60 gallon products first for this search term. The ordered list of products for a keyword is called an OPC Label; the first product on the list has an OPC Ranking of 1.One way we aim to adjust observed SPA ordering is by changing keyword bid values. This task aims to align SPA ordering with our ideal ordering by adjusting keyword bids.

Note: Within the advertising and data & automation teams, we use "Short ID" to refer to products.

Overview:

- For each keyword, given an observed advertising placement ordering (SPA spots) and ideal ordering (OPC labels), adjust bids such that the bid ordering matches the ideal ordering

Goals: To have our products show up in a given search results page at the ad placement spots in our desired order

- For each Short ID where the SPA Rank matches the OPC Ranking: do not adjust the bid
    - This means the products are already in the correct position.
- For each Short ID where the (a) SPA Rank does not match the OPC Ranking or (b) the SPA Rank is not found: adjust the bids such that they align with the OPC label ordering.

Input:

- There are two inputs files attached that will be used on the script, Keywords and OPC Labels with their respective parameters

Processing:

- Assign OPC Label to each respective keyword_text
    - Get the keyword_text, OPC Label pair from the OPC Labels file
    - Map the OPC Label to the matching keyword_text from the Keywords file
- Based on the OPC Label for each keyword assign an OPC Ranking (from 1 to n) based on the short_id's place in the list
- Perform bid swaps for out-of-position short IDs that have both the OPC Ranking and the SPA Rank, where performing the bid swaps include
    - Swap bids amongst the out-of-position short IDs, based on their relative OPC Ranking
        - The highest OPC Rank should have the highest bid, the second highest OPC Rank should have the second highest bid, all the way to the lowest OPC Rank getting the smallest bid.
            - Example:
                - Before swap
                - OPC#1 - $3
                - OPC#2 - $2
                - OPC#3 - $4
                - After swap
                - OPC#1 - $4
                - OPC#2 - $3
                - OPC#3 - $2
- Identifying any short IDs that are (a) not present in the SPA spots but are (b) ranked higher than the lowest ranked short ID observed in the SPA spots and that have OPC Ranking
    - If the OPC Ranking is higher than the ranks of all short IDs observed in the SPA spots, then perform 15% bid increments on top of the highest bid of all lower ran SPA Spots

- If the 15% increcement results in a bid smaller than the previous bid, use the max of 15% increment and the current bid.
    - Example
        - Before increments
            - OPC#1 - SPA# N/A - $5
            - OPC#2 - SPA# N/A - $3
            - OPC#3 - SPA#3 - $3.5
        - After increments
            - OPC#1 - SPA# 1 - $5 (as 4.03 x 1.15 = 4.63)
            - OPC#2 - SPA# 2 - $4.03
            - OPC#3 - SPA#3 - $3.5

Output:

- Excel file format
    - With Columns:
        - **short_id, keyword_text, SPA Rank, bid, OPC Label, OPC Ranking, new bid (after the bid swapping or bid increments)**
    - Sorted by **keyword_text, OPC Ranking**