TRANSPORT AND TELECOMMUNICATION INSTITUTE

COMPUTER SCIENCE

Business Intelligence and Data Visualisation

Reflective Diary: Exploring Data Visualization and Business Intelligence for a North American Retailer

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Introduction

As part of my coursework in Business Intelligence and Data Visualization at Transport and Communication Institute (TSI), I embarked on a project titled "Large Scale North American Retailer Analysis" utilizing Tableau Public. Tableau Public was utilized for creating the interactive dashboards (Tableau Software, 2022).. This initiative placed me in the role of a BI consultant for a major North American retailer focused on wholesaling and manufacturing home goods and groceries. My main objective was to analyze data spanning from late 2017 to 2020 to unearth insights concerning sales trends, inventory management, and financial performance across various brand stores.

Data Exploration and Preparation

The initial phase demanded a thorough understanding and meticulous preparation of the data:

- **Data Cleaning**: Initial examinations revealed inconsistencies and missing values that were subsequently standardized and corrected.
- **Handling Missing Values**: Techniques such as mean substitution and interpolation were employed to address missing data points, ensuring comprehensive data integrity.
- **Data Pre-processing**: This included normalization to standardize various data attributes and encoding categorical variables to facilitate analysis.
- **Data Compilation**: Investigating data compilation helped me grasp the sources and methods used, including transaction records and inventory logs.
- **Enhancements in Data Structure**: I introduced calculated fields to enhance data utility, such as metrics for average purchase values and customer loyalty.
- **Data Characteristics**: An extensive exploration of data distribution, trends, and outliers set the stage for deeper analysis.

```
1   # Filling missing values
2   data['ITEM_DESCRIPTION'].fillna('Description Not Available', inplace=True)
3
4   # Converting date fields from integer to datetime
5   data['INVOICE_DATE'] = pd.to_datetime(data['INVOICE_DATE'], format='%Y%m%d')
6   data['ORDER_DATE'] = pd.to_datetime(data['ORDER_DATE'], format='%Y%m%d')
```

Fig 1. Part of Python code for Data Exploration and Preparation

Visual Design and Implementation

Recognizing the importance of visual consistency and branding, I chose a color palette that aligns with TSI's visual identity. The standard built-in blue palette in Tableau was selected to harmonize with TSI's logo, incorporating shades of blue, white, and grey to maintain aesthetic coherence across the dashboard. My attempt to integrate the University of the West of England's logo, which is vivid red, disrupted this harmony, leading me to omit it from the final design. Color harmony is essential in data visualization to enhance readability and viewer engagement (Cairo, 2016).

To support my color decisions, I used tools like Interworks Color Tool and Adobe Color to ensure the colors not only matched the institutional branding but also enhanced readability and visual appeal.
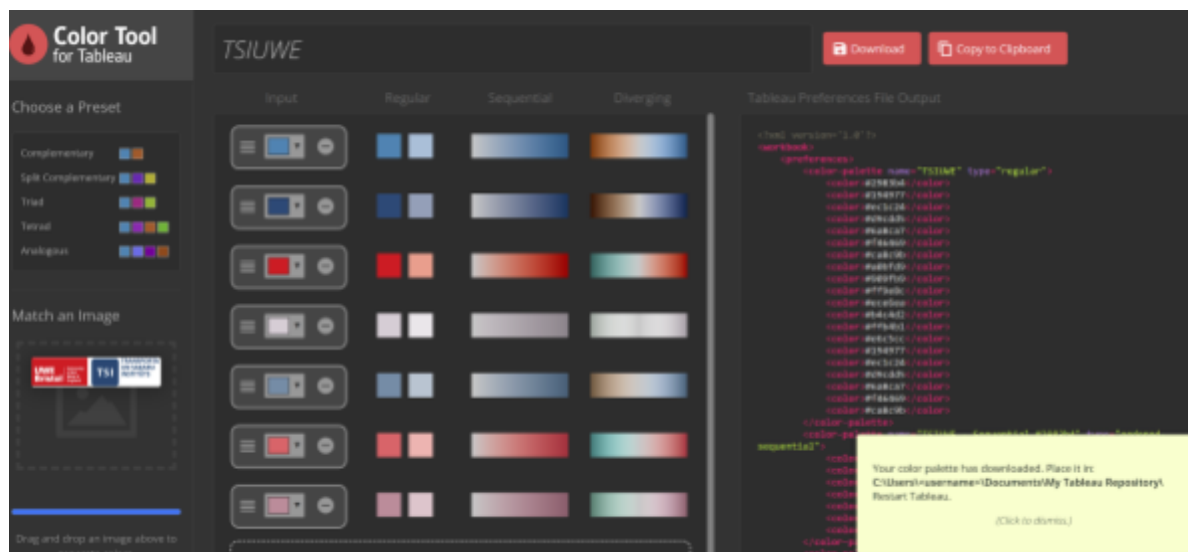

Fig 2. Interworks Color Tool

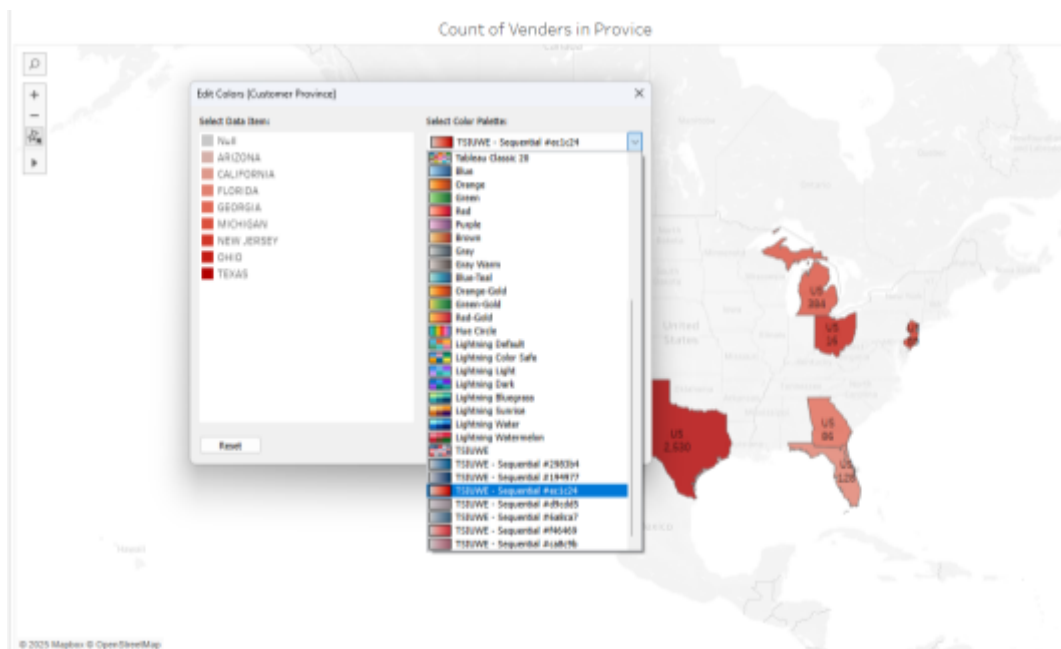Fig 3. Adobe Color

Fig 4. Adobe Color

Fig 5. Interworks Color Tool

Analysis and Insights

Deep dives into the dataset were carried out with a focus on:

- **Sales Trends**: Trends such as the total number of orders, average orders per customer, and revenue were visualized to highlight seasonal behaviors and purchasing patterns.
- **Top Performers**: Identification of top-performing products, customers, regions, and brands through bar charts and heat maps revealed key drivers of revenue.
- **Financial Analysis**: Critical examination of metrics like year-over-year growth, inventory values, and cost of goods sold provided foundational insights for strategic decision-making.
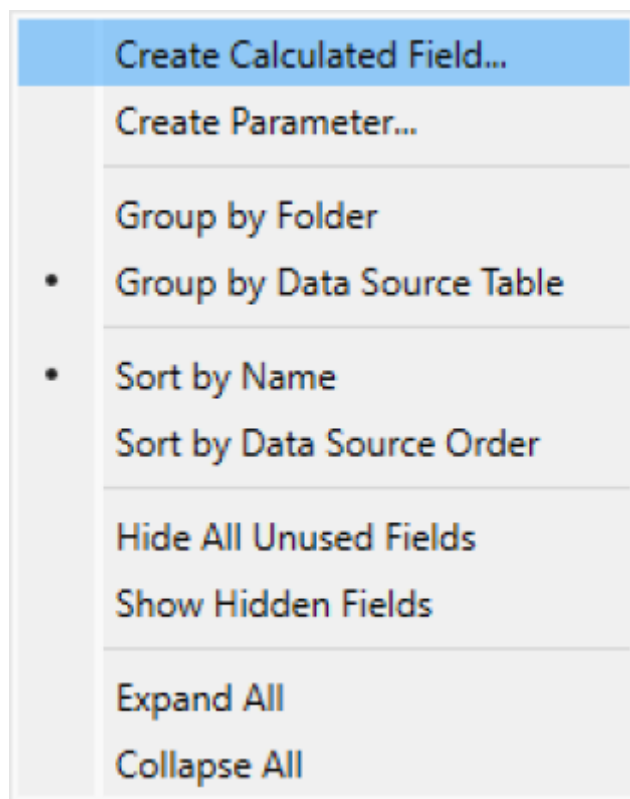
Fig 6. Create Calculated Field

Fig 7. Avg. Orders per Customer. Formula in Tableau

Interactive Dashboard Access

To provide stakeholders with a hands-on experience, I published the dashboard on Tableau Public, allowing users to explore data slices and visualize impacts in real-time.

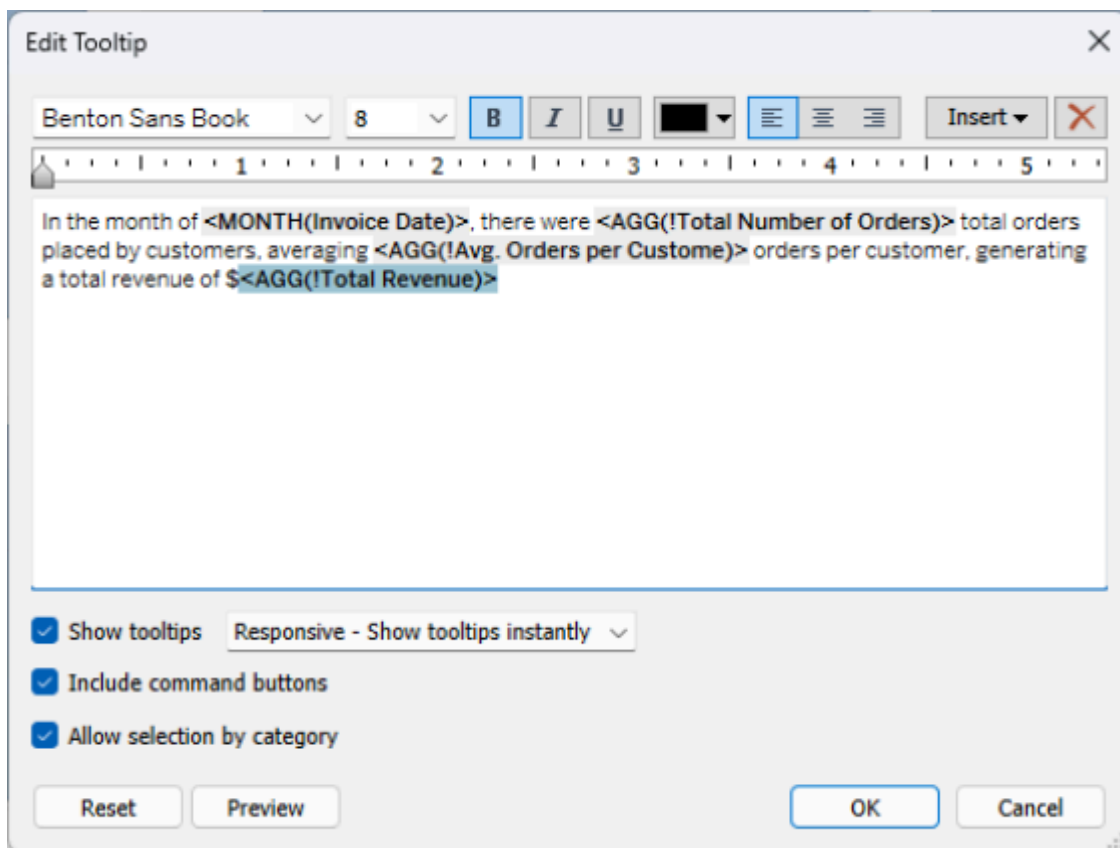Access the Dashboard Here: Comprehensive Retail Sales Analysis

Fig 8. Edit Tooltip

Rationale Behind the Layout of Graphics

- **Hierarchical Organization**: The dashboard is arranged to highlight the importance of key financial metrics at the top, reflecting their foundational role.
- **Grouping Related Metrics**: This allows for easier comparative analysis, enhancing user understanding of interrelated data.
- **Flow of Information**: The left-to-right arrangement caters to Western reading patterns, facilitating a logical progression through the data.
- **Geographic and Detailed Sales Analysis**: The central geographic map acts as a macro overview, linking broad financial data with detailed sales metrics.

Choice of Colors and Their Impact

The selection of blue, grey, and white tones not only supports TSI's corporate identity but also ensures the dashboard is visually appealing and accessible. The exclusion of overly

vibrant colors like the red from the University of the West of England's logo was a deliberate choice to maintain visual harmony and focus.
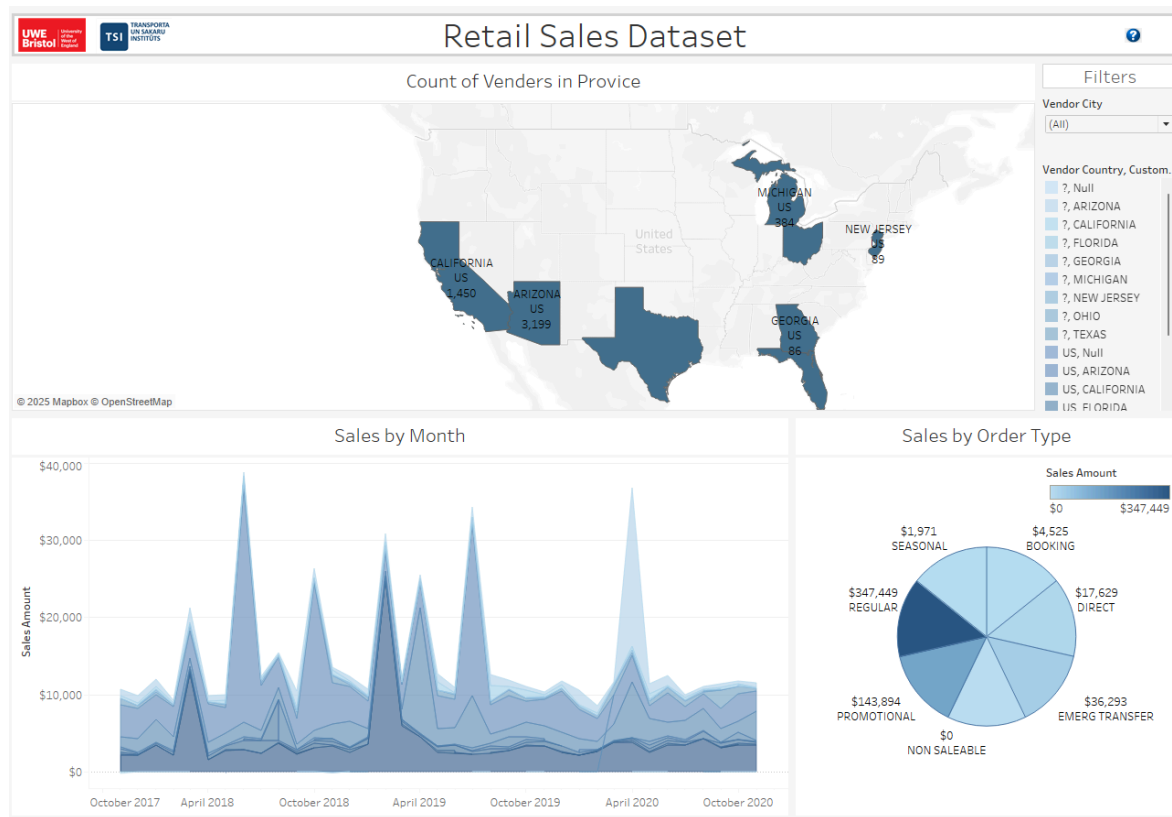

Fig 9. University of the West of England's (personal opinion: this is an excellent LOGO and University)!
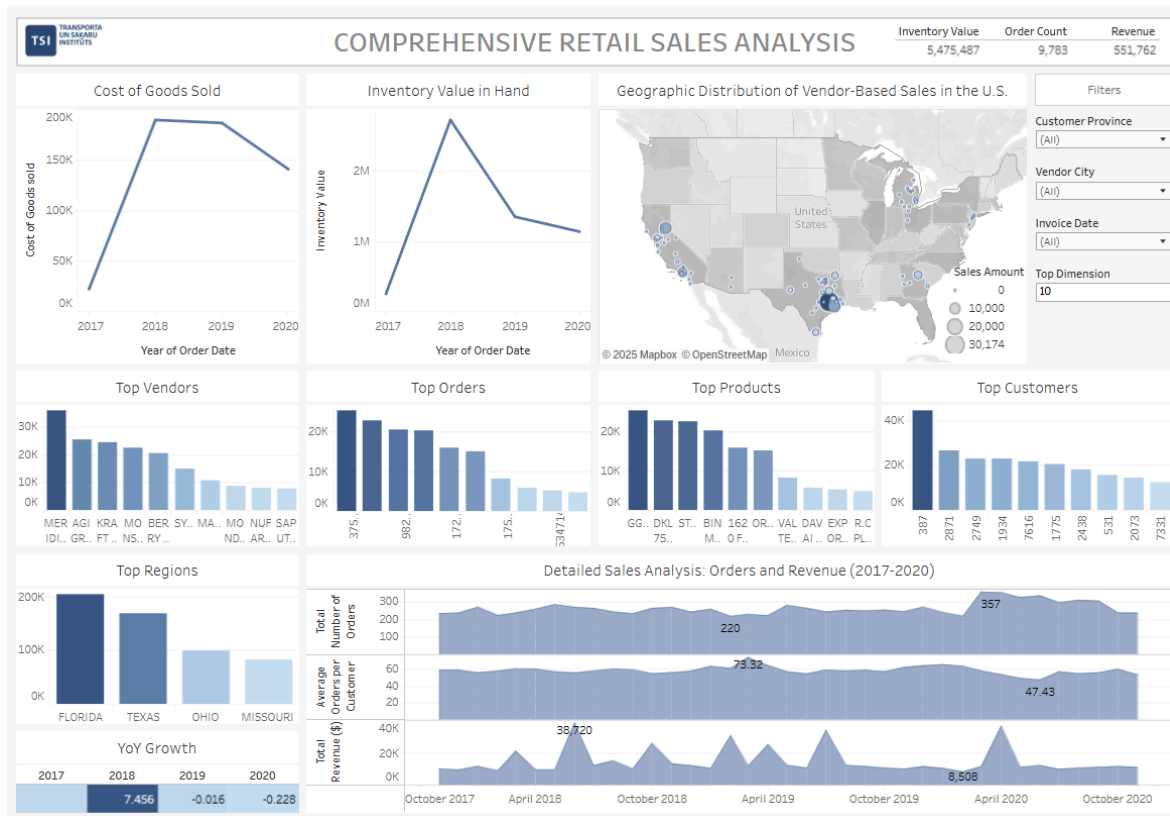
Fig 10. Format Dashboard

Dashboard

Fig 11. Dashboard Result Using Tableau Public Desktop

Access the Dashboard Here: Comprehensive Retail Sales Analysis

Conclusion

This project profoundly enhanced my capabilities in utilizing Tableau for intricate business intelligence tasks, marking a significant milestone in my academic and professional development. Through hands-on data analysis and visualization, I honed my technical skills of strategic decision-making. The insights generated have not only prepared me to offer valuable contributions in a real-world business setting but have also instilled a robust analytical mindset that is critical for my future career in data science.

Reference

1. Cairo, A. (2016). The Truthful Art: Data, Charts, and Maps for Communication. New Riders Publishing.
2. Sleeper, R. (2021). Tableau Desktop Pocket Reference. O'Reilly Media, Inc.
3. Tableau Software. (2022). Tableau Public User Guide. Retrieved from https://public.tableau.com
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