**ANALYSIS APROACH using PYTHON**

**#Perform data quality assessment (missing values, anomalies, duplicates)**

* import pandas as pd
* Read ace\_data.csv file and view it
* explore the ace\_data info
* sum the number of missing values in each column of acedata dataframe
* fill the missing values in the dataframe with zero
* perform summary statistics on acedata dataframe to see any outlier
* for negative value in Sales and Cost Price column, confirm the minimum values in each column
* negative value in Sales and Cost Price column, confirm the minimum vaues in each column
* fill the masked negative values in the acedata dataframe with zero
* confirm the min Sales and cost price to be replaced by zero
* drop duplicates in acedata dataframe and view the dataframe, no duplicates found

**#Summarize total sales, revenue, and discount rates by region and segment**

* add the Revenue column to the acedata dataframe
* add discount rate column to the dataframe and view
* view the category column
* split the category column into two columns
* view the new Category and Segiment column
* replace none with empty string in the dataframe
* Join segiments and Sub category columns together to form a new column
* view the new column, Segiment
* Summary of total sales by region and segiment
* summary of revenue by region and segiment
* summary of discount rates by region and segiment
* Identify top 5 best-selling products and underperforming products by revenue
* top 5 best selling product
* 5 underperforming products
* Provide insights into product categories with highest margins

**#Analyze sales distribution across Order Mode (Online vs In-Store)**

* Group and sum sales
* plot the horizontal bar chart of sales against Order mode
* view revenue by region
* drop regions that contain zero
* plot a horizontal bar chart of revenue by region
* view category and profit margin columns
* drop nan in the dataset and view
* group the mean of profit margin by category
* drop the first row with missing value
* plot the horizontal bar chart of category against profit margin

A blue bar graph with numbers

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AI-generated content may be incorrect.

**ACE baseline Intelligence Report on Regional Performance, Customer Trends, and Product Insights**

This report represents a baseline snapshot of business performance across regions, customers, and product categories. Retail operations by ACE covers all the nine regions of England and beyond with the highest revenue coming from the Yorkshire and the Humber. Among many products sold by ACE in a couple of years ago, grooming and wearable tech products have an outstanding profit margin. Plenty customers walk into our store to purchase products, but online customers are relatively more than in-store customers. The report was generated from analysis of sales dataset from ACE over the period of 1 week using python.

After Yorkshire and Humber region, Southeast, Northeast, West Midlands and London are high performing regions generating high revenue for the company. Underperforming regions such as East of England, East Midlands, Northwest have produced low revenue with the lowest revenue from Southwest of England. The top five most selling products include bicycles, outdoor materials and the 5 lowest selling products are food produce especially fresh food product like vegetables, fruits and canned products. The possible reason might be that they are highly perishable. However other food products have 100% profit margin and are drives of profitability for the company. Crafts, home improvement materials, storage and sport related product are not profitable.

Notable action plan will include improving logistics for product delivery and online marketing to support the higher online customers especially in the low performing regions including Wales and Scotland. Stocking more of outdoors product such as bicycles, gardening and grooming products, non-perishable food produce and other products like baby and beauty products will also increase the company profitability.