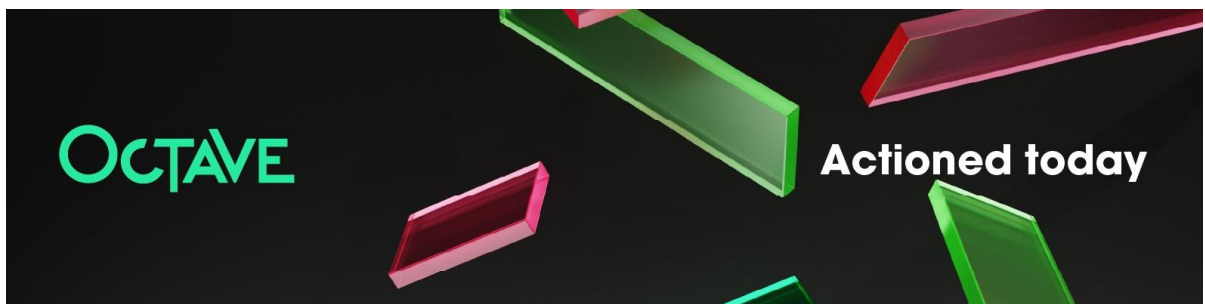


Data Storm 4.0

Final - Case Crack

OCTAVE &
Rotaract Club of University of Moratuwa,
MAY 13th, 2023



1 Optimization of Freezer Assortment and Volume

1.1 Business Problem

As a result of your successful provision of an analytical solution during the previous round of Data Storm 4.0, Beverages Company XYZ now relies on your expertise to optimize their product assortment within the allocated freezer type. Product assortment, or product mix in retail, pertains to the diverse range of goods that a manufacturer or shop offers to customers.

Company XYZ allocated freezers for each of their stores based on the recommendation you provided in the semifinal round. Stores within the same segment were assigned the same type of freezer for product storage and display. Since Company XYZ have wide range of products, now they want to optimize their freezer assortment and volume allocation for each product to maximize their total margin from each store.

Considering historical sales data, Company XYZ made the decision to stock the top-selling product of each segment in the freezers across all stores belonging to that segment. Additionally, to ensure a balanced product assortment, they set a maximum limit of 30% of the recommended freezer type's volume for any single product. Further, since they have limited stock of each product, Company XYZ intends to ensure that the total stock distributed is below the current available stock. These strategic approaches enable the Company XYZ to optimize their product offerings while maintaining a diversified selection within each segment and avoiding stock shortages and guaranteeing that they can fulfill orders in a timely and efficient manner. For this, they again seek your help to provide an advanced analytics solution to optimize their freezer assortment and volume allocation of their products to maximize their total margin earned from each of their stores.

Margin is computed as follows:

$$\text{Margin} = \text{Item selling price} - \text{Item cost}$$

1.2 Data Sources

You are provided with the following data source files (same data sources as semifinal round except two additional columns in *product_data.csv*) to develop a data analytics solution.

1. **Sales Data Set** – Historical product sales data set (distributed product volumes for each store in a given week) consists of 81000 records at Outlet-Week-Item level. Please refer to the Data-dictionary.xlsx for more details about the attributions. (*sales_data.csv*)
2. **Outlet Data Set** – Consists of 988 records of stores with shops space (outlet area in square feet). The granularity of the data set is at outlet level. Please refer to the Data-dictionary.xlsx for more details about the attributions. (*outlet_data.csv*)
3. **Product Data Set** – Consists of product wise data such as product name, volume, price, **cost, and stock**. The granularity of the data set is at product level. Please refer to the Data-dictionary.xlsx for more details about the attributions. (*product_data.csv*)
4. **Week Data Set** – Consists of week start date and end date for the given week id. The granularity of the data set is at week level. Please refer to the Data-dictionary.xlsx for more details about the attributions. (*week_data.csv*)
5. **Freezer Data Set** - Consists of freezer asset wise data such as freezer type, volume, and power consumption, etc. The granularity of the data set is at freezer asset level. Please refer to the Data-dictionary.xlsx for more details about the attributions. (*freezer_data.csv*)

1.3 Deliverables & Evaluation Metrics

In this competition, you are required to submit the following.

1. Analytical Solution (40 marks) – In this competition, you are required to create an analytical model to:

- (a) Optimize item assortment and volume allocation for each segment-freezer type combination you recommended in the previous round.

Distribution of marks for this part is as follows:

- Correctly identifying the decision variables – **5 marks**.
- Correctly identifying the constraints – **10 marks**.
- Correctly identifying the objective – **5 marks**.
- Effectiveness of the approach taken and the final solution - **20 marks**.

You are required to submit your notebook file (.ipynb) with clearly defined steps and well commented code, and display of your final solution for each segment-freezer type combination in the following format.

Store segment	Recommended Freezer type	Freezer Volume	Product ID	Product Name	Allocated Volume in L

Additionally, provide a summary of the total margin earned from each segment.

2. Final Presentation and Pitching (60 Points) – For the final presentation, combine your solution to both semi final round and final round business problems and present it as one

advanced analytics project to solve Company XYZ's business problem of optimizing freezer allocation and assortment process. Key points to include are:

- Overall business problem
- Objectives and key deliverables
- Solution design
- Intervention strategy

Pitching round marking criteria:

1. Content and overall presentation outline- **5 Points.**
2. Problem and presentation of analytical solution – **15 Points.**
3. Business Model and Intervention strategy - **15 Points**
4. Language skills and pronunciation – **5 Points.**
5. Eye contact and positive outlook – **5 Points.**
6. Time management – **5 Points.**
7. Ability to answer questions – **10 Points.**