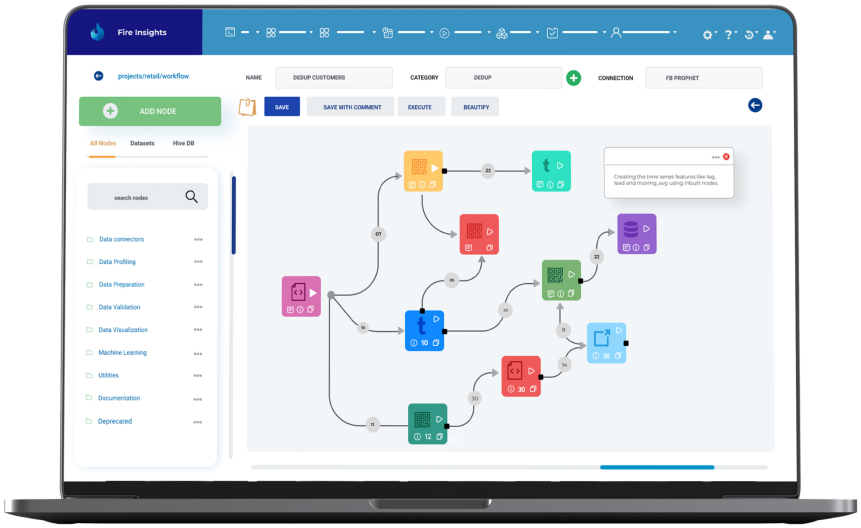
sparkflows.io



Turbo-charge Decision Making by using the Best-In-Class Self-Service Business Solution Builder.

# Business Solution for On-Shelf Availability & Out-of-Stock Problems

Business Objective

Challenges

Solution Approach

- Data profiling, Exploratory analysis, Data transformation
- Computing features like phantom inventor and safety stock
- Forecasting sales over historical data to identify OOS

Implementation Process

- Dataset Definition
- Exploratory Data Analysis
- Feature Engineering Workflow
- Phantom Inventory and Possible Out-Of-Stock situation are determined based on mismatch between Sales and Inventory tracking system.
- Machine Learning Workflow
  - Create Prediction Model

Business Impact

References

## Business Objective

Our client is a Global Firm in the Health and Hygiene Industry. It's extremely critical to replenish items in a timely manner.

Out-Of-Stock scenario occurs when the retailer doesn’t have products to sell.

On-Shelf-Availability means Product is available in the inventory however it may be placed in the wrong place making it inaccessible to Customers.

## Challenges

Out-of-Stock happens primarily due to following reasons

- Ordering too little stock
- Ordering too late
- Not accounting for seasonality

In some cases, the retailers had an accurate forecast, they placed their orders in time, and the products are in storage.  However, lack of proper assortment insights can impact OSA. Sometimes, products don't end up on the right shelves or they are not replenished in time.

When shoppers can’t find what they’re looking for, 70% will buy a different brand, and 30% will visit a different store.

# Solution Approach

Sparkflows provide the Self-Service Platform for performing the different steps of Business Solution Development

## Data profiling, Exploratory analysis, Data transformation

Following insights are computed and plotted:

- Generation of a continuous range of dates and adds Inventory related information based on incoming dataset.
- Computation of flag based on each Inventory specific transactions i.e. Replenishment Flag, Promotion Flag
- Zero Sales Days - Events of consecutive Zero Sales Days need to be validated for Out Of Stock situations. Zero Sales Days might be ok for slow moving products however consecutive events need to be analyzed.
- Identification of Insufficient On-Hand & In-Pipeline Product Inventory.
- Identification of Insufficient Lead Time to receive products

## Computing features like phantom inventor and safety stock

- Phantom Inventory - It denotes the gap between the Inventory and the Sales System. This might result due to the misplacement of Products, stolen, loss or issue with the Inventory Tracking system.

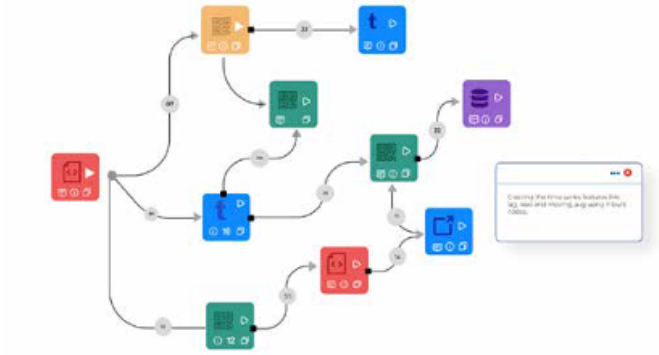
- Safety Stock - It acts as the trigger point to order a product. Safety Stock level for a product is the level where replenishment needs to be ordered. If On Hand Inventory level dips below Safety Stock then it would result in a few days of Zero Stock. This would result in loss of business.

### Forecasting sales over historical data to identify OOS

- It runs prediction sales of a product over a historical period
- It compares sales prediction against the actual sales data and identifies Out Of Stock issue

## Implementation Process

- Dataset Definition
- Exploratory Data Analysis
- Data Preparation
- Feature Engineering
- Customer Clustering
- Cluster Evaluation



## Dataset Definition

The Source data contains following columns

- Date
- Store Id
- SKU
- Product Category
- Total Sales Units
- On Hand Inventory Units
- Replenishment Units
- Inventory Pipeline
- Units In Transit
- Units on Order
- Units under Promotion
- Shelf Capacity

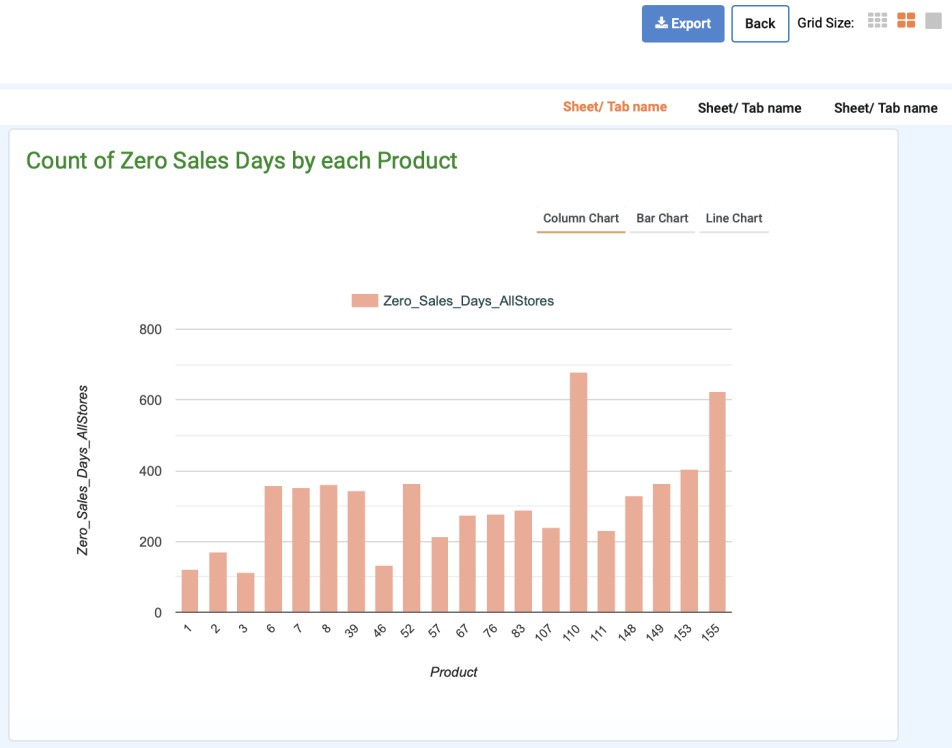
## Exploratory Data Analysis

- Powerful Exploratory Data Analysis Workflow can be designed using the Fire Insight Studio.The workflow provides crucial insights in graphical form.

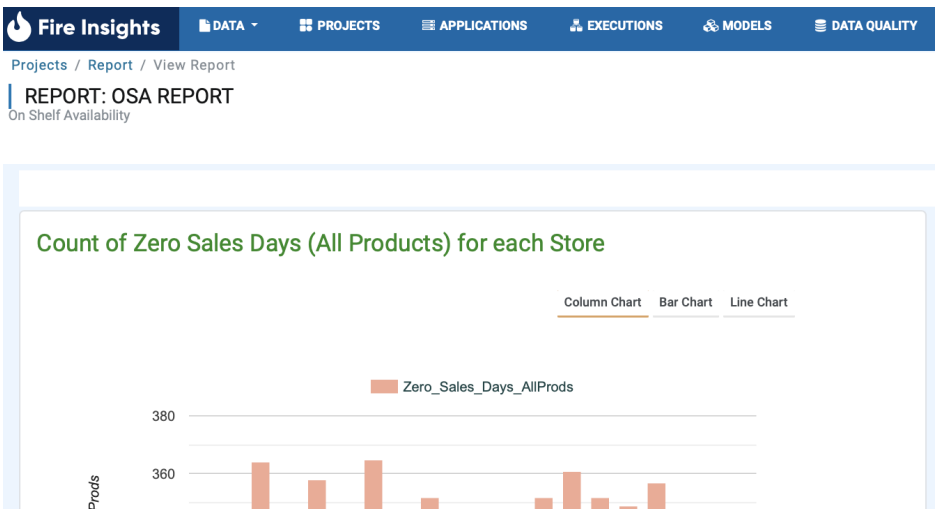
- The workflow is creating features like average monthly purchase,

total number of products and other features which could provide more predictive power to the K-means model which will be trained in the next step.

Let’s find out the number of Zero Sales Days for every Product Item.

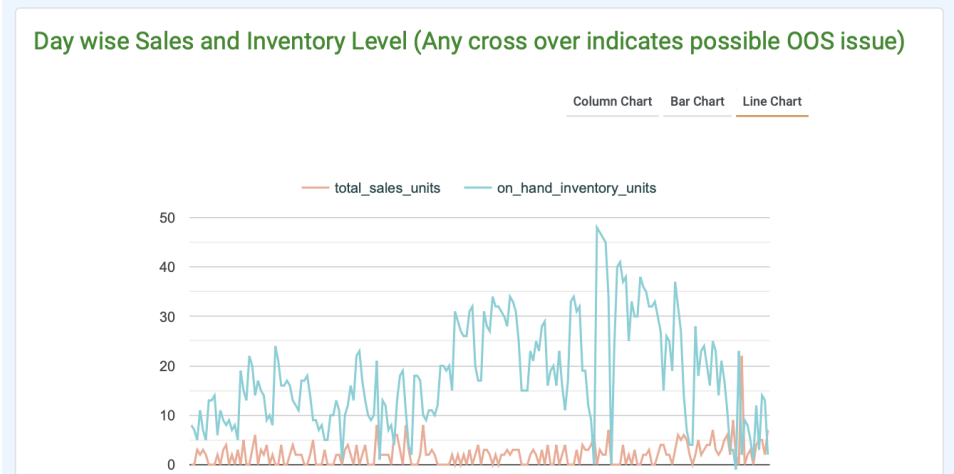



Let’s also find out the count of Zero Sales Days for every Store.



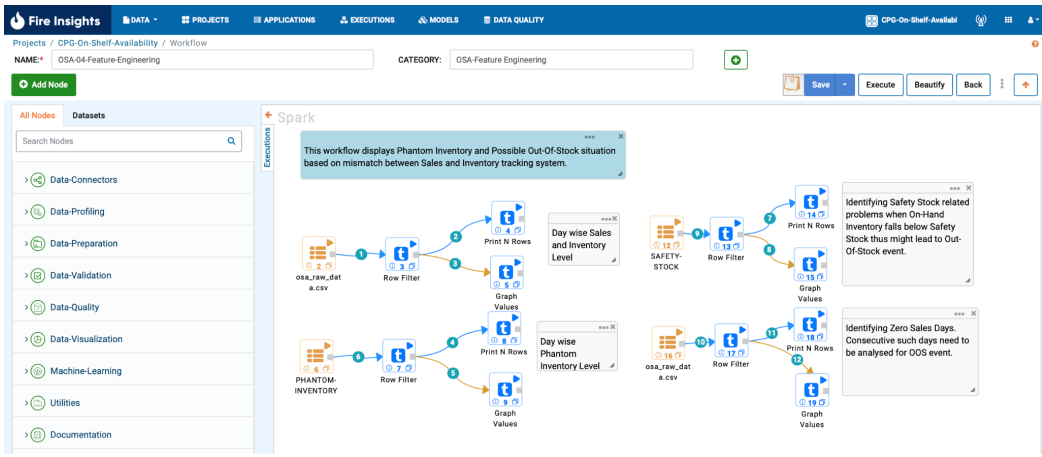
Identify Top Stores by Total Units Sold.

Identify the Cross Over between Day-wise Sales and Inventory to identify potential OOS Events.



## Feature Engineering Workflow

Phantom Inventory and Possible Out-Of-Stock situation are determined based on mismatch between Sales and Inventory tracking system.

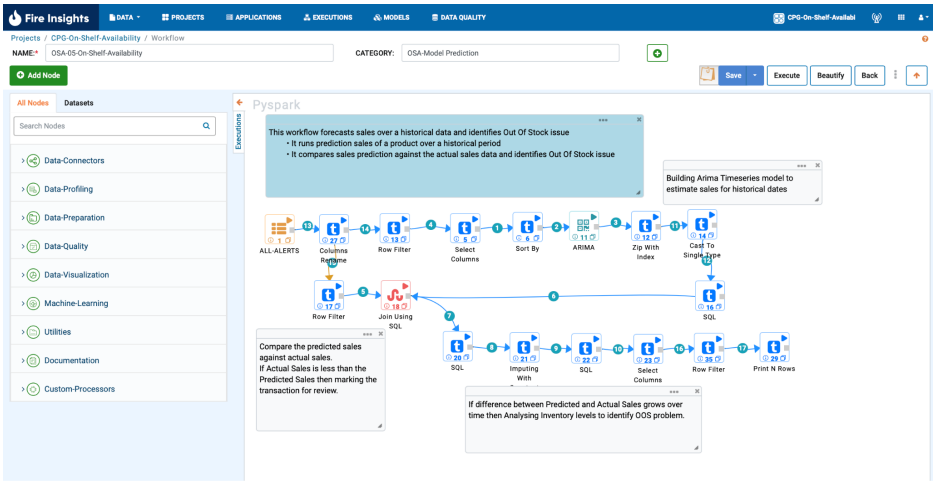



## Machine Learning Workflow

### Create Prediction Model

This model forecasts sales over a historical data and identifies Out Of Stock issue

- It runs prediction sales of a product over a historical period
- It compares sales prediction against the actual sales data and identifies Out Of Stock issue



## Final Insights: Predicted OOS Events and Inventory Alerts

Out Of Stock Event

| store_id | sku | zero_sales_flag | oos_alert | phantom_inventory | phantom_inventory_ind | Predicted_Total_Sales_Units | off_sales_alert | trans_date |
|---|---|---|---|---|---|---|---|---|
| IntegerType | IntegerType | IntegerType | IntegerType | DoubleType | IntegerType | IntegerType | IntegerType | StringType |
| 63 | 57 | 0 | 0 | 0.0 | 0 | 6 | 1 | 2021-02-18 |
| 63 | 57 | 0 | 0 | 0.0 | 0 | 5 | 1 | 2021-03-26 |

# Business Impact

- Brand Availability. Retailers can improve their online reputation
- Increased Sales and Competitive Advantage
- reduce the cost of holding excess inventory, increase customer satisfaction by ensuring that products are always available
- Increase in Operational Efficiency and decrease in Labour Costs

# References

https://www.sparkflows.io/

https://docs.sparkflows.io

https://www.sparkflows.io/videos

https://www.sparkflows.io/data-sheets