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Business Intelligence Analysis



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Stock ID: 47857043



Introduction

Introduction

Background Information

- The retail chain operates a network of stores across multiple cities, offering a diverse range of products. With growing competition and fluctuating market demands, the company seeks to enhance its sales performance and optimize stock levels.

Objective of the Analysis

- This analysis aims to:
- Identify Sales Trends: Understand how sales evolve over time and across locations.
- Analyze Stock Impact: Determine how stock availability influences sales volume.
- Conduct Regression Analysis: Assess the relationship between sales and time to forecast future trends.
- Provide Data-Driven Recommendations: Suggest actionable insights to improve inventory management and maximize revenue.





Methodology

Data Details

- The data consists of 6 .csv files, the main one regarding sales and transactions and the other 5 being auxiliary regarding details about products, stores and locations.

Module 1: Data Cleaning and Preparation Using Excel

Imported raw sales data into Excel.

Used **filters, sorting, and conditional formatting** to identify missing or inconsistent values.

Applied **Excel formulas** to clean and format the dataset.

Standardized column headers and removed duplicates to ensure integrity.

Module 2: Data Querying and Analysis Using PostgreSQL

Data Querying:

Utilize **SQL queries** to extract and manipulate data from the PostgreSQL database

Perform checks to ensure data is populated in the tables.

Data Analysis:

Create **data cubes** using the ROLLUP function to summarize data along hierarchies.

Analyze sales trends over time and across various regions to identify patterns.

Results:

Interpret the results of the SQL queries to derive insights that inform business strategies.

Module 3: Data Visualization and Statistical Analysis

Used **Python (Plotly, Pandas, and Seaborn)** for advanced visualizations.

Created a **Sunburst Chart** to analyze sales distribution across cities, stores, and products.

Developed a **scatter plot with a trendline** to study the relationship between stock levels and sales volume.

Conducted **regression analysis in Excel** to evaluate how sales change over time.

Module 4: Data Visualization and Dashboards Using Tableau

Imported processed data into **Tableau**.

Created a **dashboard** showcasing sales performance, stock trends, and key insights.

Designed **interactive charts** to allow dynamic filtering by store, product, and time period.

Provided a **data-driven recommendation section** for business decision-making.



Results

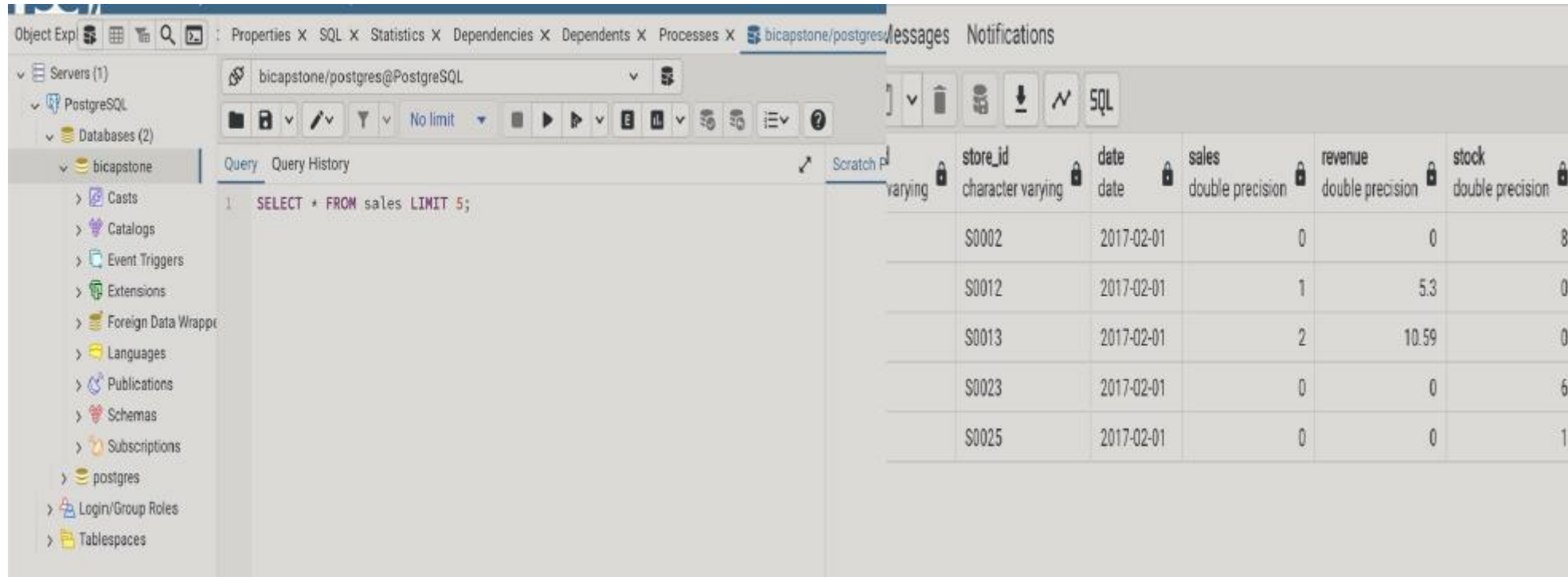
Module 1, Lesson 1: Data Cleaning and Preparation

	A	B	C	D	E	F	G	H	I	J	K	
1	product_id	store_id	date	sales	revenue	stock	price	promo_type_1	promo_bin_1	promo_type_2	promo_bin_2	prom
2	P0001	S0002	01-02-17	0	0	8	6.25	PR14		PR03		
3	P0001	S0012	01-02-17	1	5.3	0	6.25	PR14		PR03		
4	P0001	S0013	01-02-17	2	10.59	0	6.25	PR14		PR03		
5	P0001	S0023	01-02-17	0	0	6	6.25	PR14		PR03		
6	P0001	S0025	01-02-17	0	0	1	6.25	PR14		PR03		
7	P0001	S0027	01-02-17	0	0	7	6.25	PR14		PR03		
8	P0001	S0040	01-02-17	0	0	19	6.25	PR14		PR03		
9	P0001	S0049	01-02-17	0	0	8	6.25	PR14		PR03		
10	P0001	S0050	01-02-17	0	0	5	6.25	PR14		PR03		
11	P0001	S0051	01-02-17	0	0	6	6.25	PR14		PR03		
12	P0001	S0055	01-02-17	0	0	6	6.25	PR14		PR03		
13	P0001	S0056	01-02-17	1	5.3	6	6.25	PR14		PR03		
14	P0001	S0062	01-02-17	0	0	2	6.25	PR14		PR03		
15	P0001	S0063	01-02-17	0	0	7	6.25	PR14		PR03		
16	P0001	S0066	01-02-17	0	0	1	6.25	PR14		PR03		
17	P0001	S0078	01-02-17	0	0	6	6.25	PR14		PR03		
18	P0001	S0082	01-02-17	0	0	4	6.25	PR14		PR03		
19	P0001	S0083	01-02-17	0	0	10	6.25	PR14		PR03		
20	P0001	S0087	01-02-17	0	0	10	6.25	PR14		PR03		
21	P0001	S0094	01-02-17	0	0	6	6.25	PR14		PR03		
22	P0001	S0096	01-02-17	0	0	2	6.25	PR14		PR03		
23	P0001	S0102	01-02-17	0	0	7	6.25	PR14		PR03		
24	P0001	S0103	01-02-17	1	5.3	10	6.25	PR14		PR03		
25	P0001	S0104	01-02-17	0	0	22	6.25	PR14		PR03		
26	P0001	S0105	01-02-17	0	0	6	6.25	PR14		PR03		

Module 1, Lesson 2: Data Analysis Using Pivot Tables

City Name ▾	Sum Sales	Total Revenue	Average Sales
Edinburgh	5538	\$18,146.50	0.68
Helsinki	3675	\$17,880.98	0.38
London	1901	\$5,080.29	0.64
Saint Petersburg	1247	\$4,545.47	0.25
Vienna	787	\$1,713.89	0.19
Grand Total	13148	\$47,367.13	0.44

Module 2, Lesson 1: Data Querying Using PostgreSQL



The screenshot displays the PostgreSQL Enterprise Studio interface. On the left, the 'Object Explorer' pane shows the database structure, including 'Servers (1)', 'PostgreSQL', 'Databases (2)', and the 'bicapstone' database. The 'Query' pane in the center contains the SQL statement: `SELECT * FROM sales LIMIT 5;`. The 'Messages' pane on the right shows the query results as a table with the following data:

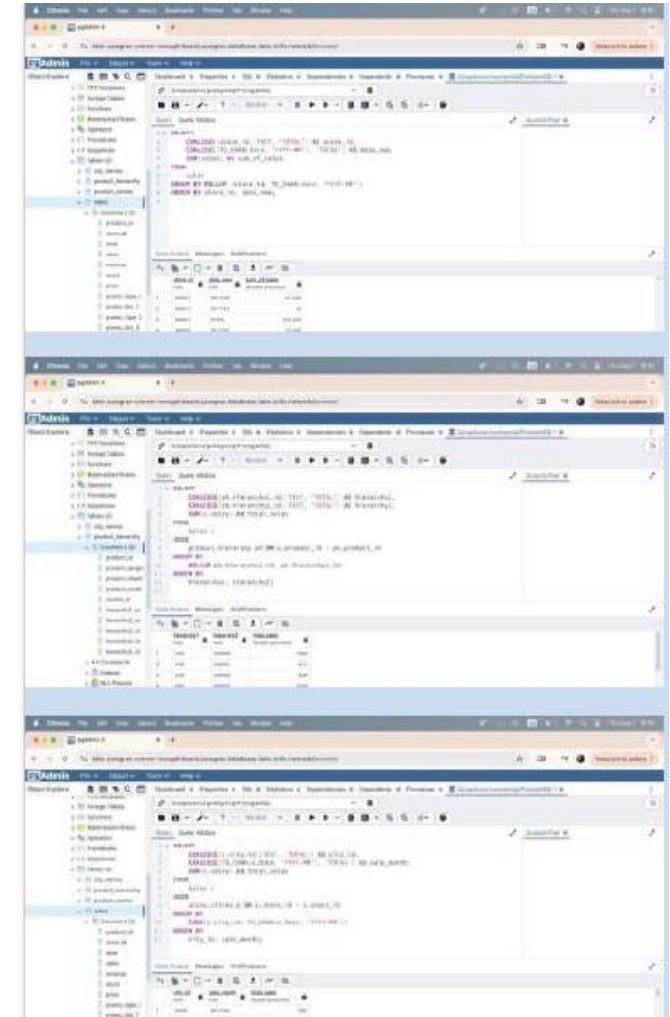
store_id	date	sales	revenue	stock
S0002	2017-02-01	0	0	8
S0012	2017-02-01	1	5.3	0
S0013	2017-02-01	2	10.59	0
S0023	2017-02-01	0	0	6
S0025	2017-02-01	0	0	1

Module 2, Lesson 2: Data Analysis Using PostgreSQL

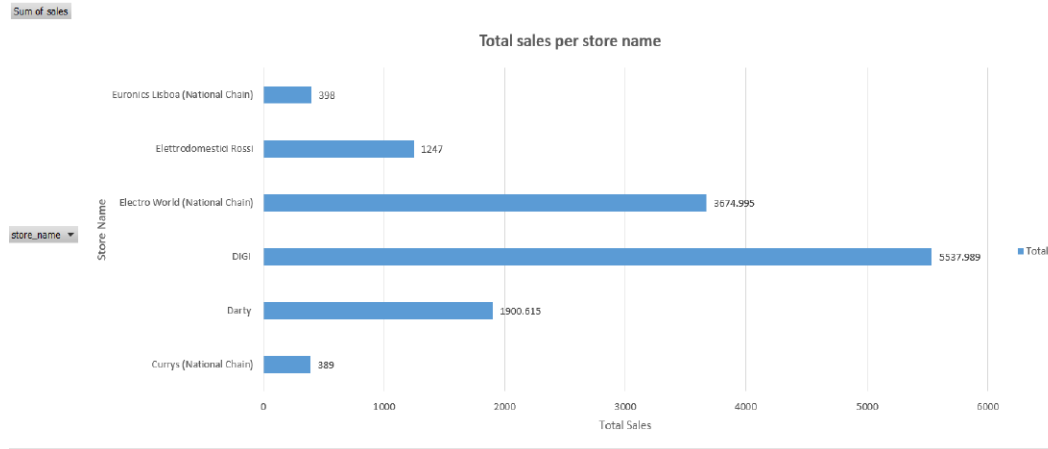
Creation of Data Cubes with ROLLUP: This helps in identifying which products perform best in specific regions or time periods, allowing businesses to tailor their sales strategies and inventory levels accordingly.

Summarizing Data Along Hierarchies: This enables businesses to focus on high-performing categories while identifying underperforming areas that may need attention or strategic changes, thus optimizing marketing efforts and resource allocation.

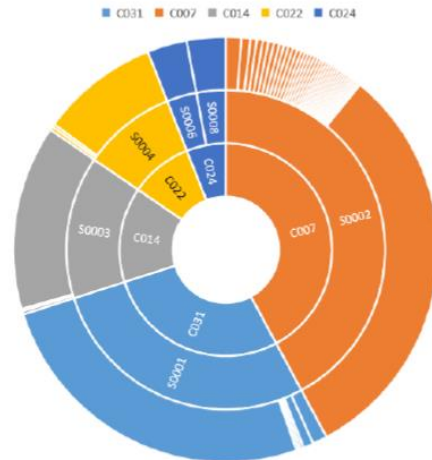
Identifying Sales Trends Over Time and Across Various Regions: This information is crucial for forecasting demand, planning promotions, and managing stock levels effectively to avoid overstocking or stockouts, ultimately leading to improved customer satisfaction and profitability.



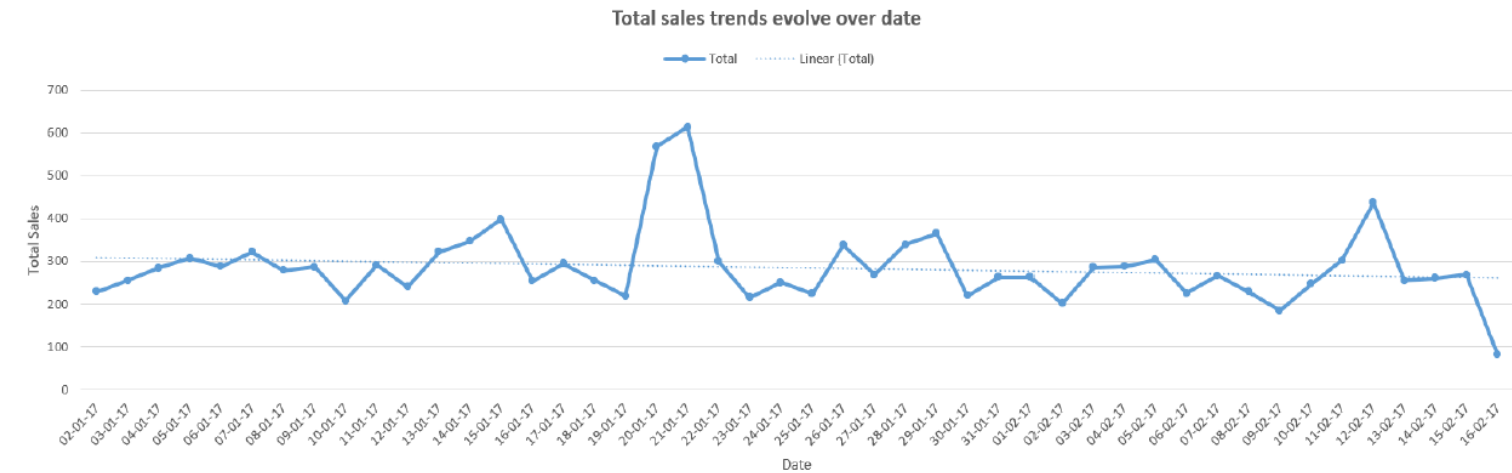
Module 3, Lesson 1: Data Visualization Using Excel



The sales distribution of each product of every store of each city



Sum of sales

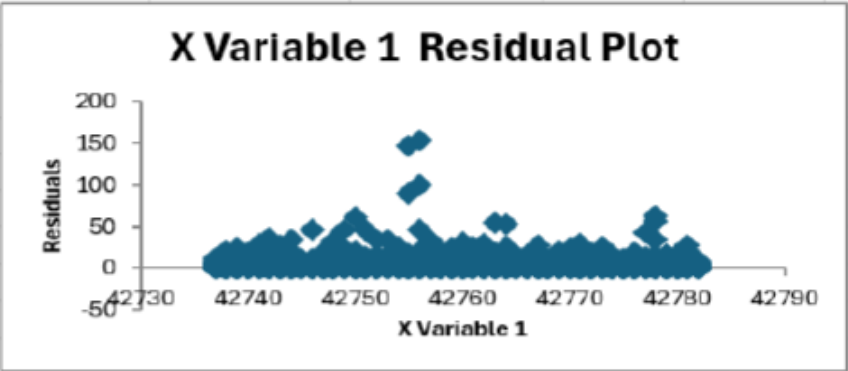


date

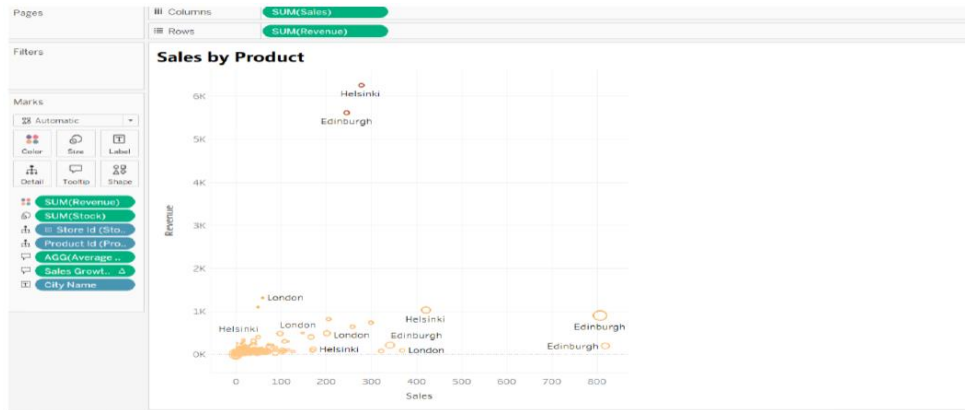
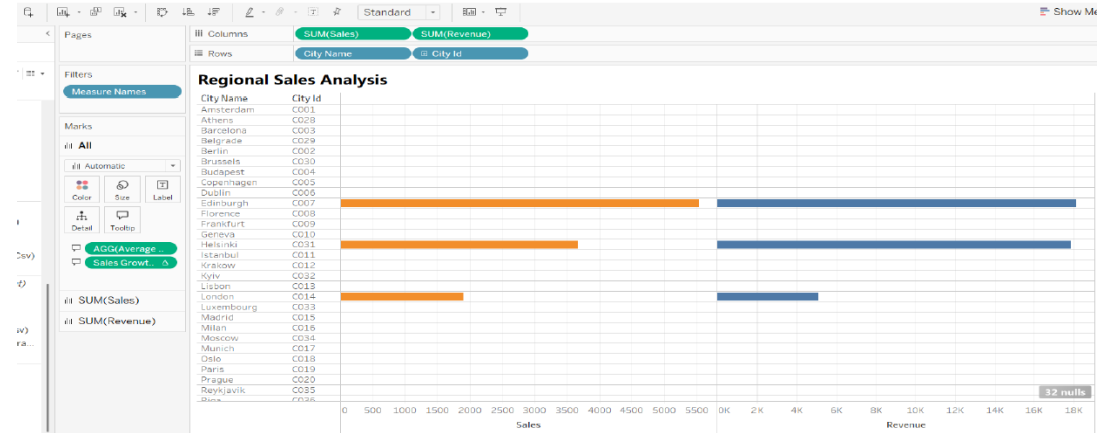
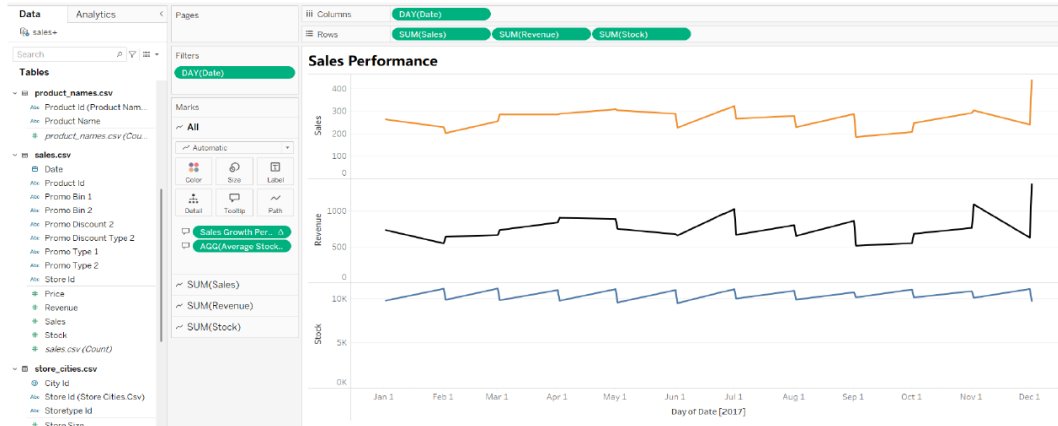
Module 3, Lesson 2: Statistical Analysis

SUMMARY OUTPUT									
Regression Statistics									
Multiple R	0.00255527								
R Square	6.52941E-06								
Adjusted R Square	-4.34753E-05								
Standard Error	2.805644826								
Observations	20000								
ANOVA									
	df	SS	MS	F	Significance F				
Regression	1	1.027846923	1.027846923	0.130575909	0.71783948				
Residual	19998	157417.1145	7.87164289						
Total	19999	157418.1424							
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%	
Intercept	-23.25708307	65.83469919	-0.353264819	0.723893642	-152.2985326	105.7843664	-152.2985326	105.7843664	
X Variable 1	0.000556371	0.001539689	0.361352883	0.717839483	-0.002461547	0.003574289	-0.002461547	0.003574289	

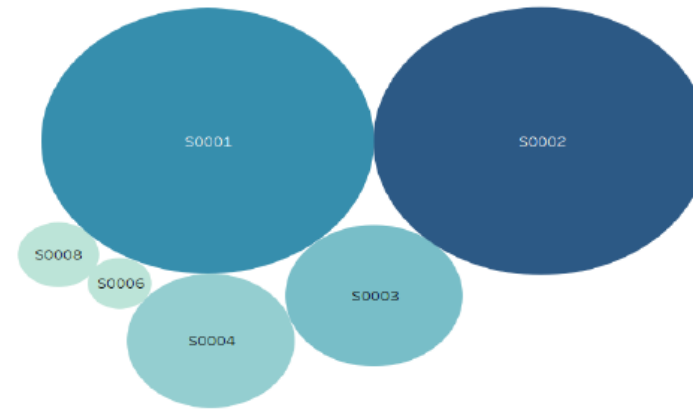
X Variable 1 Residual Plot



Module 4, Lesson 1: Basic Tableau Visualizations

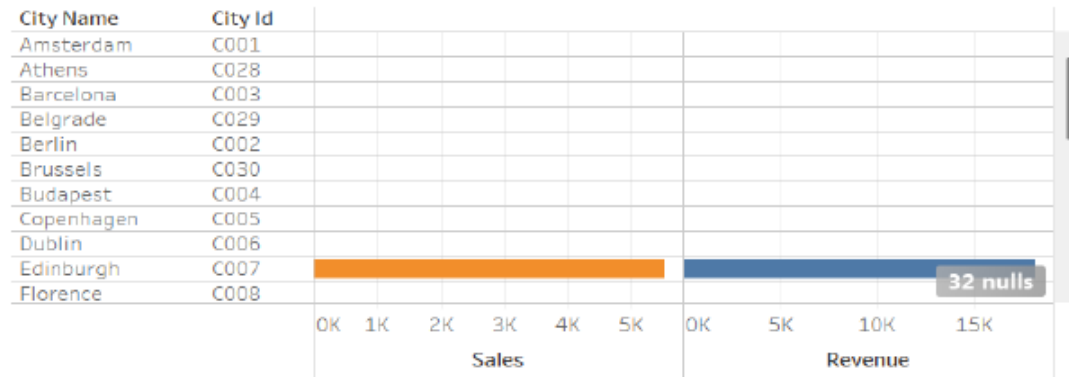


Sales by Store

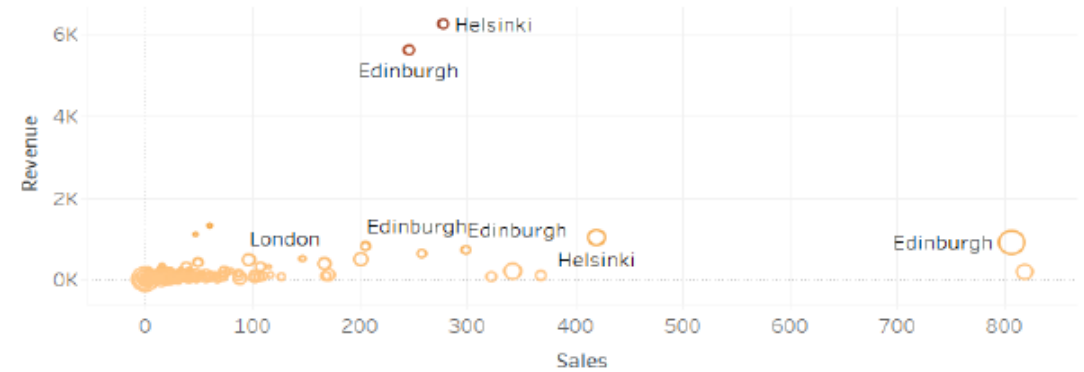


Module 4, Lesson 2: Advanced Visualizations Using Tableau

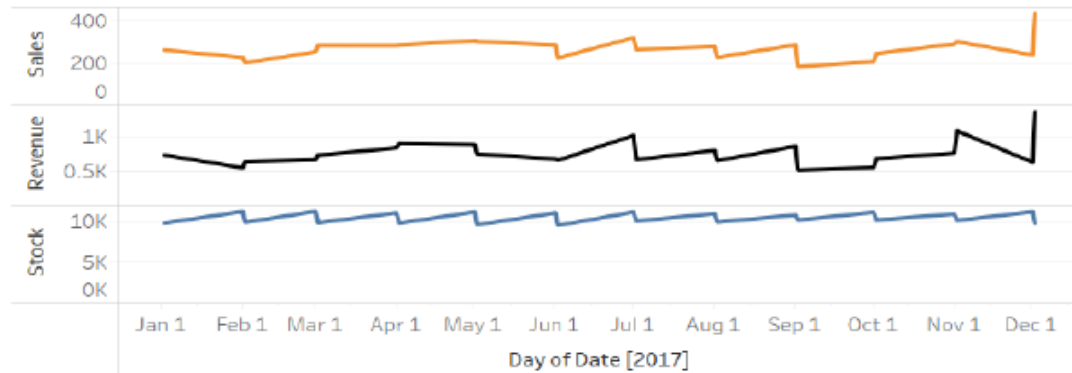
Regional Sales Analysis



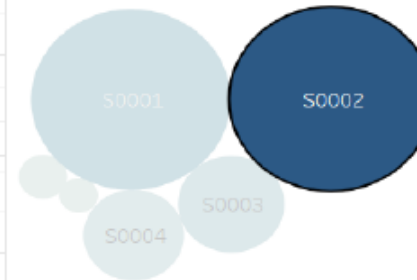
Sales by Product



Sales Performance



Sales by Store





Discussion

Insights and Recommendations

Sales Performance Varies by Location

- Some stores significantly outperform others, indicating **differences in customer demand and purchasing behavior**.
- **Implication:** The retail chain should **analyze store-level factors** (e.g., location demographics, competitor presence) to optimize operations.

Stock Levels & Sales Correlation is Weak

- The scatter plot and regression analysis suggest **no strong correlation between stock levels and sales**.
- **Implication:** Other factors (such as **pricing, promotions, and seasonality**) might have a **greater influence on sales trends**.

Regression Analysis Shows No Strong Predictive Relationship

- The R^2 value is nearly zero, indicating that the independent variable does not significantly predict sales.
- **Implication:** Businesses should **consider more variables** (e.g., marketing campaigns, discounts, seasonal trends) in future predictive models.



Conclusion

Summary

Analysis of Sales Performance Across Cities

- Based on the provided key findings, here is a rewritten summary and conclusion, emphasizing clarity and actionable insights.

Key Findings

- The analysis reveals distinct performance patterns across different cities:
- **Helsinki and Edinburgh** show strong revenue despite moderate sales volumes. This suggests that these locations are either selling **high-value products** or have adopted successful **premium pricing strategies**.
- In contrast, **London and Saint Petersburg** generate lower revenue relative to their high sales volume. This indicates a potential reliance on **lower-priced products** or smaller transaction values.
- **Stock management** appears to be a key area for improvement. Some cities maintain high stock levels without a corresponding increase in revenue, which points to potential inefficiencies in inventory and logistics.

Conclusion and Recommendations

- The company's strategy should focus on two primary areas for optimization:
- **Pricing Strategy:** Review and adjust the pricing model in cities like **London and Saint Petersburg** to increase revenue without compromising sales volume. The success of Helsinki and Edinburgh can serve as a benchmark for this effort.
- **Stock Management:** Improve inventory allocation by linking **stock levels to revenue potential**. This will help prevent overstocking in low-revenue cities and ensure that high-revenue locations have adequate supply to meet demand.



Appendix

Appendix

Include any relevant additional charts, worksheets, or tables that you may have created during the analysis phase