

# 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.

The screenshot shows the Amazon search results page for "55 gallon trash bags". The top navigation bar includes the Amazon logo, a search bar with the query "55 gallon trash bags", and links for account and orders. Below the navigation bar, there are filters for "Eligible for Free Shipping", "Department", "Customer Reviews", "Brands", "Price", "Deals & Discounts", "Waste Bag Material Features", "Waste Bag Material", "Waste Bag Recommended Uses For Product", and "Subscription Options". The main content area displays a grid of product listings. A red rectangle highlights a section labeled "RESULTS" containing four Sponsored Product Ads (SPA). The first SPA is for "Reli. Easy Grab Trash Bags, 55-60 Gallon (150 Count), Made in USA | Star Seal Super High..." with a price of \$49.99. The second SPA is for "Reli. SuperValue 55 Gallon Trash Bags (150 Count Bulk), Made in USA - Clear Trash Ba..." with a price of \$49.99. The third SPA is for "Reli. SuperValue 40-45 Gallon Trash Bags (250 Count Bulk), Made in USA | Black Large Garbage Bags - 40 Gallon - 4..." with a price of \$57.99. The fourth SPA is for "Reli. SuperValue Trash Bags, 55 - 60 Gallon | 50 Count | Made in USA | Black 55 Gallon Trash Bags | Heavy Duty Can Liners..." with a price of \$22.99. To the right of the highlighted section, there is a "Best Seller" product listing for "Aluf Plastics Heavy Duty 55 Gallon Trash Bags - (Value 50 Pack) - 1.5 MIL equivalent Industrial Strength Plastic 35..." with a price of \$11.61. Below the highlighted section, there are more product listings including "ToughBag 55 Gallon Trash Bags, 35 x 55\"

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 ranked 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  $4.03 \times 1.15 = 4.63$ )
      - 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**