



Retail Trade Sector Analysis

Group No. 07-001
Project Phase 2

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Background

- Retail sector contributes significantly to North American economy
- Understanding market trends, consumer behavior, and economic growth is important for businesses
- Efficient tactics needed to boost sales and reduce inventory waste due to competition in retail sector
- Multi-category stores preferred by customers for convenience and wide selection
- Consumer behavior patterns, such as retail goods preferences trends over the years can form effective inventory management



Problem Statement



Target audience

Multinational Retail chain management who wants to expand in Canada



Objective

To evaluate the link between sales and socioeconomic parameters such as disposable income, family income, and population, across several retail trade sectors in North America to help in inventory scaling and management



Dataset

An archived dataset containing information on retail commodity sales, as well as demographic, seasonal holidays, disposable income, and household data.



Methodology

Statistical evaluation of the dataset to determine trends and patterns in retail category sales across various retail trade sectors.

Project Proposal

Proposal

Descriptive analysis of the datasets provided, Exploratory data analysis and Visualizing related to product sales, and marketing for businesses, and create economic plans to help retail sector expand and evaluate inventory.

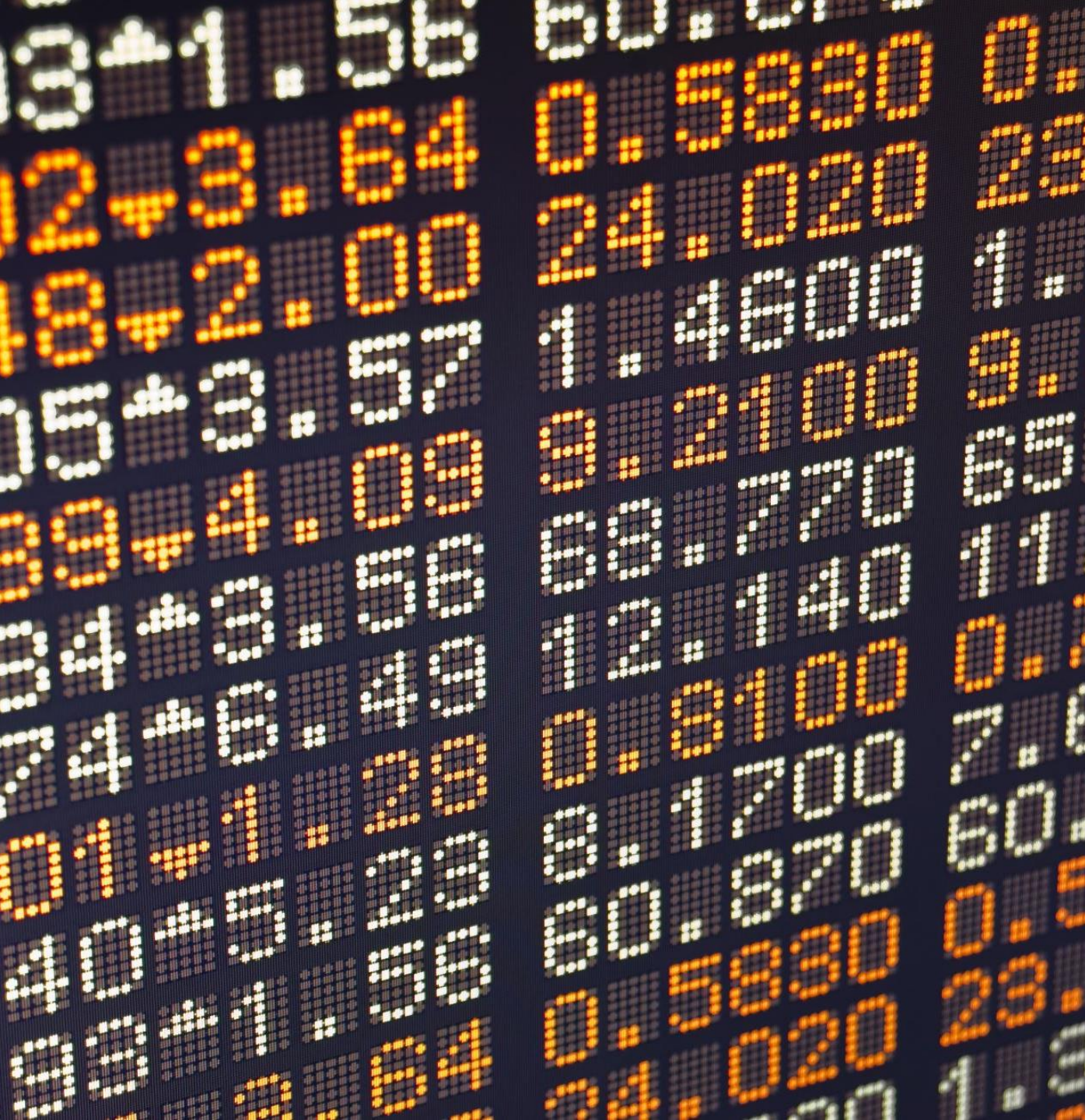
Data Wrangling

Visualize underlying patterns, trends, and relationships between factors such as product sales, population, disposable income, household income, retail commodity, and trade sector.

Steps

- Explore and study the dataset to determine factors for trend analysis.
- Clean the data to visualize effectively.
- Convert tabular data into graphs for clear and understandable analysis.



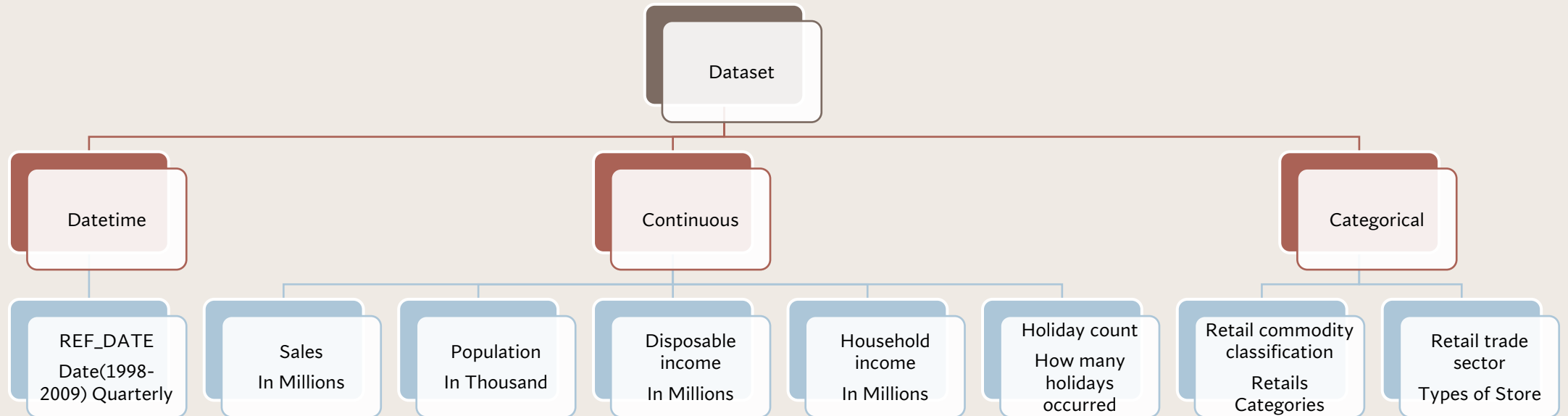


Dataset Resources

1. Retail commodity sales, by retail trade sector based on the North American industry classification system (NAICS), inactive - Open government Portal. (2017, February 27). Open Government | Open Government, Government of Canada. <https://open.canada.ca/data/en/dataset/7b9c295f-7321-42c7-9d28-11469420a5f6>
2. Household sector, selected indicators, Canada, quarterly, inactive - Open government Portal. (2018, August 30). Open Government | Open Government, Government of Canada. <https://open.canada.ca/data/en/dataset/ede3be10-c832-46c7-9693-d80de3ce856f>
3. Population estimates, quarterly - Open government Portal. (2022, December 21). Open Government | Open Government, Government of Canada. <https://open.canada.ca/data/en/dataset/ec690886-687d-4d59-9b1b-51311435d344>

Dataset Description

- This analysis will be based on the dataset that contains information from more than 4753, as reported on the NAICS official website.
- This dataset includes various variables including



Analysis questions

A man and a woman are sitting at a dark table in a modern office or meeting room. The man, on the left, has dark hair and a beard, and is wearing a green sweater. He is looking down at a white notepad and holding a white pen. The woman, on the right, has curly brown hair and is wearing a light-colored top. She is looking at a smartphone and holding a blue pen. On the table, there are several other items: a blue pen, a yellow highlighter, a black pen, a small notepad, and a clear water bottle. In the background, other people are visible working at tables, and the room has large windows and modern lighting.

1. What is the distribution of sales in different retail categories?
2. What is the distribution of total sales by retail category classification over time related to population, holiday count, disposable income?
3. How does the sales of food and beverage products vary by different retail store over time?
4. How does the sales impact over the years in different retail stores?

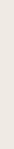
5. How does the sales of motor vehicles, parts, service, and rental products vary by different retail store over time?
6. How do the sales of automotive fuels, oils, and additives vary by different retail store over time?
7. How does the sales of clothing and footwear products vary by different retail store over time?



Phase 2

Table of Contents

1. Data Cleaning



2. Data Visualization



3. References

Data Cleaning Summary



Merge

We have Merged different dataset into one data set



Clean

We have removed explanatory brackets from Retail Category column

Rescaling numerical data for better viewing

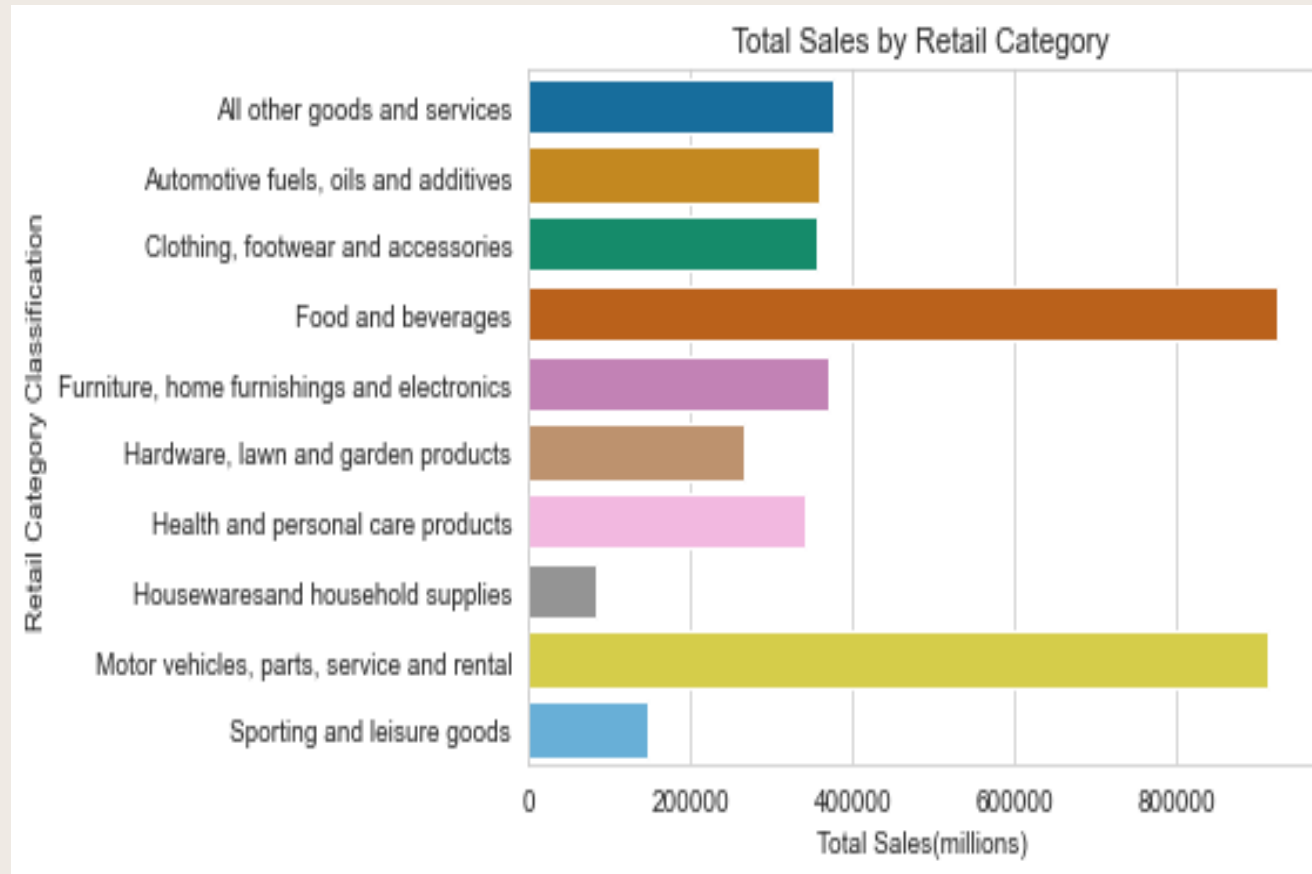
We have assumed missing data as \$0 sales



Subset

We have filtered data according to the need of graphs

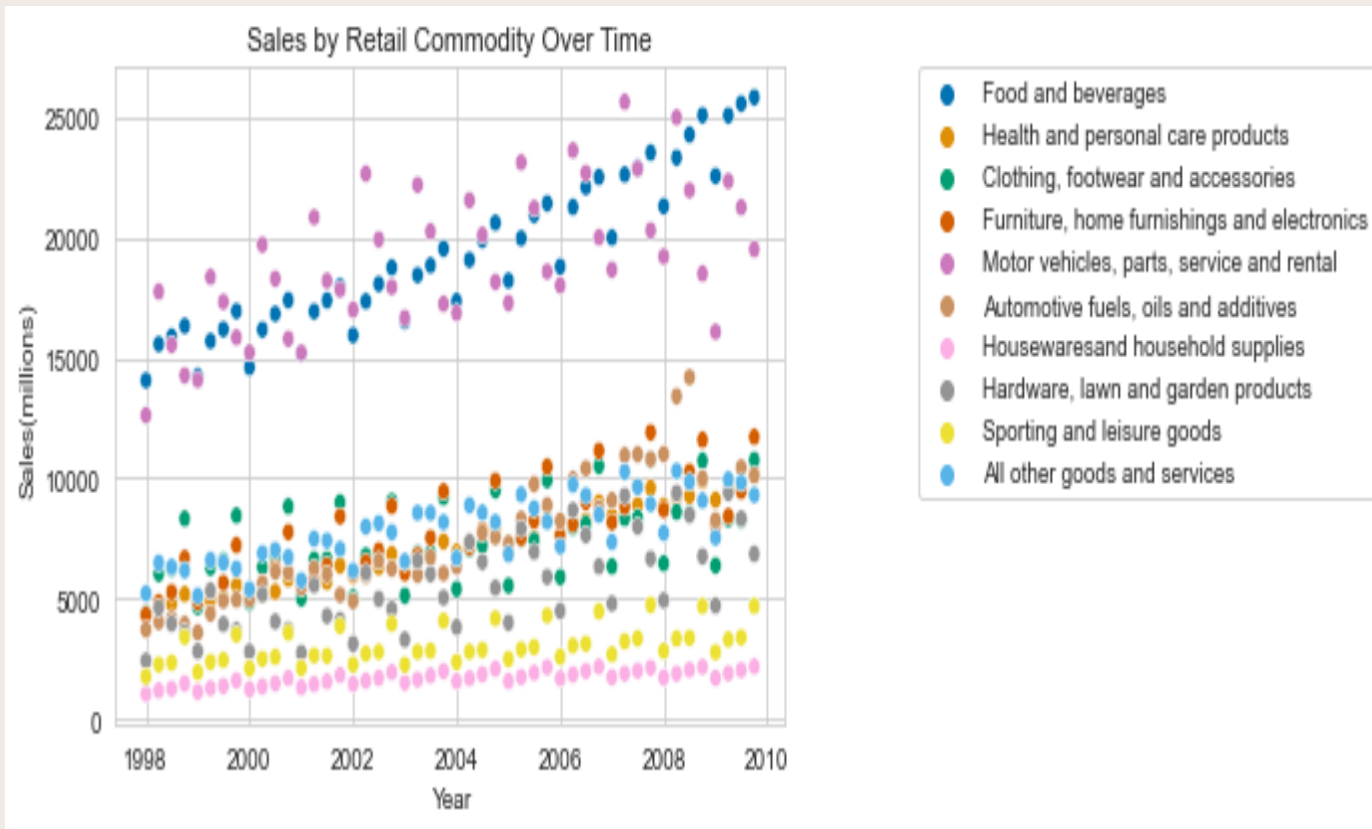
1. What is the distribution of sales in different retail categories?



Total Sales Overview Segmented By Retail Categories Over Time

- The plot shows sales by different retail categories in total
- We can glean from the graph that food and automotive products sold more while most of the other products are in the similar range for total sales except household goods and sporting/leisure goods which is below 200,000 million.

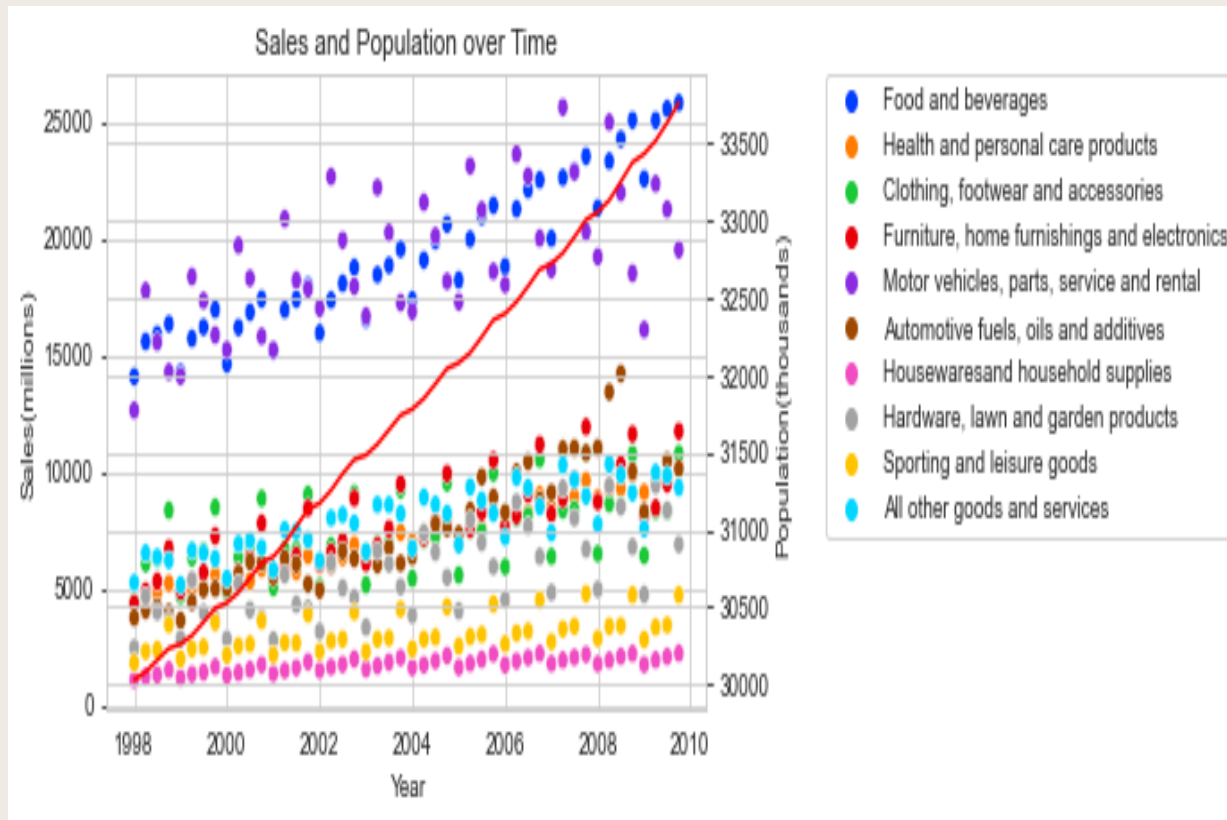
2. What is the total sales by retail commodity classification over time?



Total Sales Overview Segmented By Retail Categories Over Time

- we can see that there is a steady increase in sales of food and beverages and motor vehicles over the years but there's slight decline for sales of motor vehicles over the last few years
- Throughout the years we can see that most of the categories have a slight increase in sales over time except for household hold goods and sporting leisure as stated before

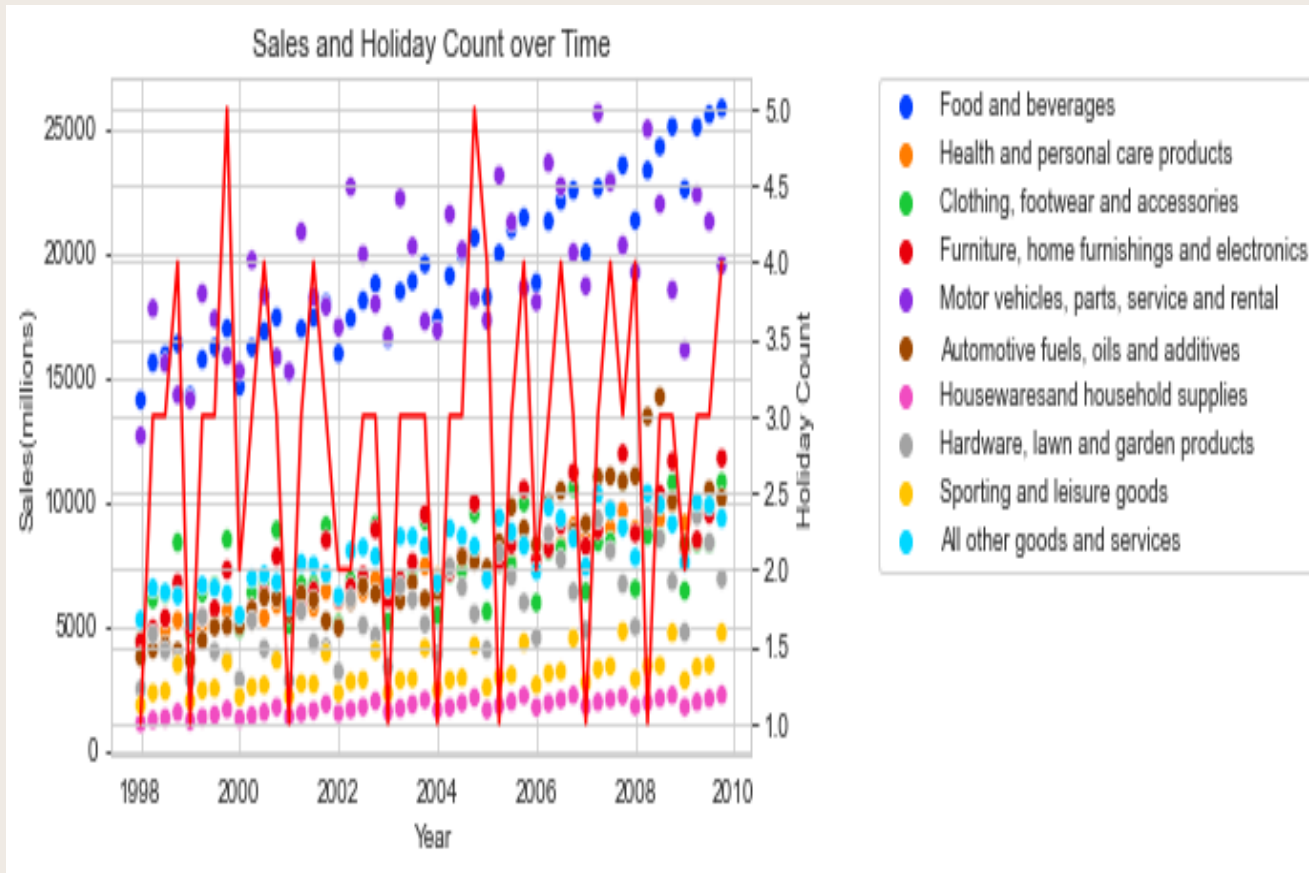
3. How is the trend of sales for different retail commodities related to the trend of population over time?



Total Sales Overview Segmented By Retail Categories with population

- We are looking at the relationship between sales, year and the total population over the years
- Even though the population increases and has a linear relationship with year the sales in each category doesn't increase significantly over time with respect to population

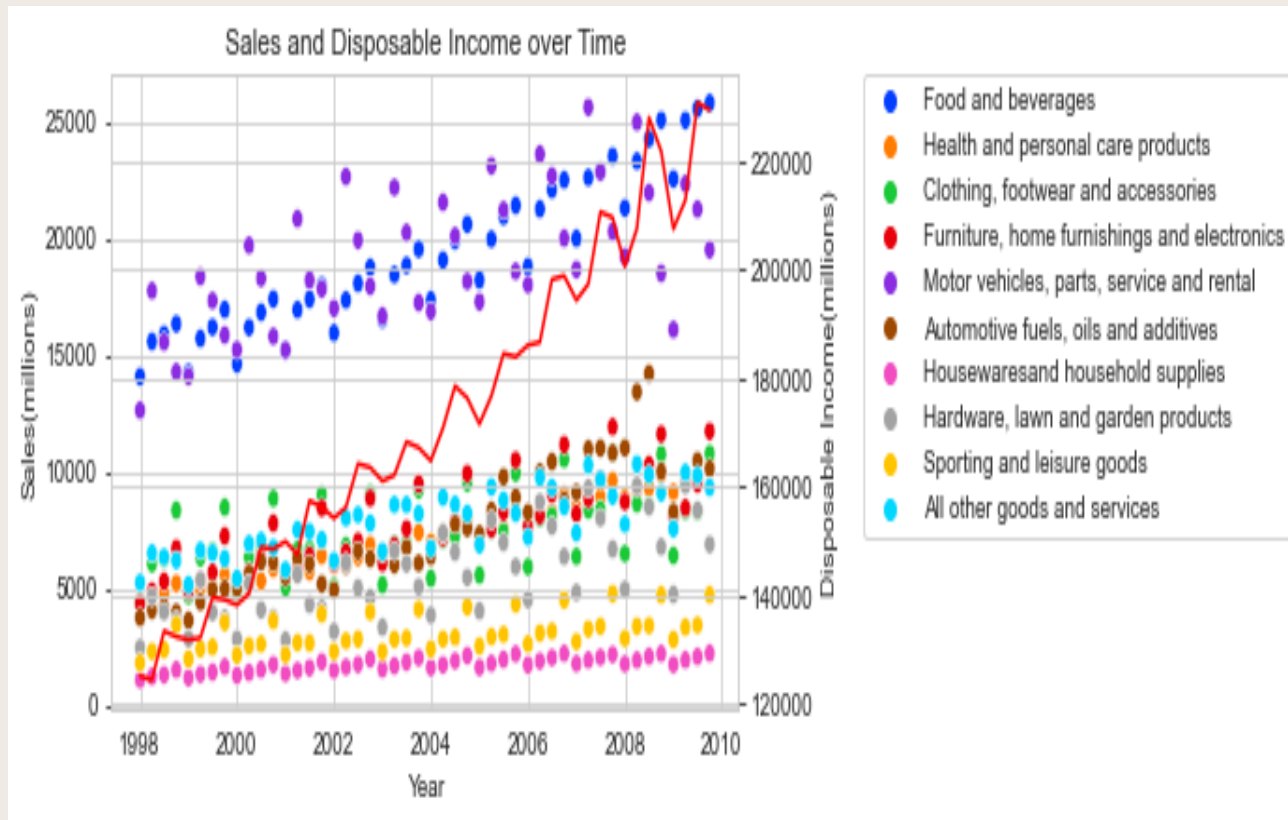
4. How is the trend of sales for different retail commodities related to the trend of holiday count over time?



Total Sales Overview Segmented By Retail Categories with Holiday count

- We are looking at the relationship between sales, year and the count of holidays over the years
- The number of holidays does have a slight impact on the sales as there is a slight increase in sales whenever the number of holidays increases

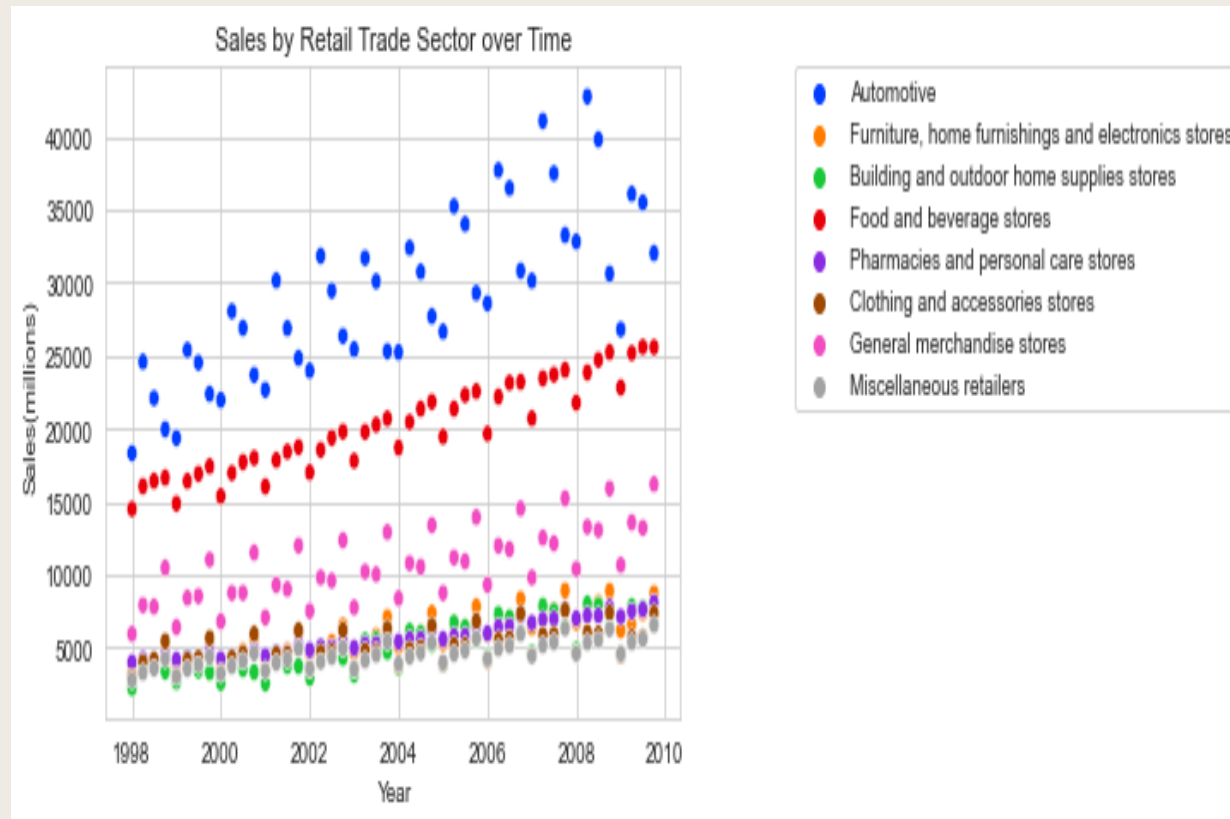
5. How is the trend of sales for different retail commodities related to the trend of disposable income over time?



Total Sales Overview Segmented by Retail Categories with Disposable Income

- The red line denotes disposable income over time
- Disposable income increases over time as the population increases with almost the same amount
- Disposable income doesn't have big impact on the Sales of retail categories

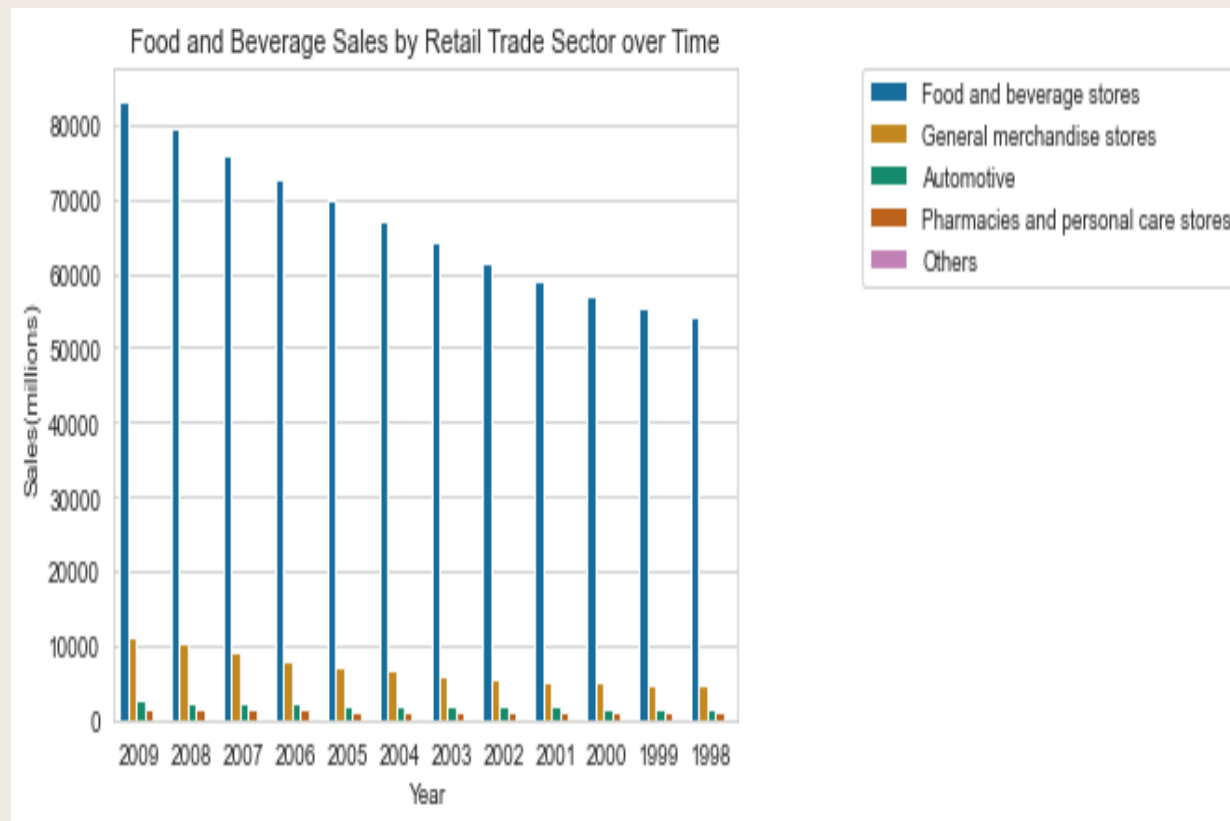
6. How does the sales impact over the years in different retail stores?



Total Sales Overview Segmented By Retail Stores

- The Graph showcases Sales over the years segmented by retail stores
- We can see that automobile and food and beverages stores dominate the sales followed general merchandise stores.
- The rest of the retail stores have the same amount of distribution of sales through out the years

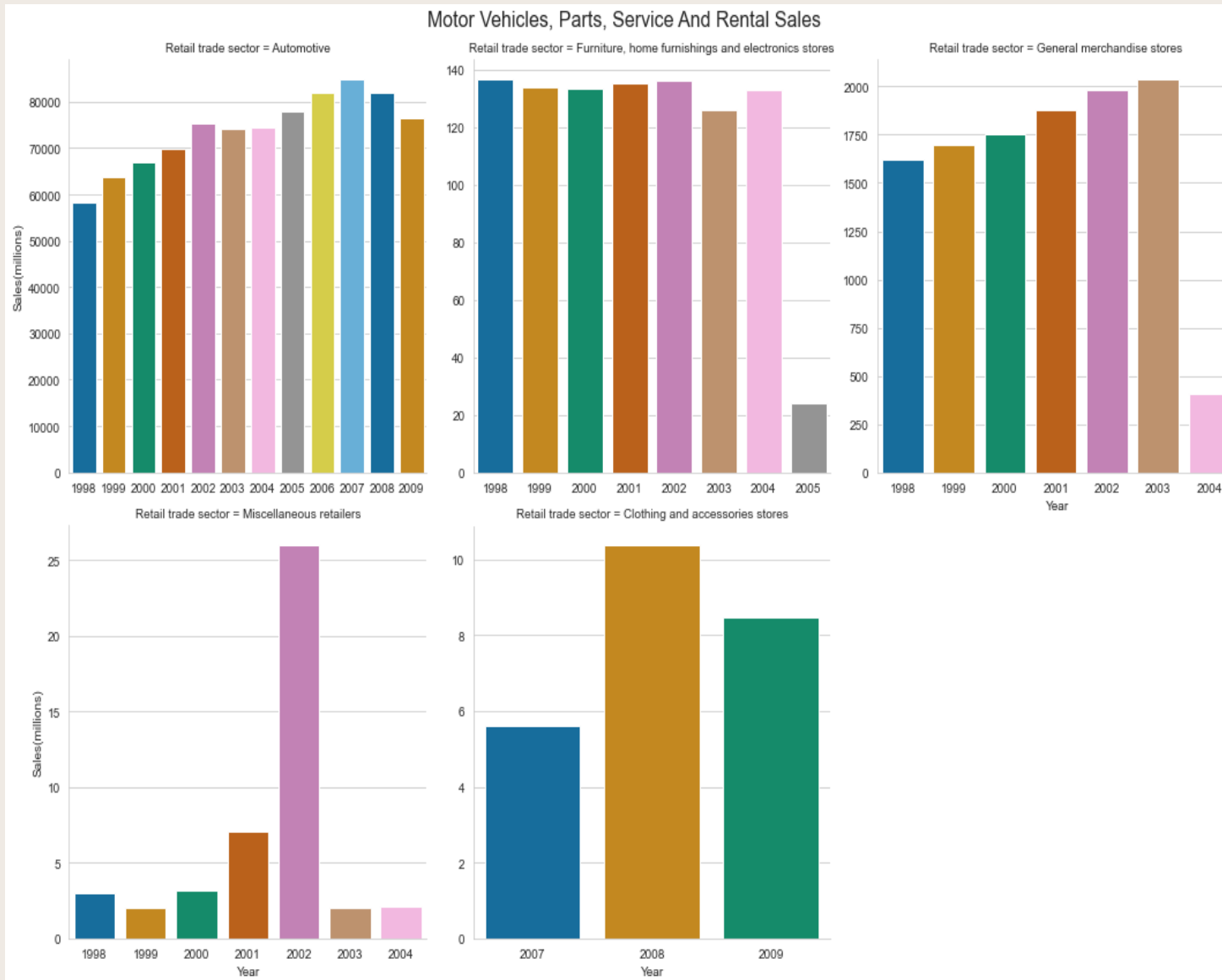
7. How does the sales of food and beverage products vary by retail store over time?



Total Sales Overview For Food And Beverages

- We have filtered the retail categories to display only food and beverages
- This graph shows the total sales of food and beverages by retail sector over time
- Most of food and beverages are sold in food and beverage stores followed by general merchandise stores
- The automobile sector and the pharmacies sector contribute to the rest of the sales in food and beverages

*Others Furniture, home furnishings and electronics stores, Miscellaneous retailers

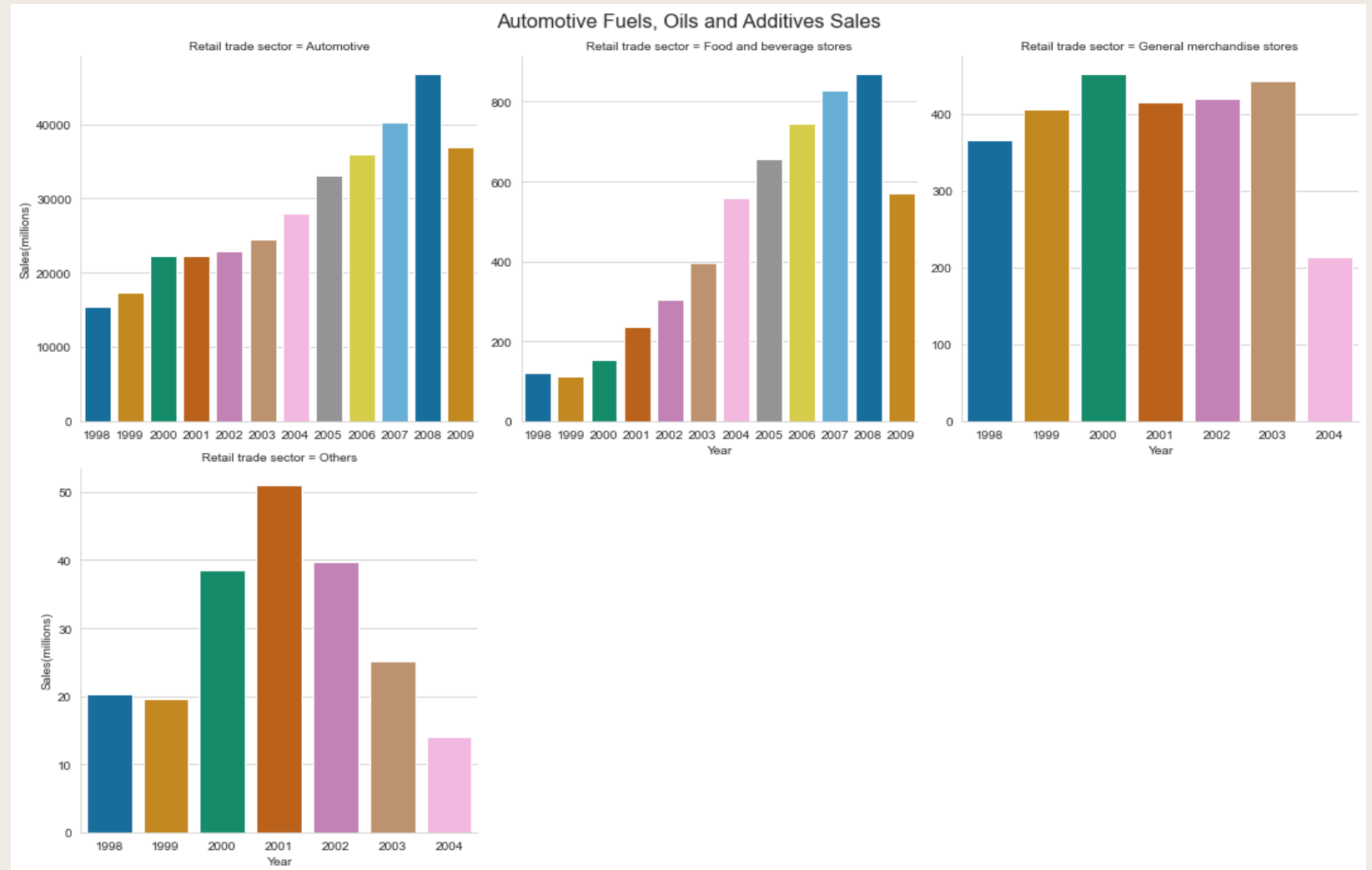


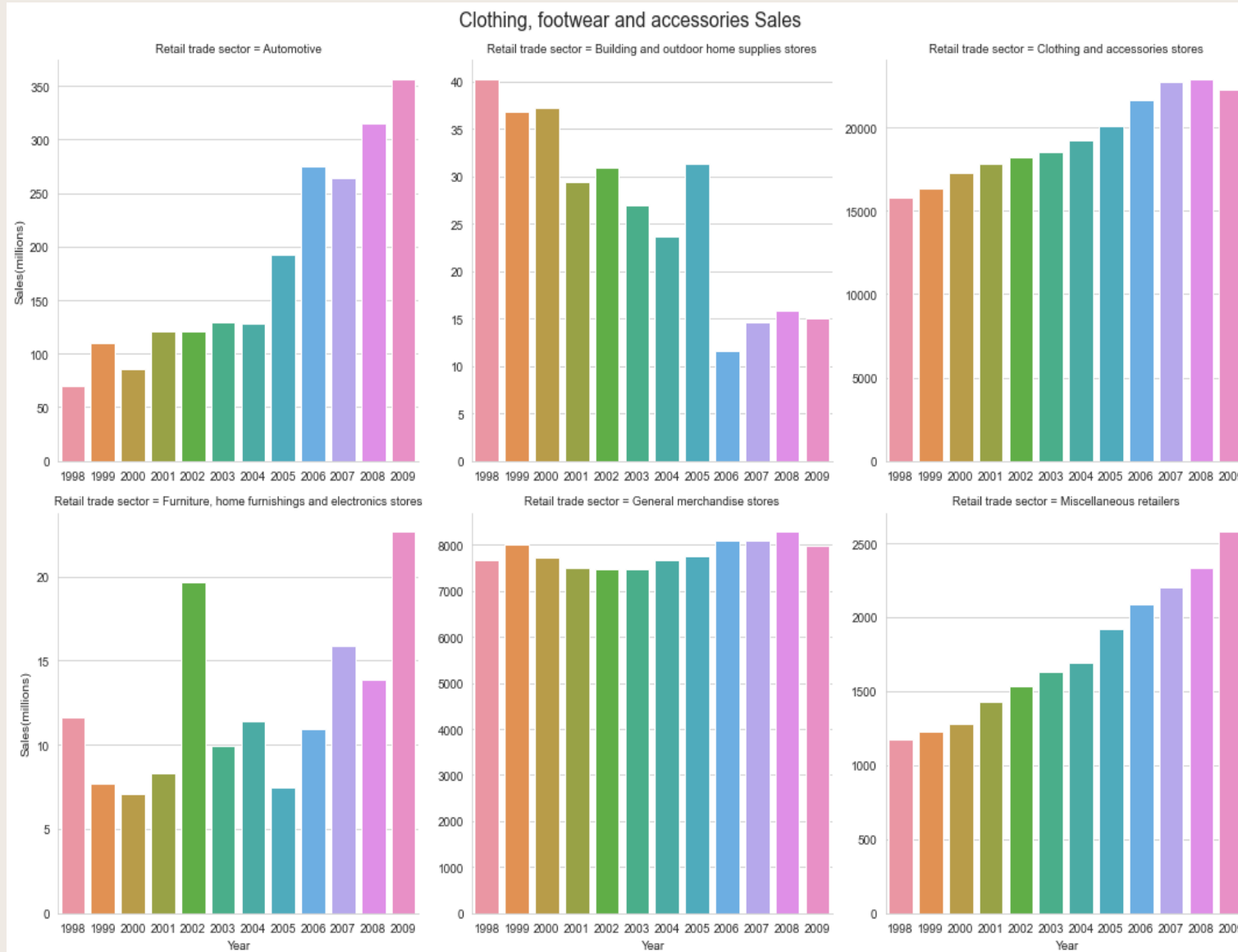
8. How do the sales of motor vehicles, parts, service, and rental products vary by retail trade store over time?

- The graph shows the sale of retail category motor vehicles, parts, service, and rental products in retail trade sector over time
- The different graphs shows the sales of the products in the automotive, furniture, general merchandise, miscellaneous retailers and clothing stores
- In auto motive stores there is a good amount of sales with a slight increase.
- In furniture and general merchandise stores we see a sudden dip in the sales in the year 2005 and 2004 respectively
- Miscellaneous retailers had a spike in sales in 2002 and rest seems lower
- In clothing stores the sales start from 2007 and shows a normal distribution

9. How do the sales of automotive fuels, oils, and additives vary by retail trade sector over time?

- The graph shows the sale of Automotive fuels, Oils and Additive sales over different retail sectors
- The different graphs shows the sales of the products in the automotive, general merchandise, food and beverages stores and the others.
- The automotive and food and beverages stores has a steady increase over the years with a dip in the year 2009
- General merchandise stores have uniform distribution with a dip in the end for the year 2004
- The rest of the stores have unimodal distribution of the sales over the years





10. How does the sales of clothing and footwear products vary by retail trade sector over time?

- The graph shows the sale of retail category clothing, footwear and accessories products in retail trade sector over time
- The different graphs shows the sales of the products in the automotive, furniture, general merchandise, miscellaneous retailers and clothing stores and building and outer supplies store
- There is a steady increase in sale in the automotive, , clothing and miscellaneous retail stores
- For general merchandise stores the sales is uniform without increase or decrease
- There is a dip in the number of sales in building and outdoor stores
- In furniture and electronic stores the distribution is multimodal with steep increase in the years 1998 and 2002 and experiences dips in between

Thank you!

Github

https://github.com/vidd01/Sales-project/blob/main/Phase2_Jupyter.ipynb

Jira

<https://dab103group7.atlassian.net/jira/core/projects/D1G7/board?atlOrigin=eyJpIjoiMGYyNzNjZDIxOWQ5NDM4MzgWNDMwOTc2MzEzZGUyM2QilCJwIjoiajI9>





Reference

• *Retail commodity sales, by retail trade sector based on the North American industry classification system (NAICS), inactive* - Open government Portal. (2017, February 27). Open Government | Open Government, Government of Canada.
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<https://open.canada.ca/data/en/dataset/ec690886-687d-4d59-9b1b-51311435d344>

• <https://github.com/dr-prodigy/python-holidays>