

# BANK TRANSACTION ANALYSIS

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# OBJECTIVE:

The objective of Bank Transaction Analysis is to gain insights into customer spending habits, preferences, and financial behaviors. By understanding these aspects, the aim is to offer personalized services tailored to individual needs, optimize targeted marketing efforts based on customer profiles, and ultimately enhance overall customer satisfaction.

Through a comprehensive analysis of customer behavior, businesses seek to foster stronger relationships, improve engagement, and deliver a more tailored and satisfying customer experience.

Understand the characteristics of high-spending and low-spending customer segments and their impact on overall revenue.

Analyze credit card transactions to identify patterns and trends in customer spending behavior over time.

Explore variations in spending across different demographic factors such as gender and location.

# VISUALIZATION USING POWER BI & PYTHON

01

Data Decision

02

Data Collection

03

Data Cleaning

04

Data Analysis

05

Data Visualization

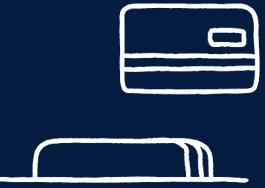


# DATA DECISION



## BANK TRANSACTION ANALYSIS

In an era of rapid digitalization, understanding and analyzing bank transactions have become increasingly vital. This project delves into the intricate world of financial data to extract meaningful insights, identify patterns, and detect anomalies. The aim is to optimize financial processes and contribute to a more secure and efficient banking system. The growing importance of data-driven decision-making in the financial sector motivated the selection of this project, as it addresses the need for advanced analytics to navigate the complexities of modern banking transactions.



## CREDIT CARD SPENDING HABITS

With a specific focus on credit card transactions, this project aims to solve valuable insights into consumer spending patterns. Analyzing credit card transactions provides a unique lens to understand individual purchasing behaviors, identify trends. By leveraging data analytics, this sub-problem contributes to optimizing credit spending habits, personalizing financial services, and enhancing customer experiences. The choice of credit card spending analysis as a sub-problem stems from its direct impact on financial decision-making and the potential to refine strategies for risk management and customer engagement in the banking sector.



# DATA COLLECTION & CLEANING

In the context of the broader bank transaction analysis framework, the focus narrows to credit card spending habits.

**01**

The credit card spending habits dataset for our analysis project comprises transactional information sourced from financial institutions

**02**

The Dataset which we choose is in (26052,8) in shape,The dataset encompasses crucial columns, including transaction amounts, dates, merchant details, and customer attributes

**03**

The collected data is then meticulously documented, detailing sources, methodologies, and any challenges encountered during the collection process.

**04**

To ensure data quality, rigorous cleaning procedures address missing values and outliers. we split the single column into two columns which consists of two variables.

**05**

we explore this dataset, the integration of AI tools for anomaly detection and pattern recognition holds promise for uncovering deeper insights.



Data analysis &  
visualization using

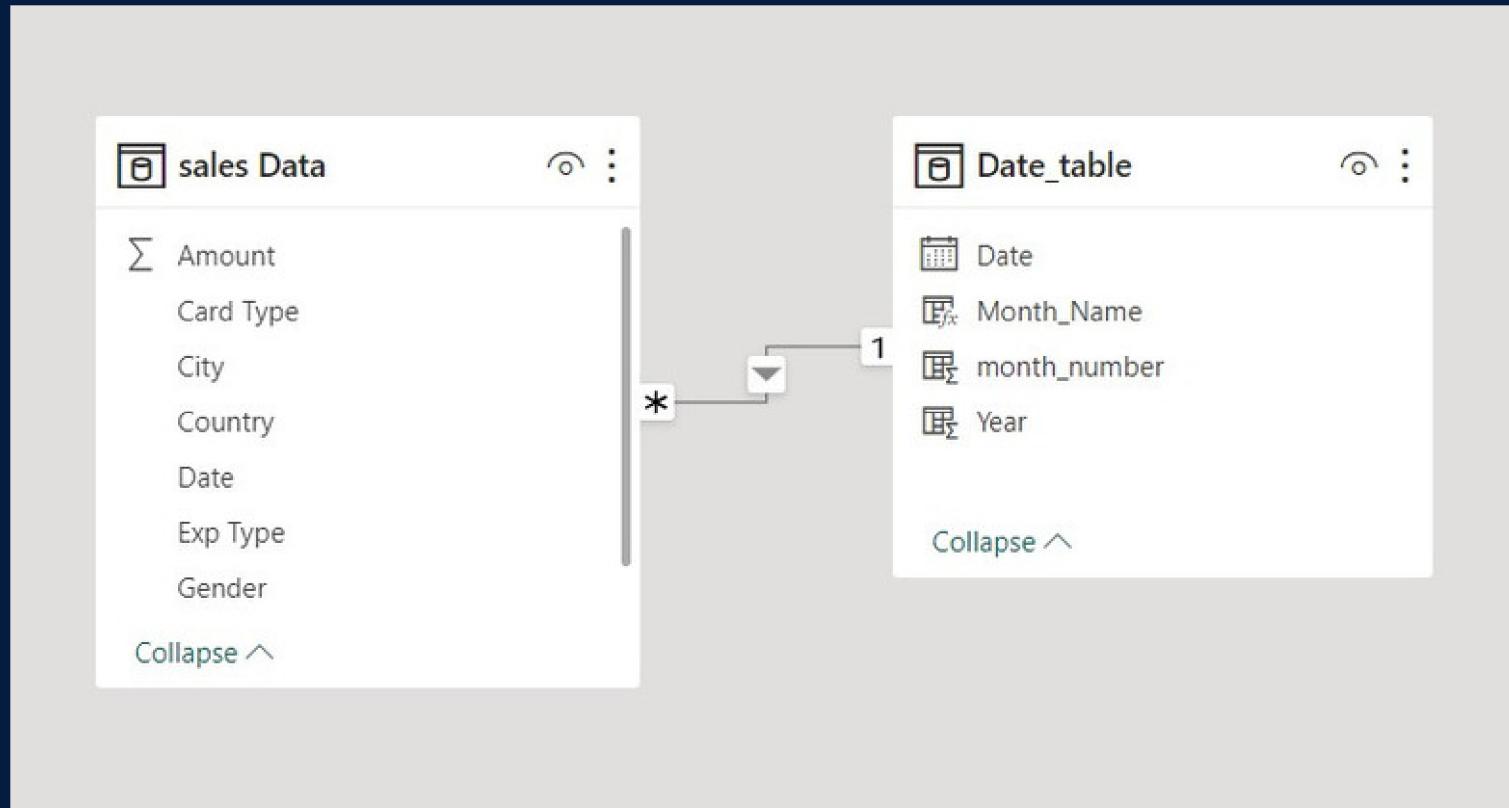
PowerBI

# Data analysis & visualization using PowerBI

Power BI is a Microsoft tool that facilitates efficient data analysis and visualization. It allows users to import and shape data from various sources, creating dynamic and interactive visualizations such as charts and graphs. With real-time updates and sharing capabilities, Power BI promotes collaboration and informed decision-making within organizations. Its user-friendly interface supports easy manipulation of data, and the tool's ability to handle diverse data sets ensures a comprehensive analysis. Power BI's features, including natural language queries, empower users to derive actionable insights, making it a valuable asset for businesses seeking to harness the power of their data for strategic decision-making.



# Data Model



we've established a relationship between two tables, the Date table and Sales table, by linking their common date column. This connection enables seamless integration for analyzing sales data over time within the Power BI environment.

Using DAX Expressions we have created new columns for better and accurate data analysis here are the Dax calculations

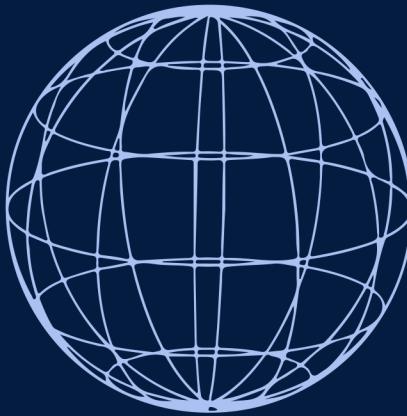
Month\_Name = FORMAT(Date\_table[Date], "mmm")

month\_number = MONTH(Date\_table[Date])

Year = YEAR(Date\_table[Date])

Date\_table = CALENDARAUTO()

# Visualizations used in Power BI

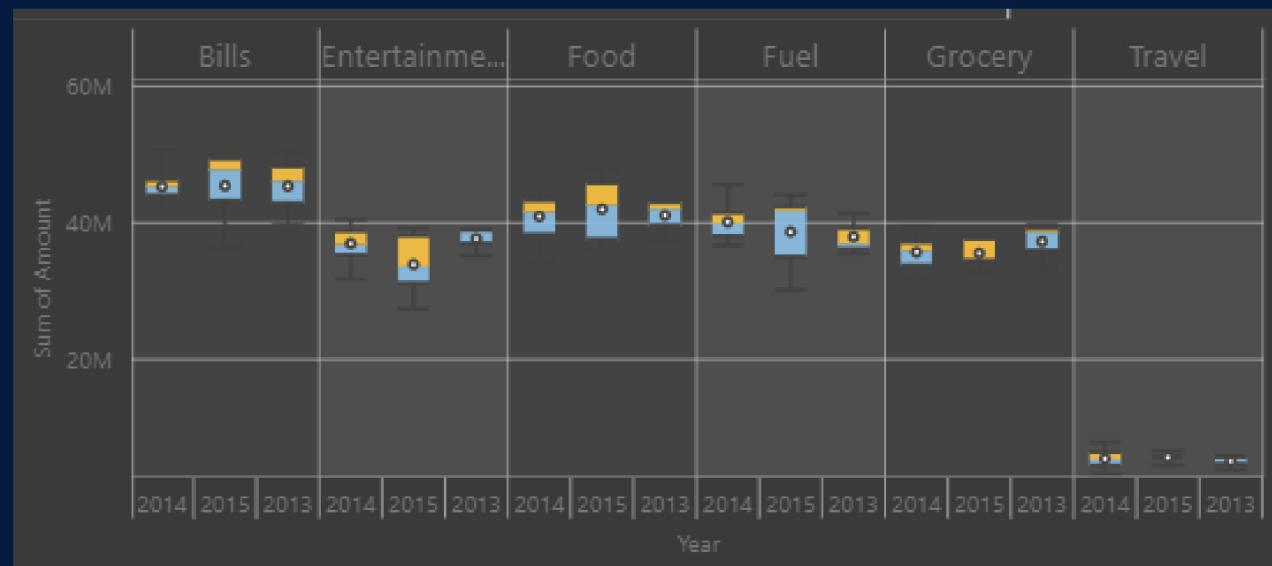


- Box Plot
- Line Chart
- Sun Burst
- Tree Map
- 100% Stacked Bar Chart
- Stacked Bar Chart

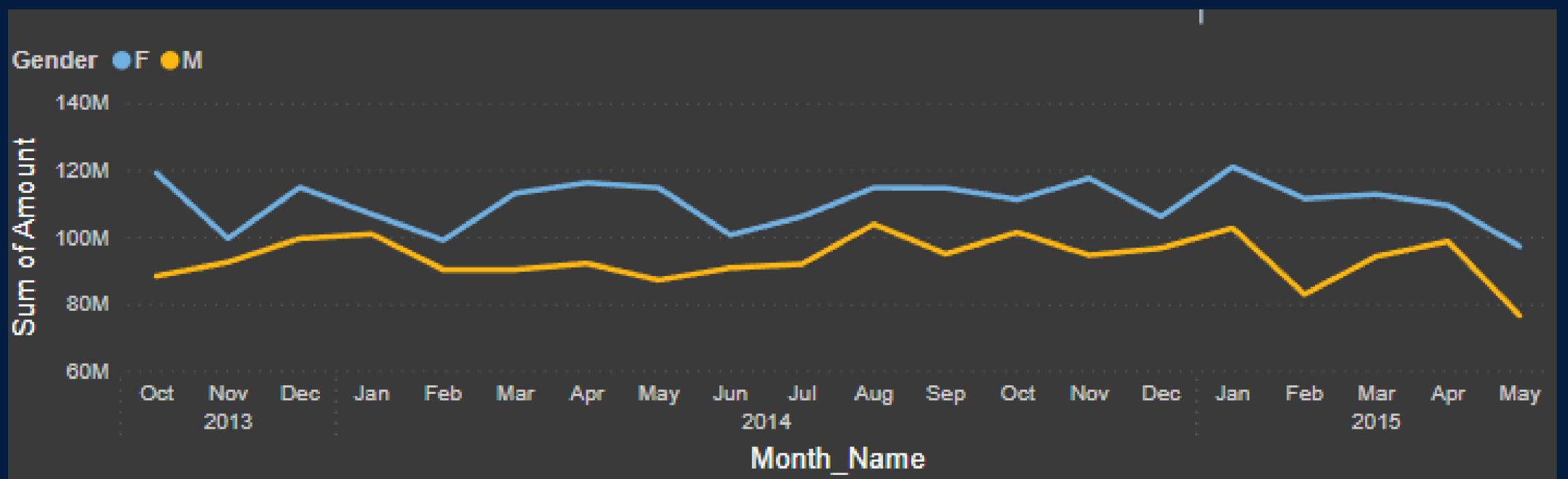


# BOX PLOT

The goal is to visualize the sum of amounts categorized by Month, Year, and Expense Type. This analysis provides a concise snapshot of expenditure patterns, facilitating informed decision-making based on monthly, yearly, and expense-specific insights.



# LINE CHART



The Line chart in Power BI is to showcase the sum of amounts grouped by Year, Month Name, and Gender. This visual representation over time provides a dynamic insight into spending trends, allowing for a comprehensive analysis of how expenditures vary across different years, months, and genders.

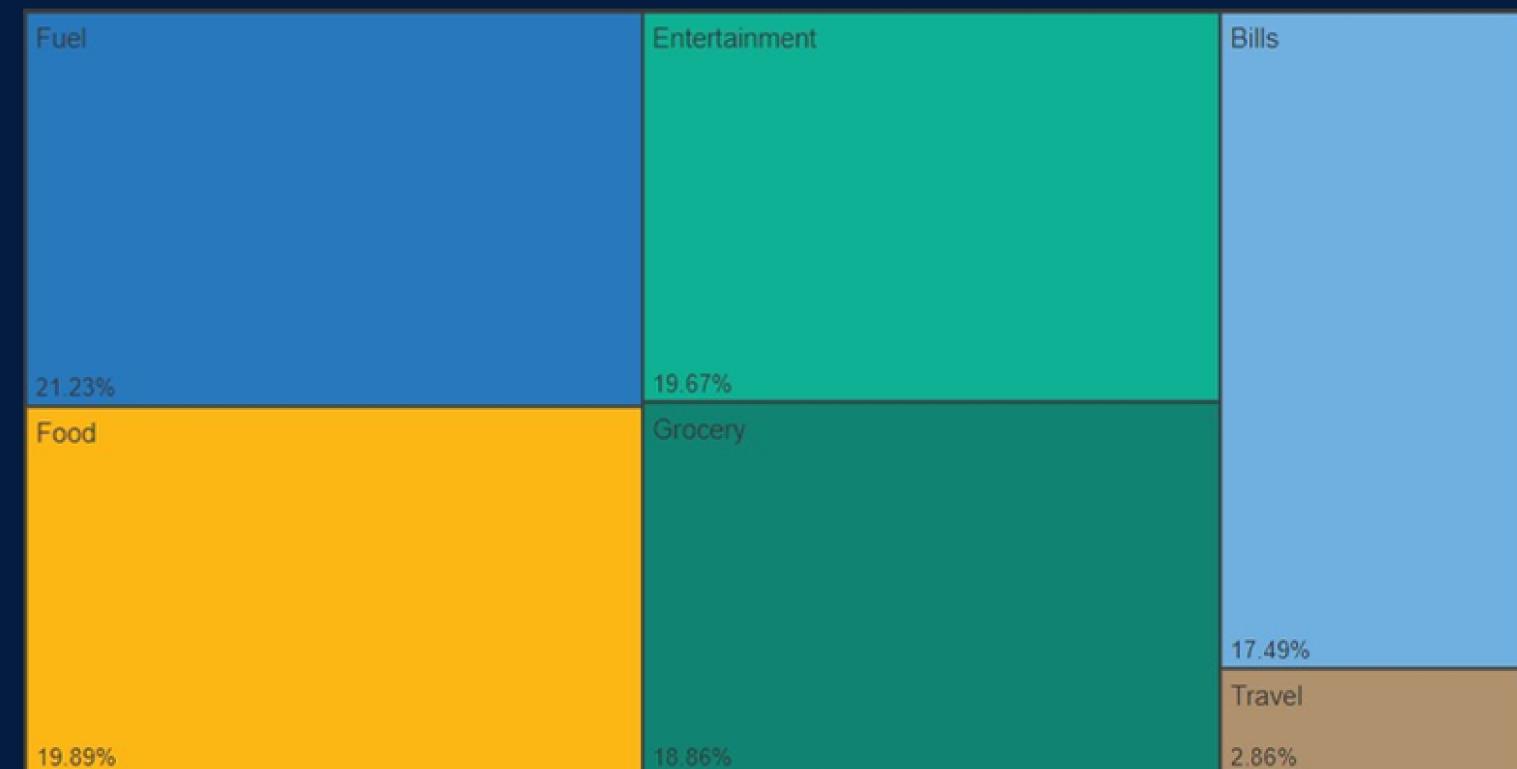
# SUNBURST CHART



Sunburst chart is used to visually represent sum of amounts categorized by Card Type, Gender, and Expense Type. This dynamic visualization offers a clear hierarchy, allowing for an intuitive exploration of spending patterns based on card type, gender, and specific expense categories.

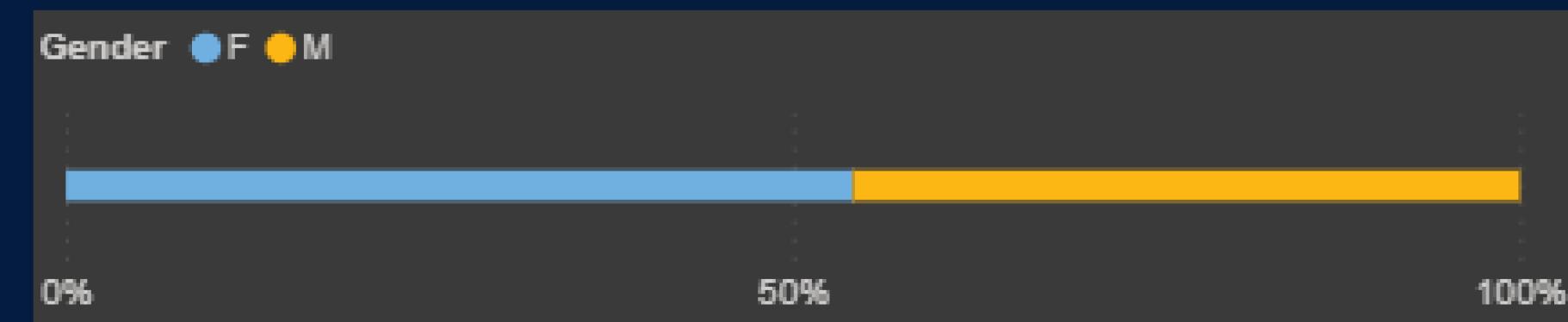
# TREE MAP

Illustrated the percentage distribution (%GT) of the sum of amounts across various Expense Types. This visualization allows for a quick and effective comparison of expenditure proportions, aiding in identifying dominant expense categories in relation to the total spending.

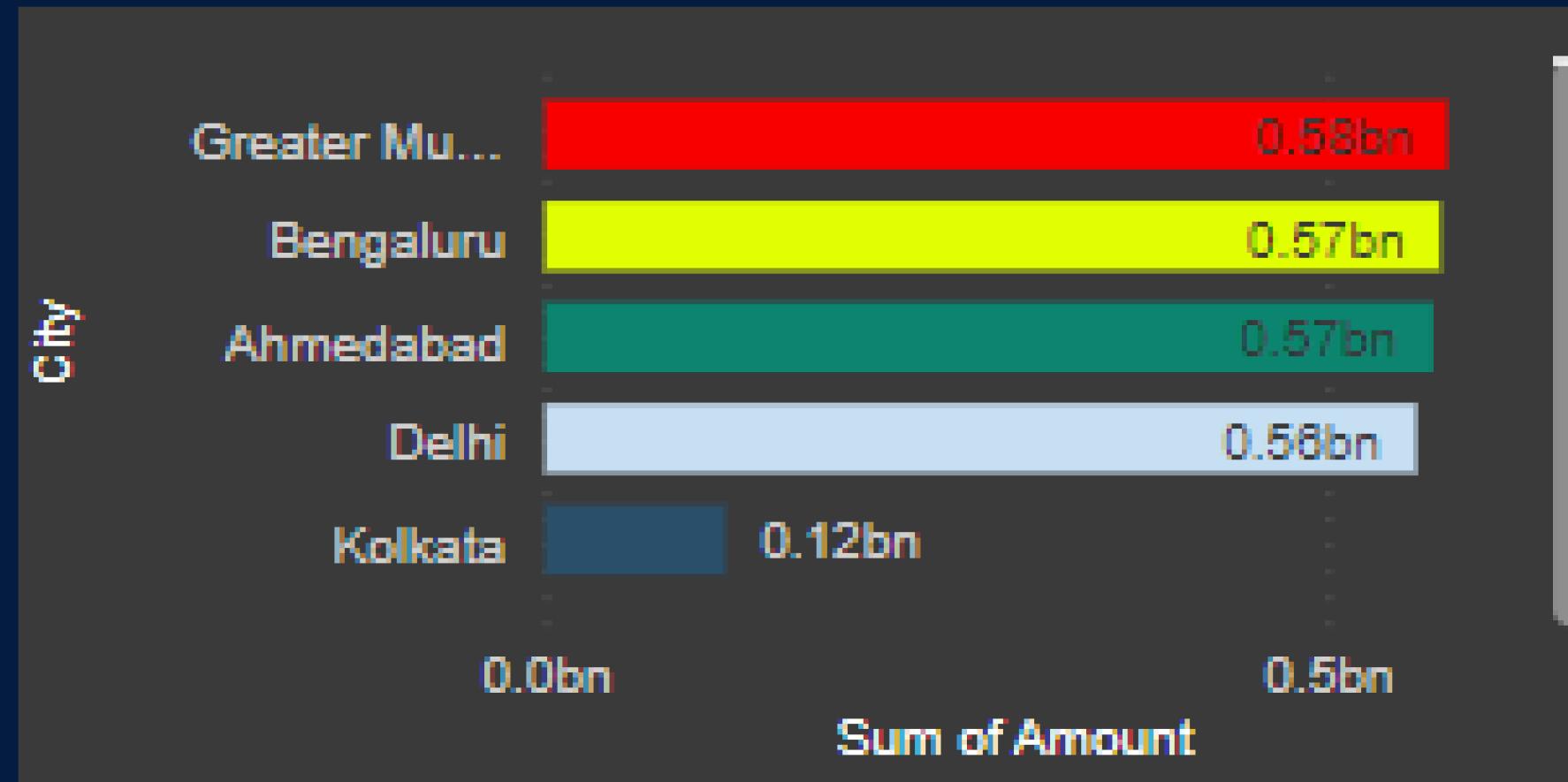


# 100% STACKED BAR CHART

Utilized a 100 percent stacked bar chart to showcase the sum of amounts categorized by gender. This visualization provides a visual breakdown of spending proportions within each gender category, offering a clear and concise representation of how expenses contribute to the total amount for each gender.

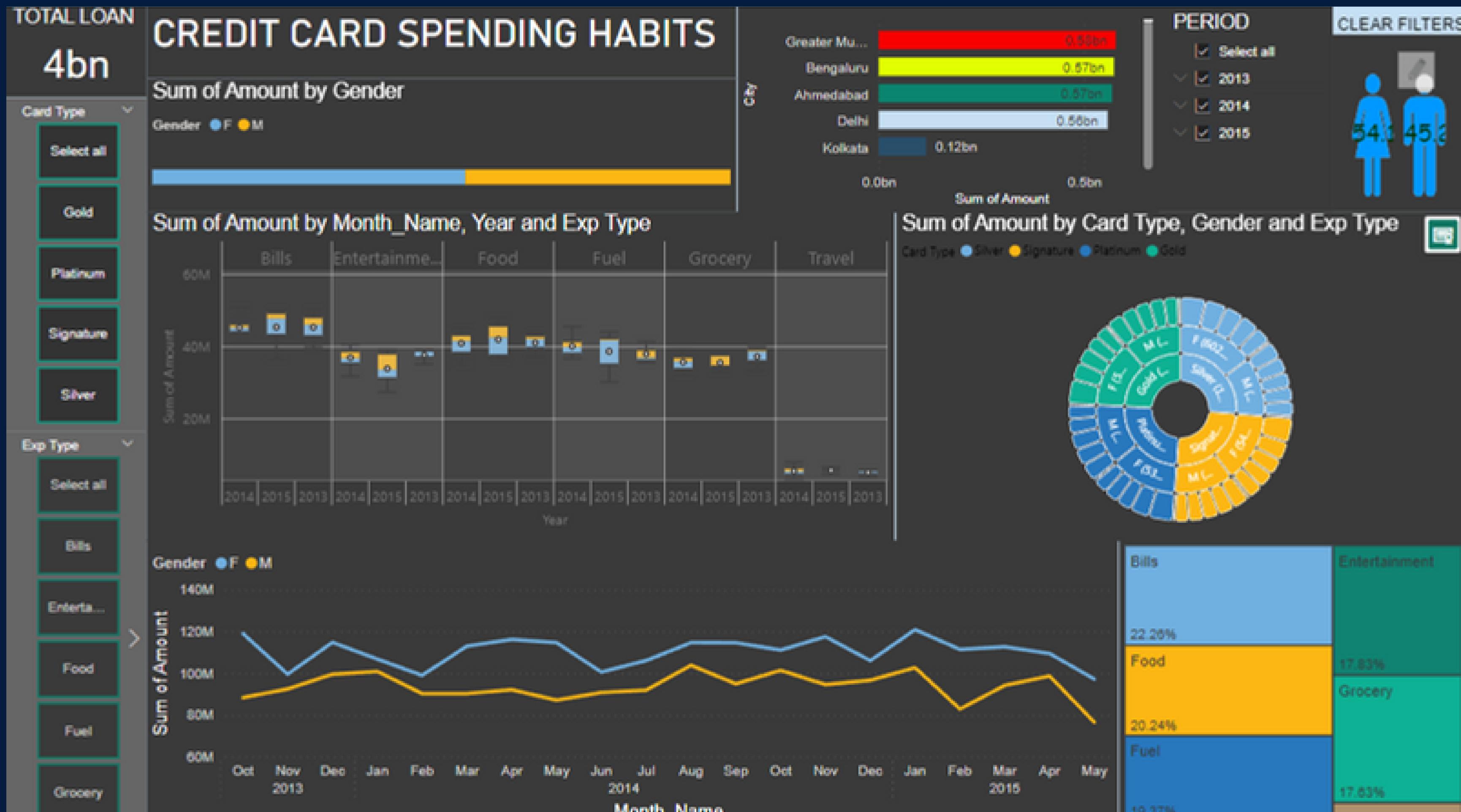


# STACKED BAR CHART



Employed a stacked bar chart in Power BI to visually represent the sum of amounts categorized by different cities. This visualization offers a clear comparison of total spending across various cities, enabling a quick and insightful analysis of regional expenditure patterns.

# DASHBOARD



# DATA ANALYSIS & VISUALIZATION USING PYTHON

# DATA ANALYSIS & VISUALIZATION USING PYTHON

In Python, data analysis and visualization typically begin with importing necessary libraries such as Pandas, NumPy, and Matplotlib or Seaborn. The first step involves loading the dataset into a Pandas DataFrame, where data can be inspected and cleaned. Pandas provides powerful tools for filtering, sorting, and handling missing data. Once the data is prepared, statistical analysis can be performed to gain insights into the dataset's characteristics. Descriptive statistics, correlation analysis, and data profiling are common techniques used at this stage.

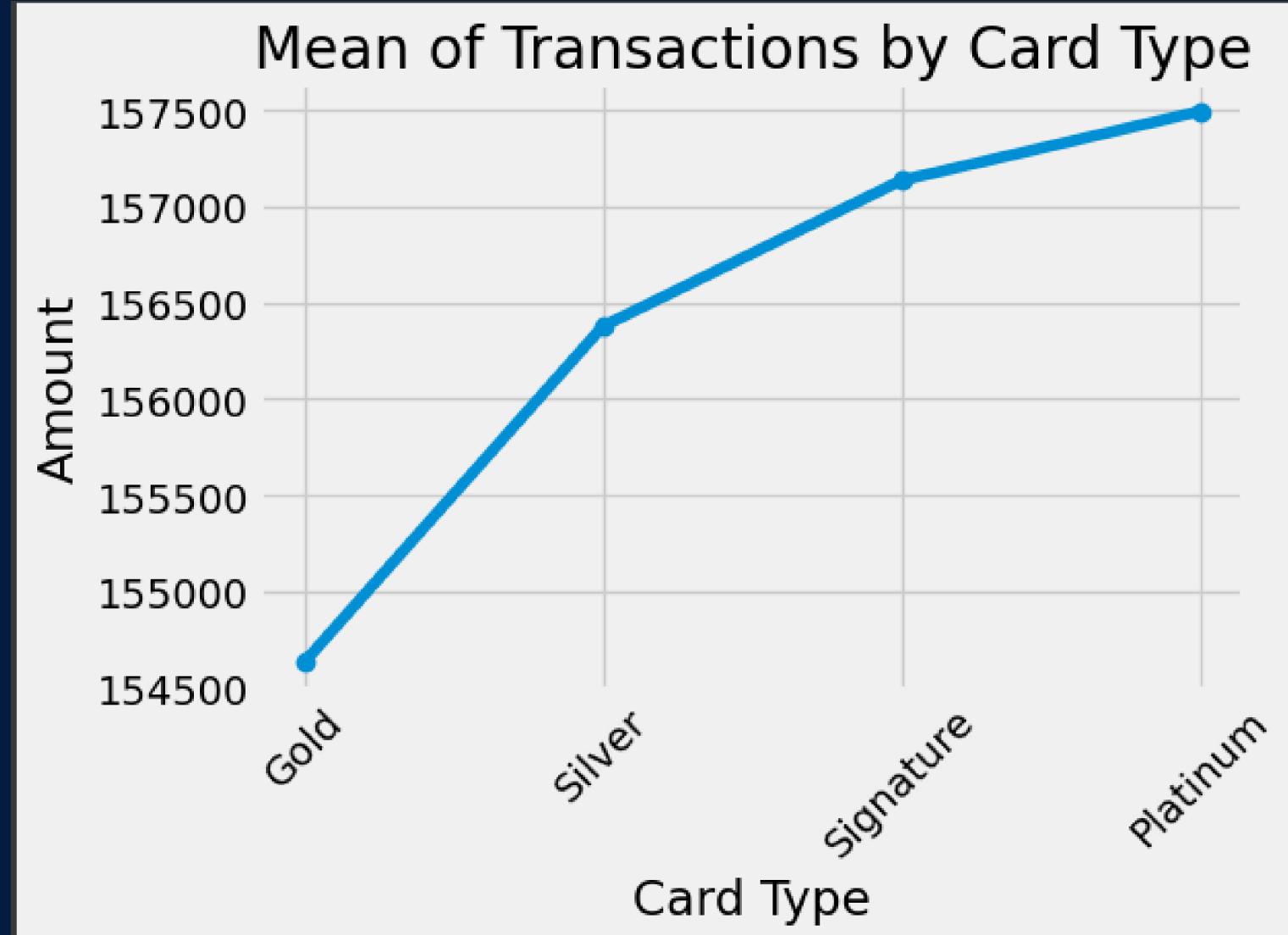
For visualization, Matplotlib and Seaborn are popular libraries for creating static plots, while tools like Plotly offer interactive visualizations. Visualizations can range from simple bar charts and scatter plots to more complex heatmaps and 3D plots, depending on the nature of the data and the insights sought. Seaborn, built on top of Matplotlib, streamlines the creation of aesthetically pleasing statistical graphics. Finally, the results of the analysis can be communicated effectively through well-designed visualizations and reports, ensuring that complex information. Overall, Python provides a versatile and powerful ecosystem for data analysis and visualization, making it a popular choice for professionals in various fields.

# Visualizations used in python



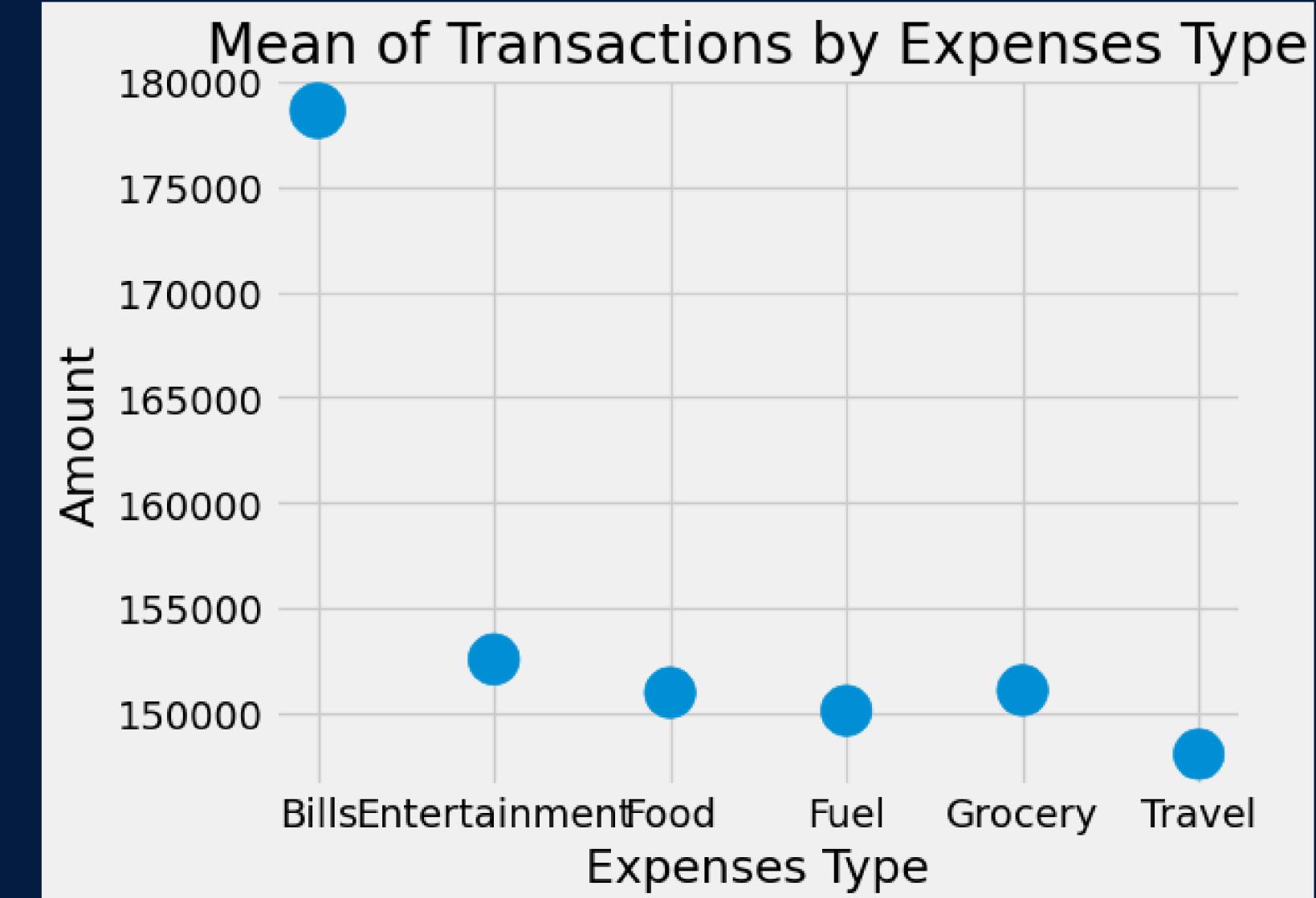
- Mean of Transactions by Card and Expense Type
- Gender Spending Comparison
- Distribution of Card Types
- Expense Type Breakdown – Proportion and Distribution
- Average Transaction Amount by Expense Type
- Daily, Monthly, Yearly Total Amount Spent Over Time
- Stacked Area Chart of Expense Types over Time
- Correlation Matrix
- Credit Card Spending Distribution by Card Type
- City-wise Expenditures
- City-wise Expenditures for Selected Cities
- Mean of Highest and Lowest cities in transactions
- Anomaly Detection: Unusual Spending Pattern
- Gauge Chart over Amount and Card Type

# MEAN OF TRANSACTIONS BY CARD TYPE



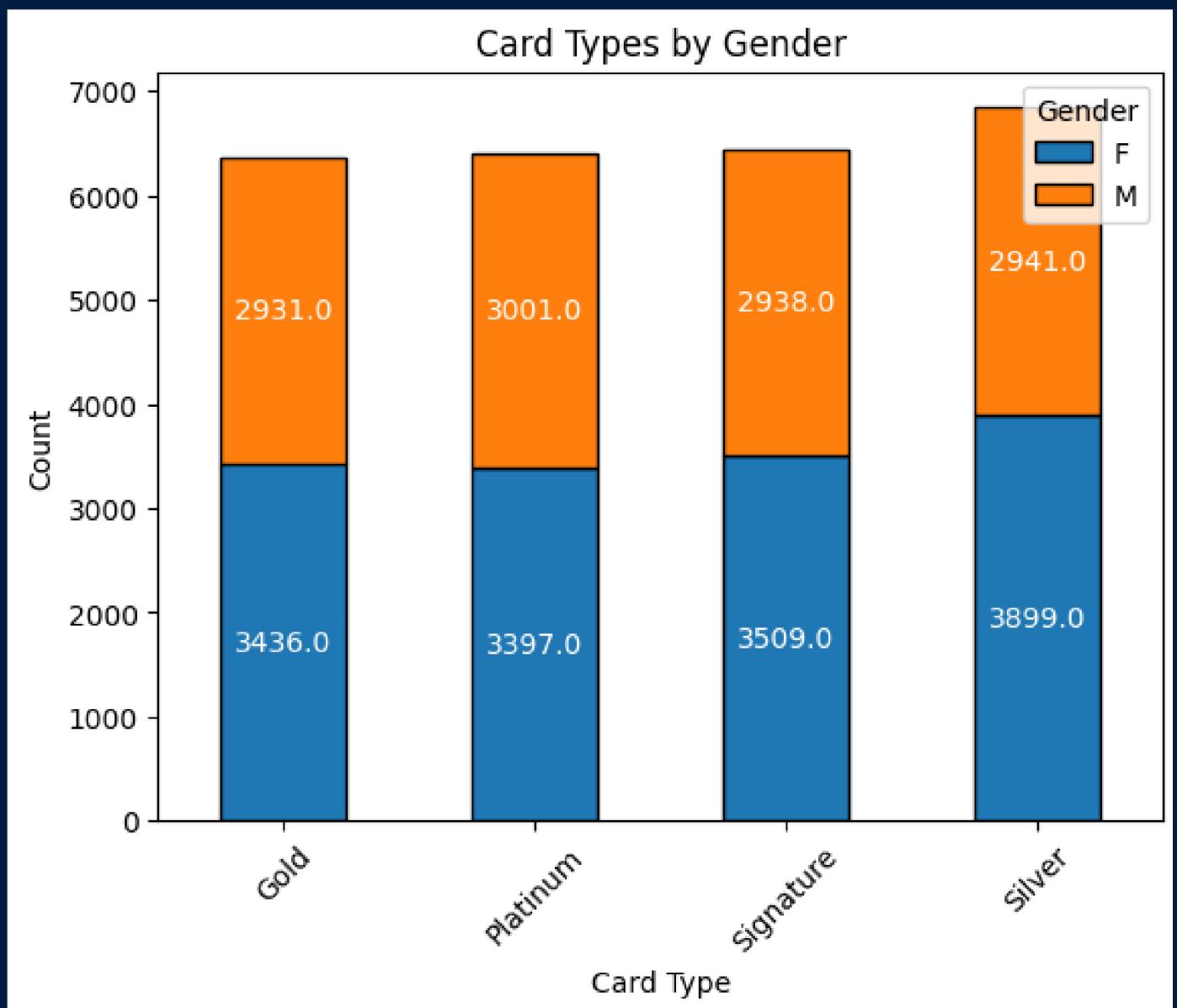
Each point on the line represents the mean transaction amount for a specific card type at a specific point of time. The 'fivethirtyeight' style is characterized by a clean, bold, and distinctive appearance.

# MEAN OF TRANSACTIONS BY EXPENSE TYPE

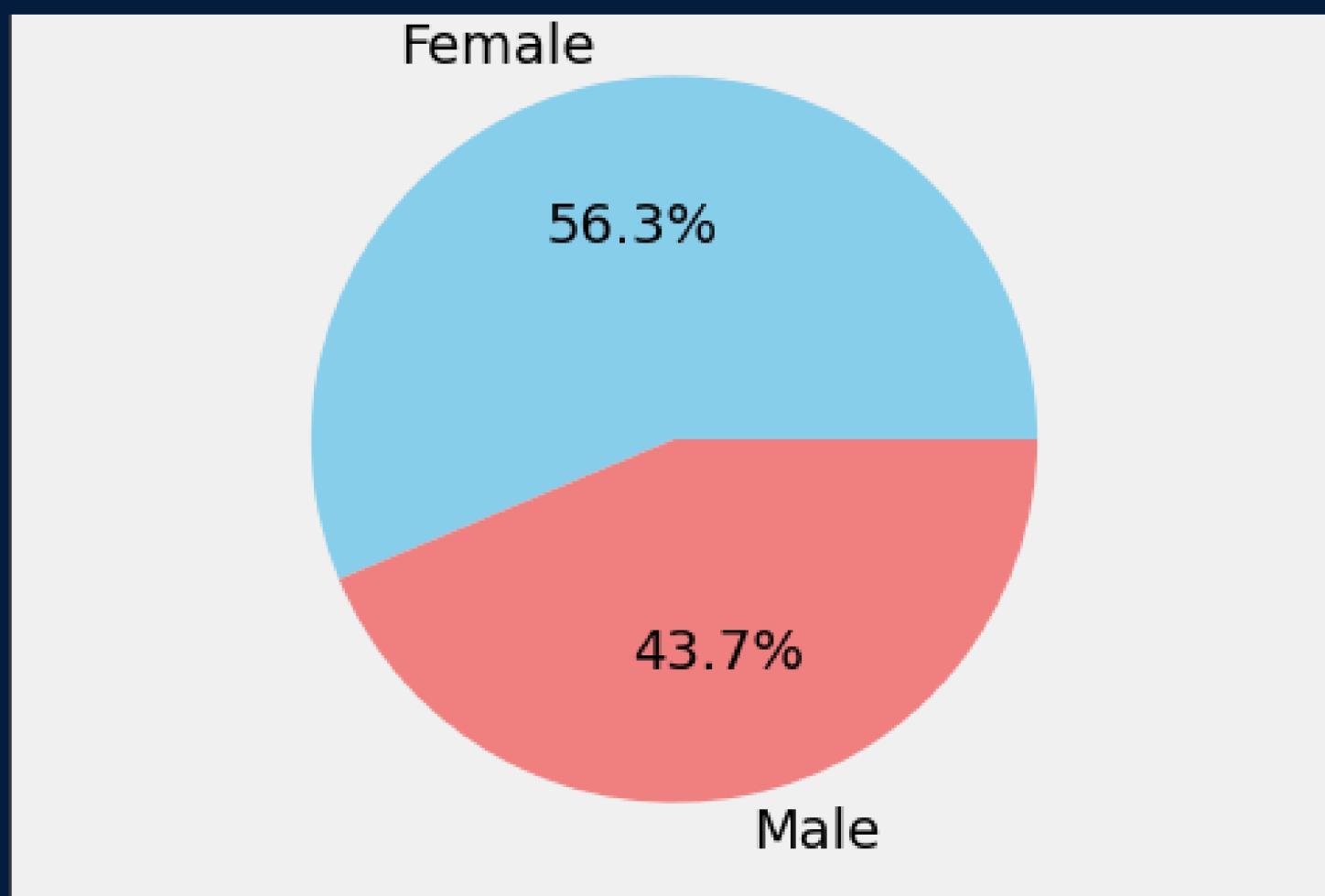
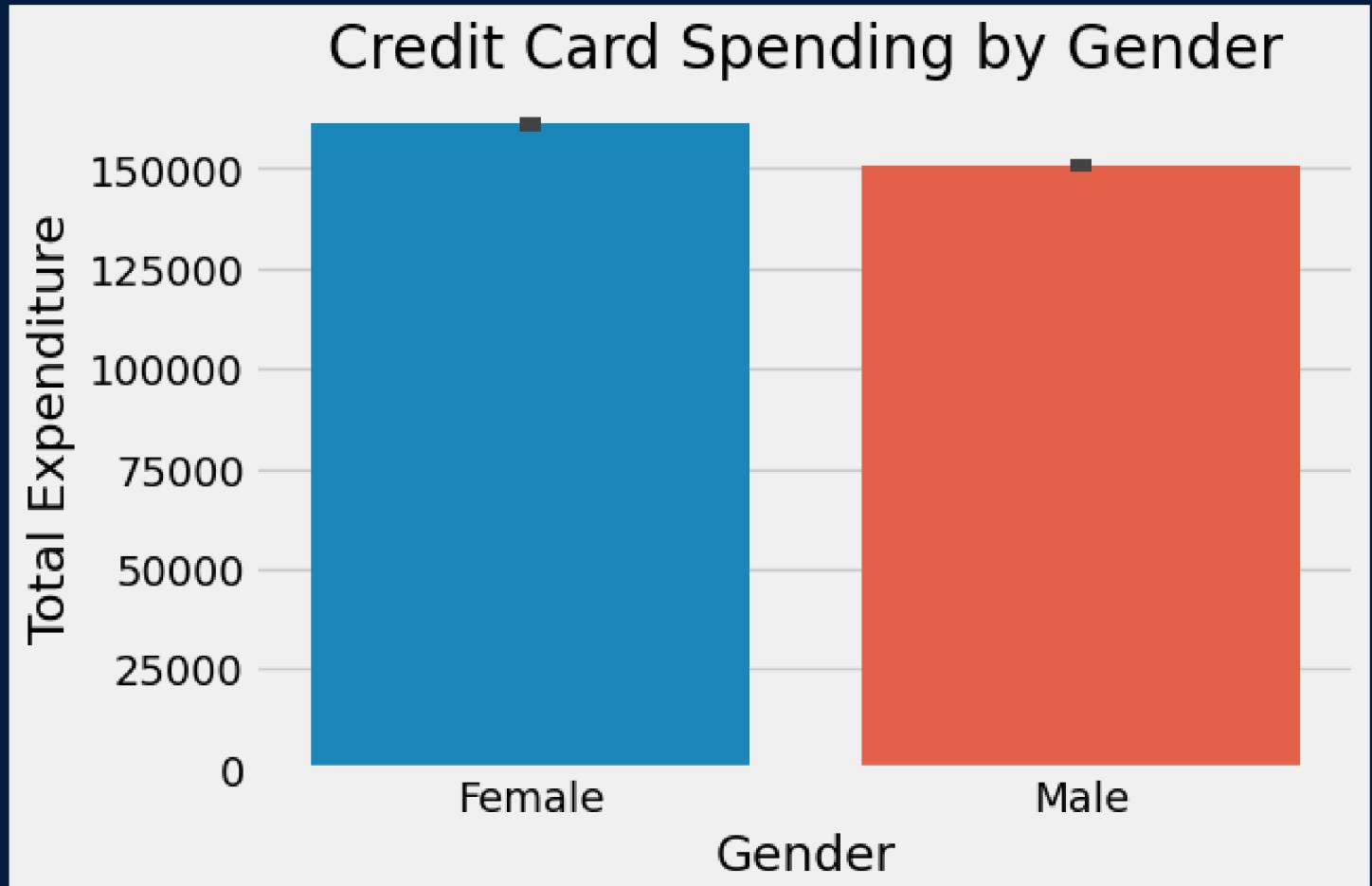


The resulting scatter plot provides a representation of the mean transaction amounts for different expense types. From the graph, bills have the highest mean transaction amount.

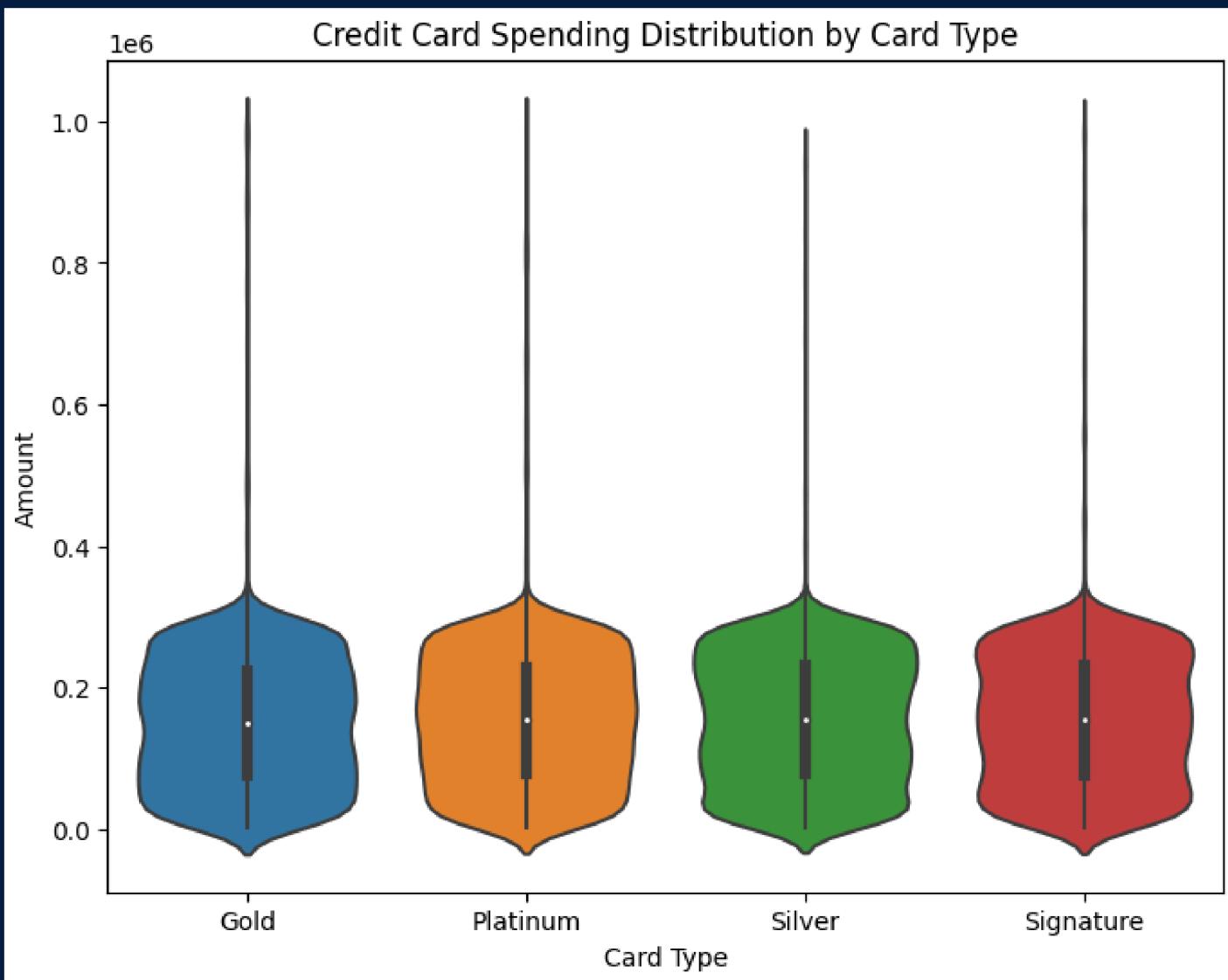
# GENDER SPENDING COMPARISONS



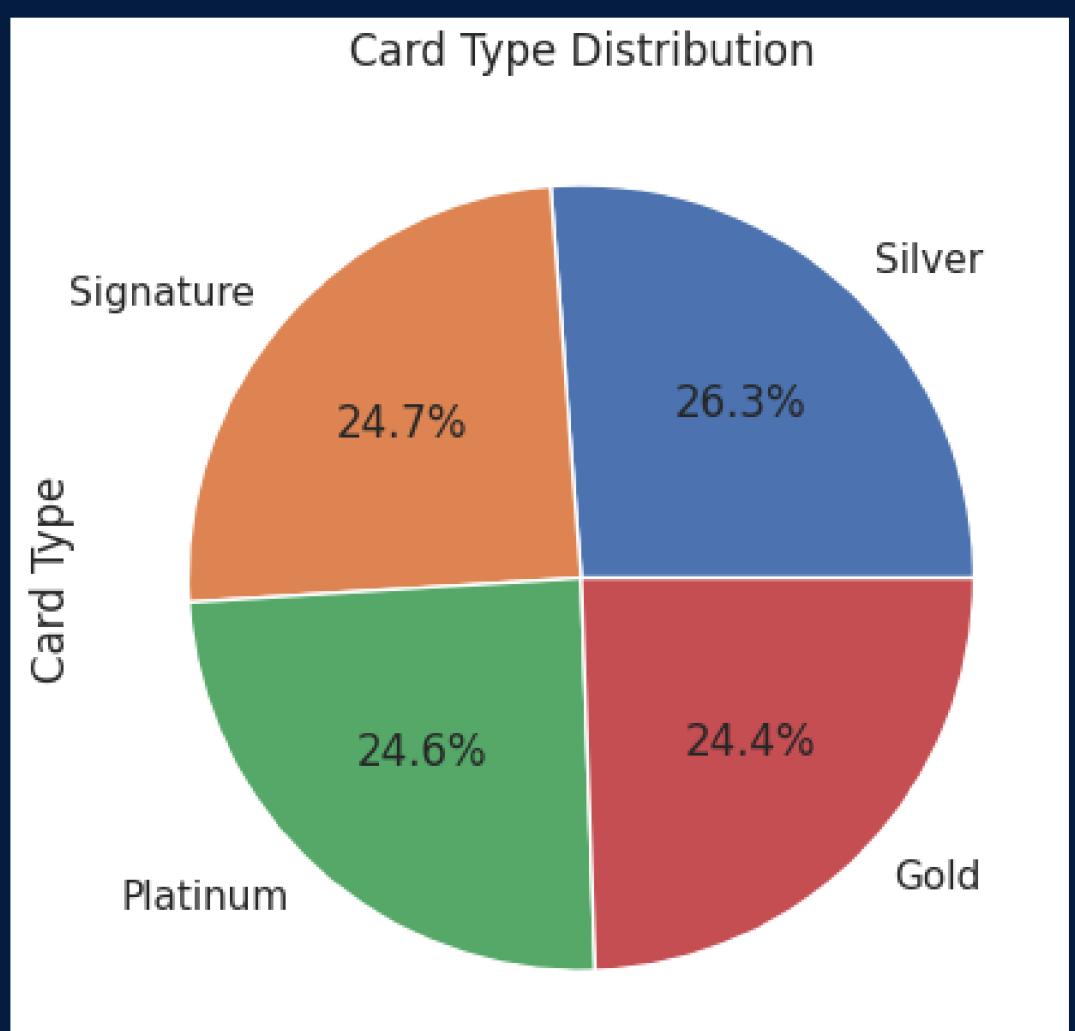
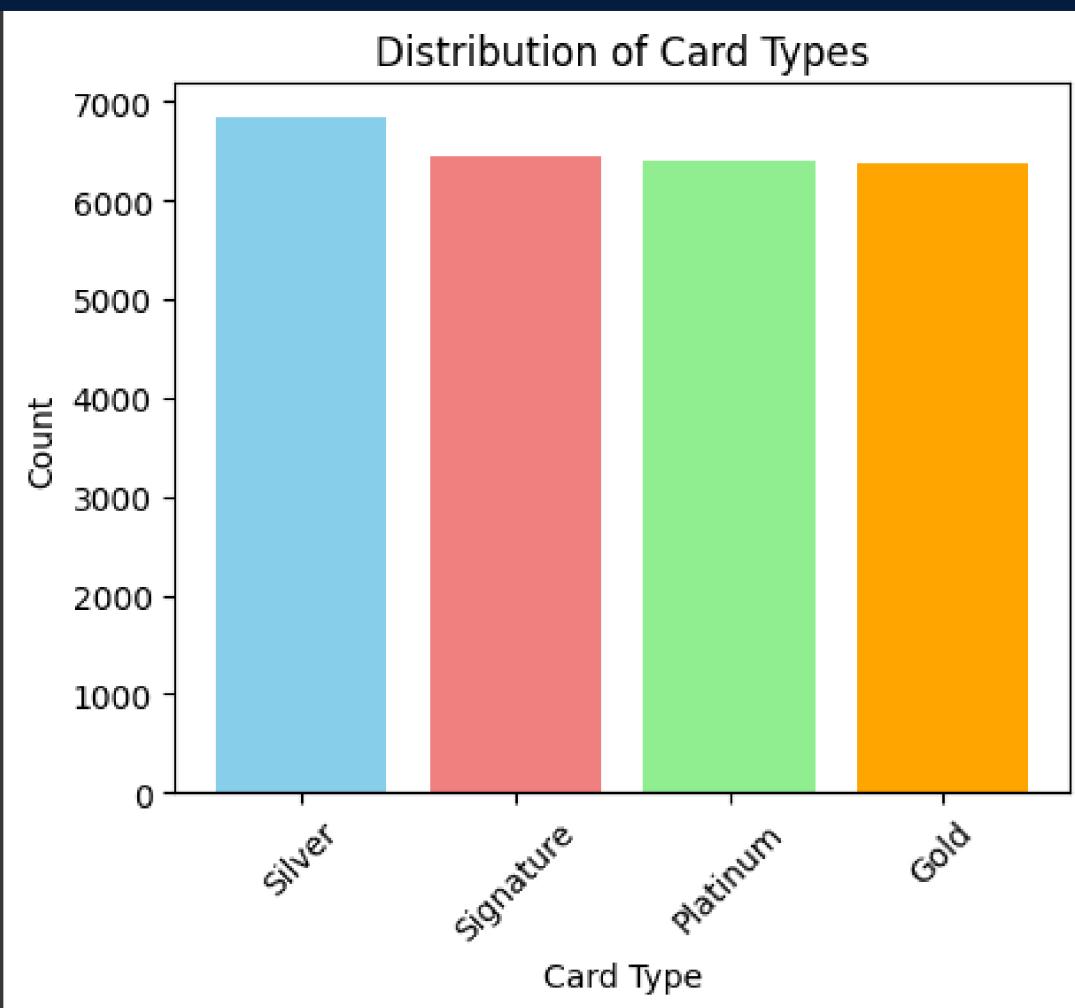
- The stacked bar plot provides a visual representation of the distribution of gender within each card type,
- The pie chart provides a visual representation of the distribution of credit card spending between different genders.
- The bar graph represents a gender, and the height of the bar indicates the average (or total) expenditure for individuals of that gender.



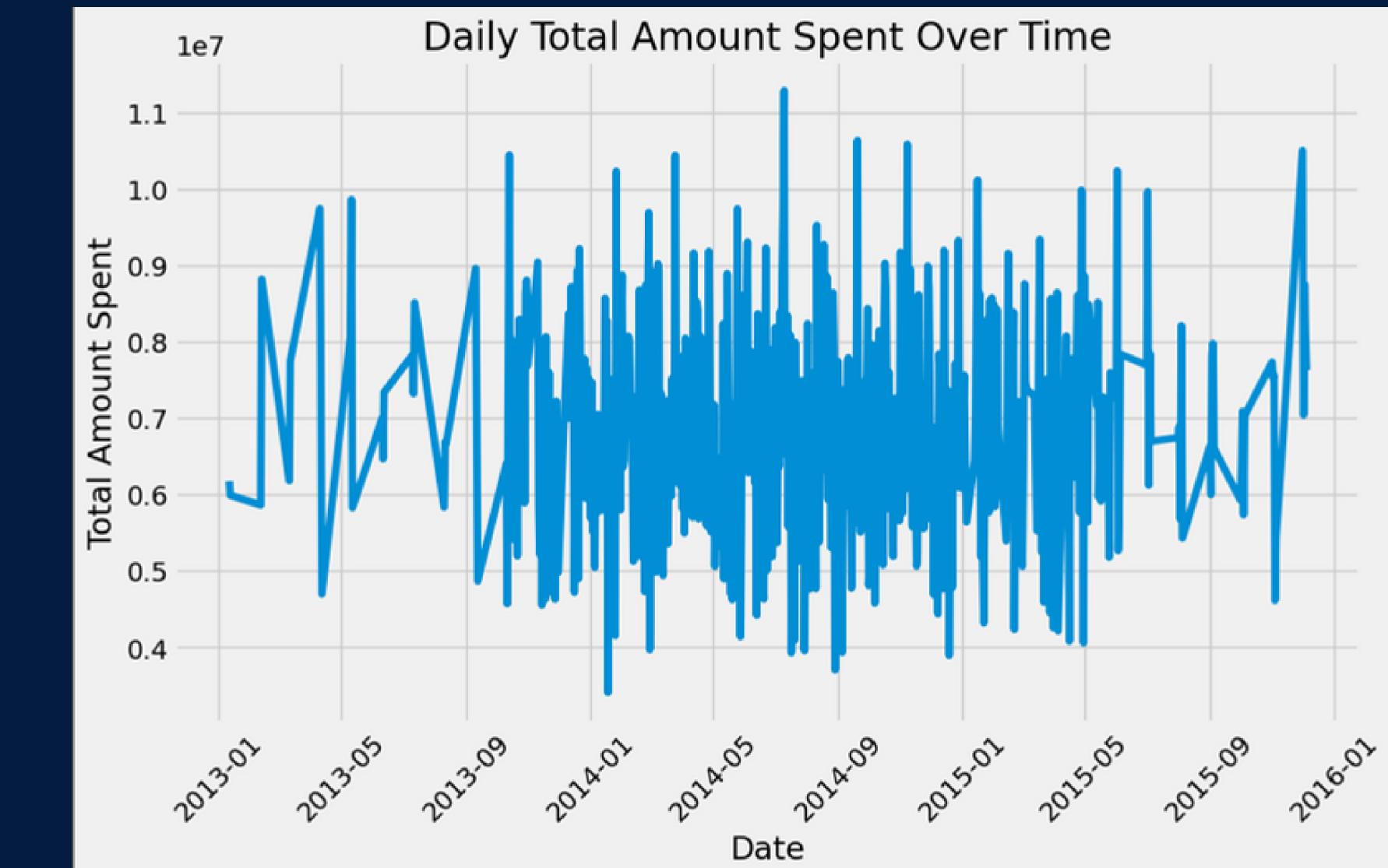
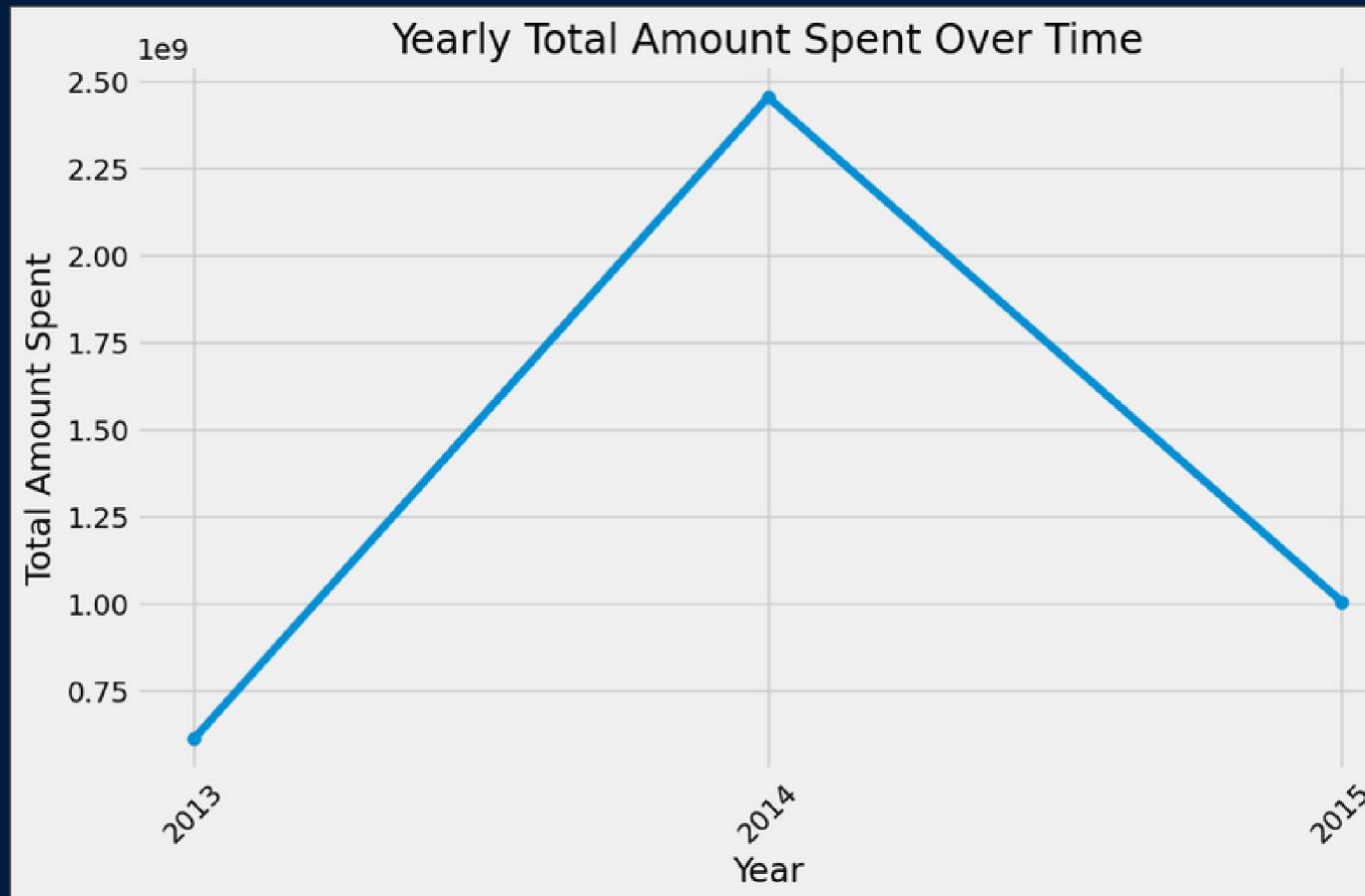
# DISTRIBUTION OF CARD TYPES



- The width of each violin in Violin Plot represents the probability density of spending amounts, while the central horizontal line inside the violin indicates the median spending.
- The height of the bar in Bar Graph indicates the frequency or count of that card type in the dataset.
- The size of each slice of Pie Chart is proportional to the percentage of occurrences of that card type in the dataset.

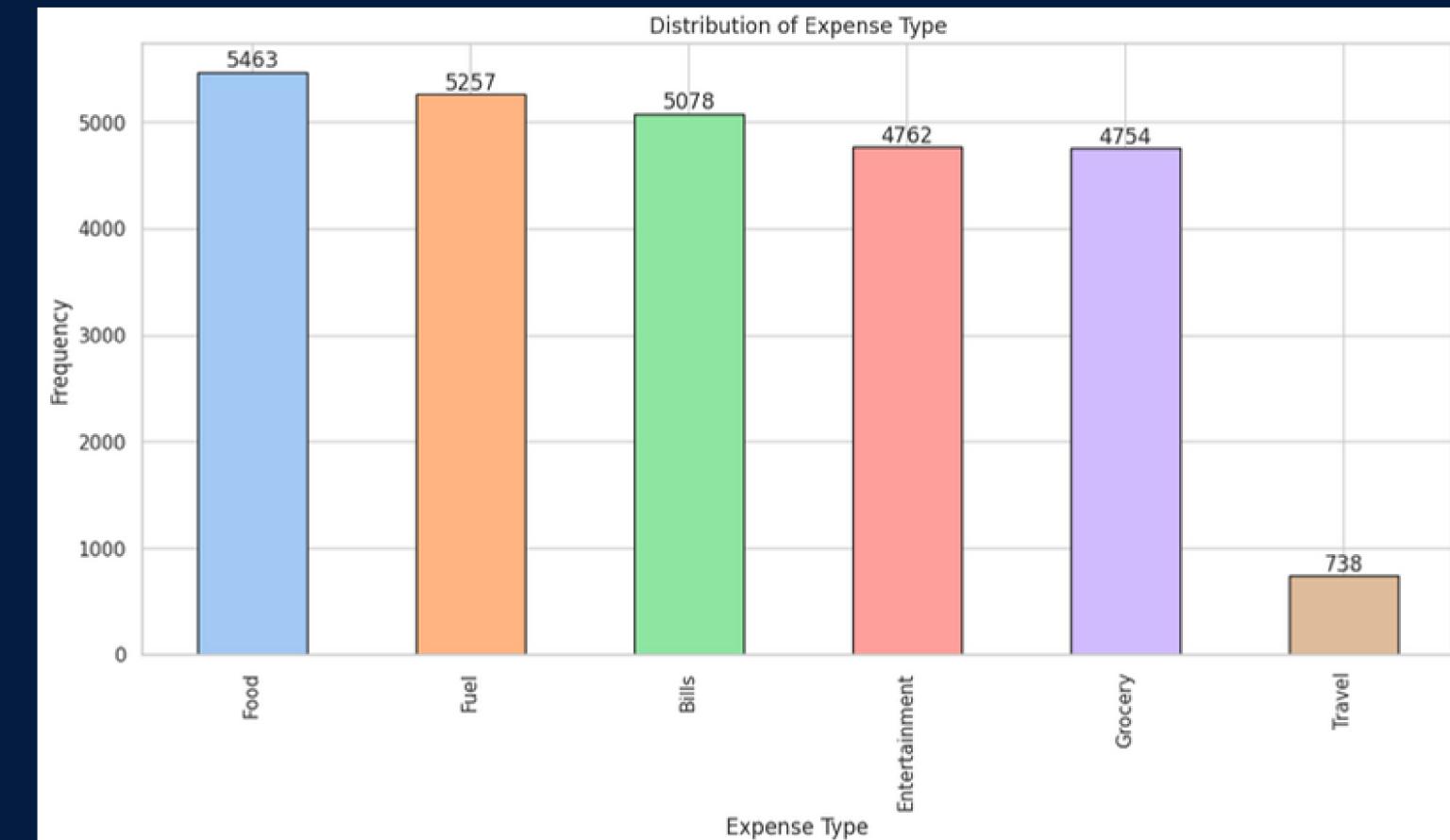
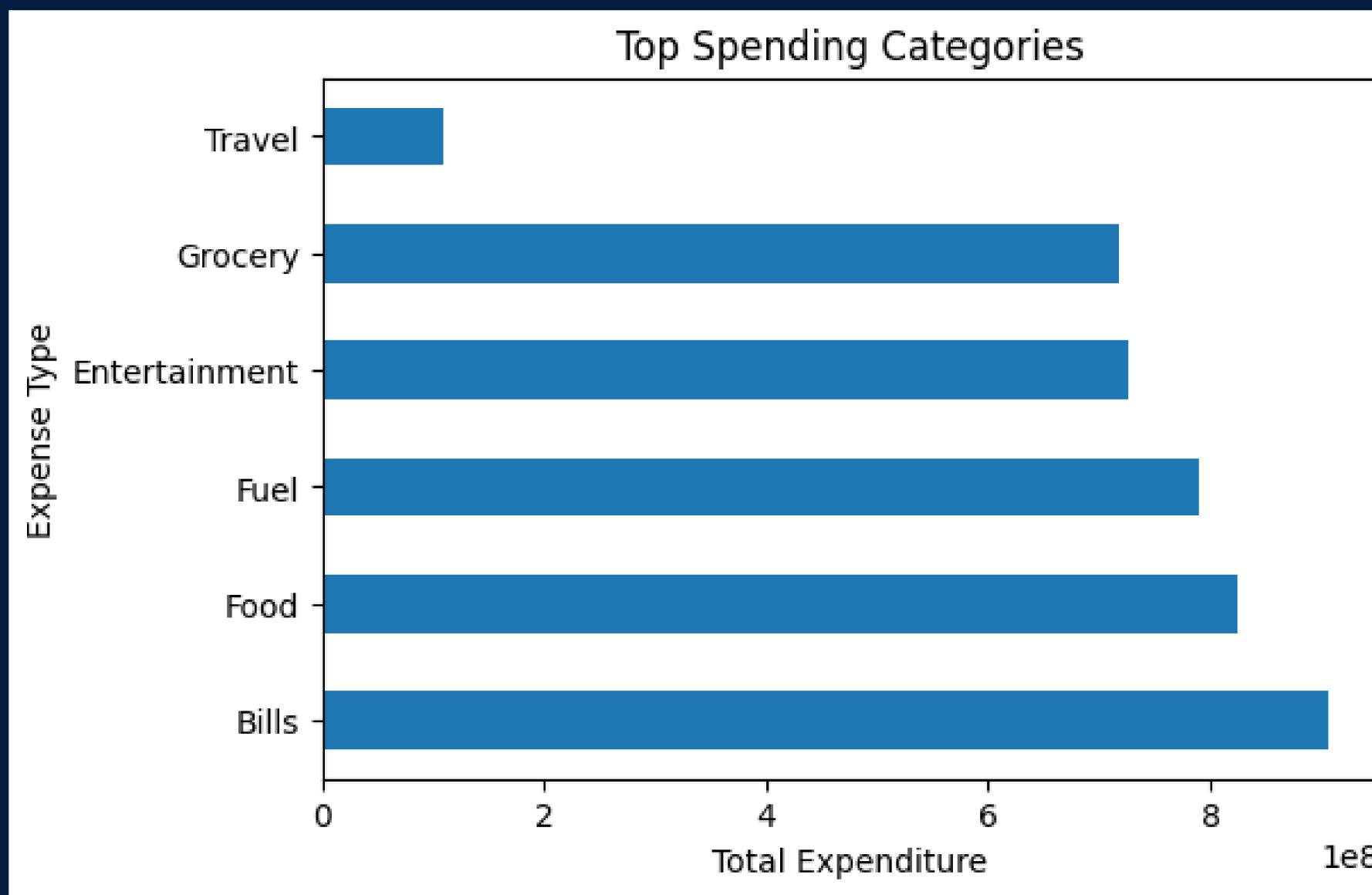


# Daily, Monthly, Yearly Total Amount Spent Over Time

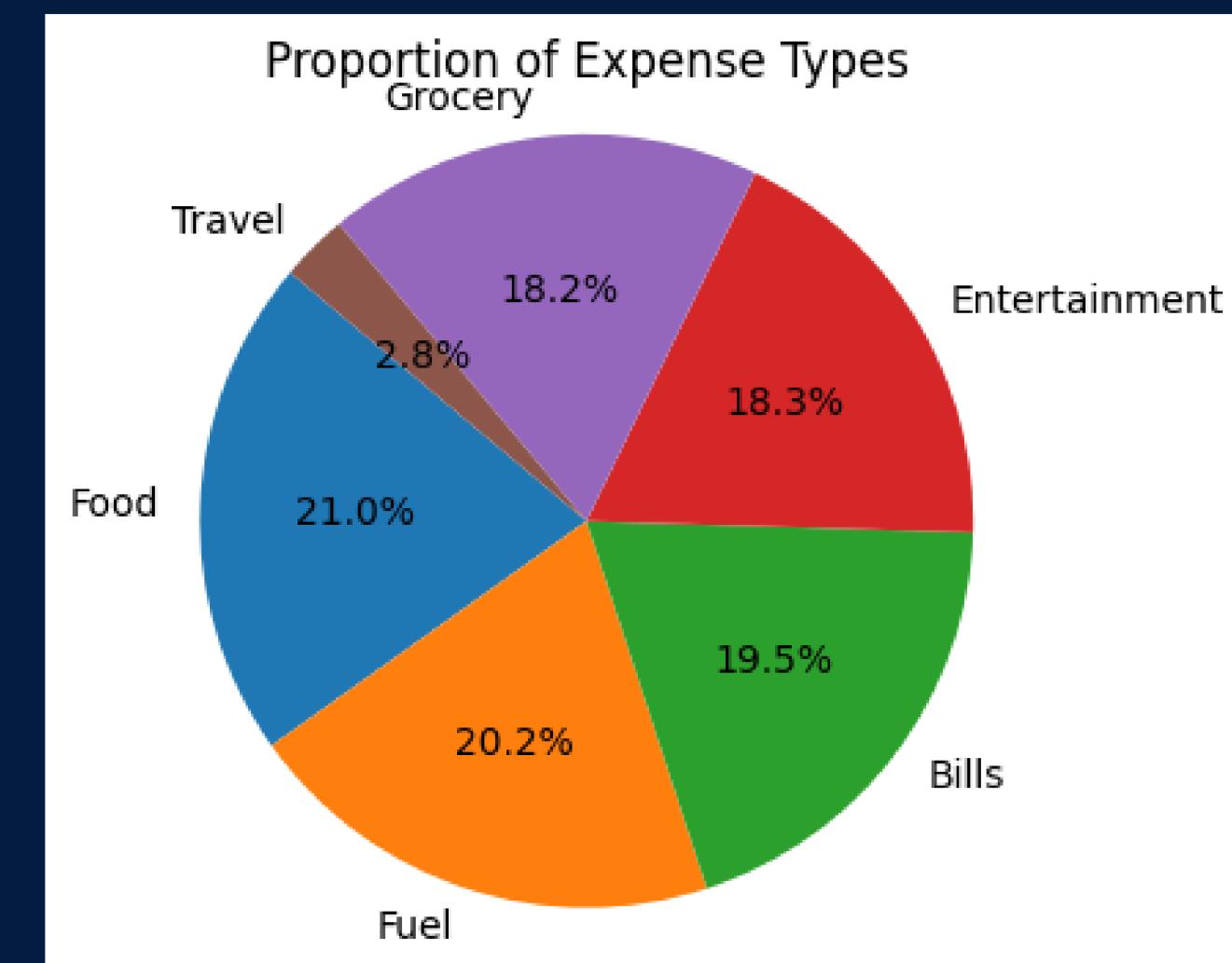


The line charts represent the total amount spent Daily, Monthly and Yearly. The line connecting the points illustrates the trend of spending, allowing for the observation of patterns or fluctuations in expenditure over time.

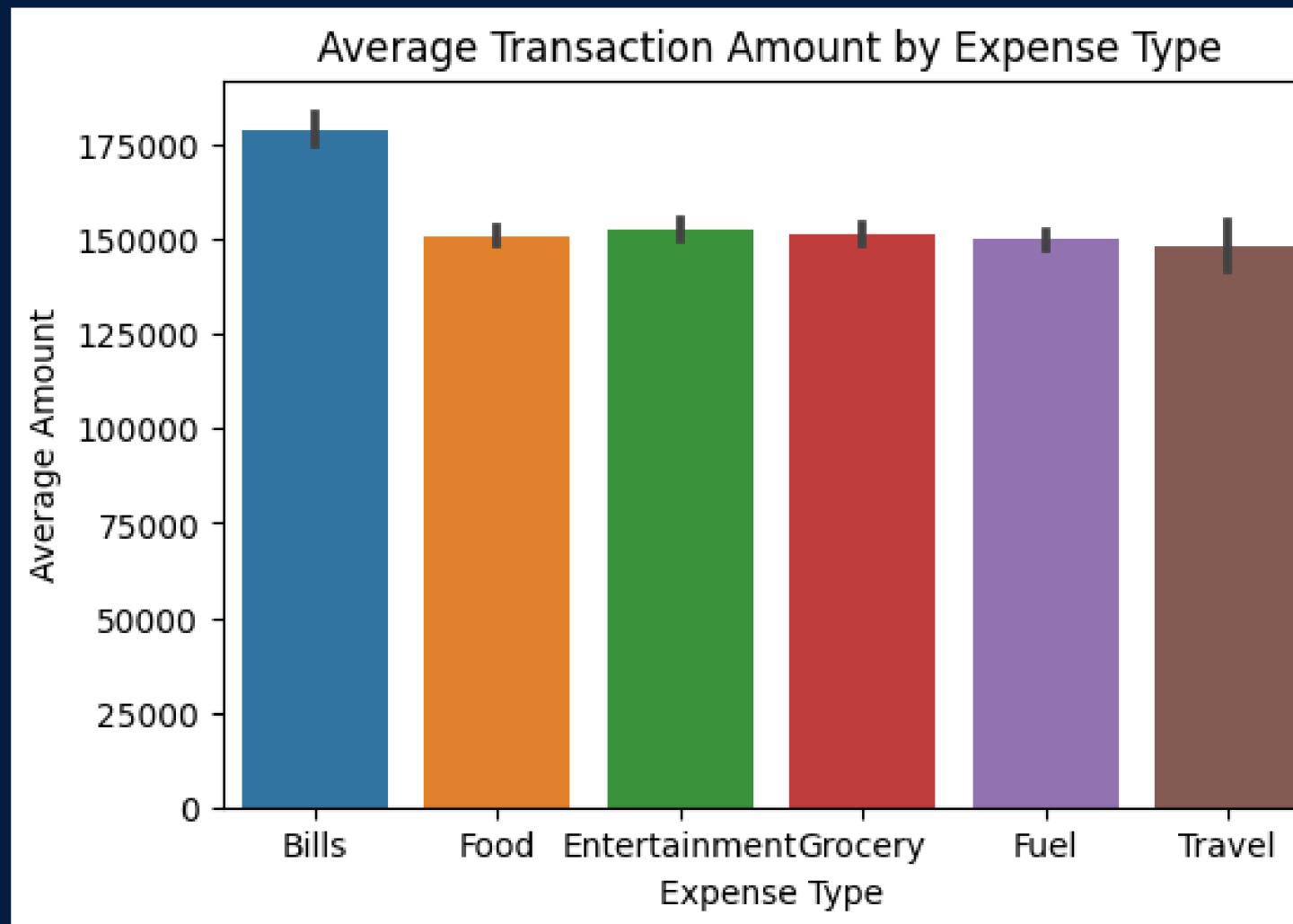
# EXPENSE TYPE BREAKDOWN



- Height of Each bar in Bar Plot representing the total amount spent in that category. The categories are sorted in ascending order of spending.
- The graph is a bar plot illustrating the distribution of expenses across different expense types. The food expenses frequency is more than other.
- The size of each wedge in Pie Chart is proportional to the percentage of occurrences of that expense type relative to the total occurrences.

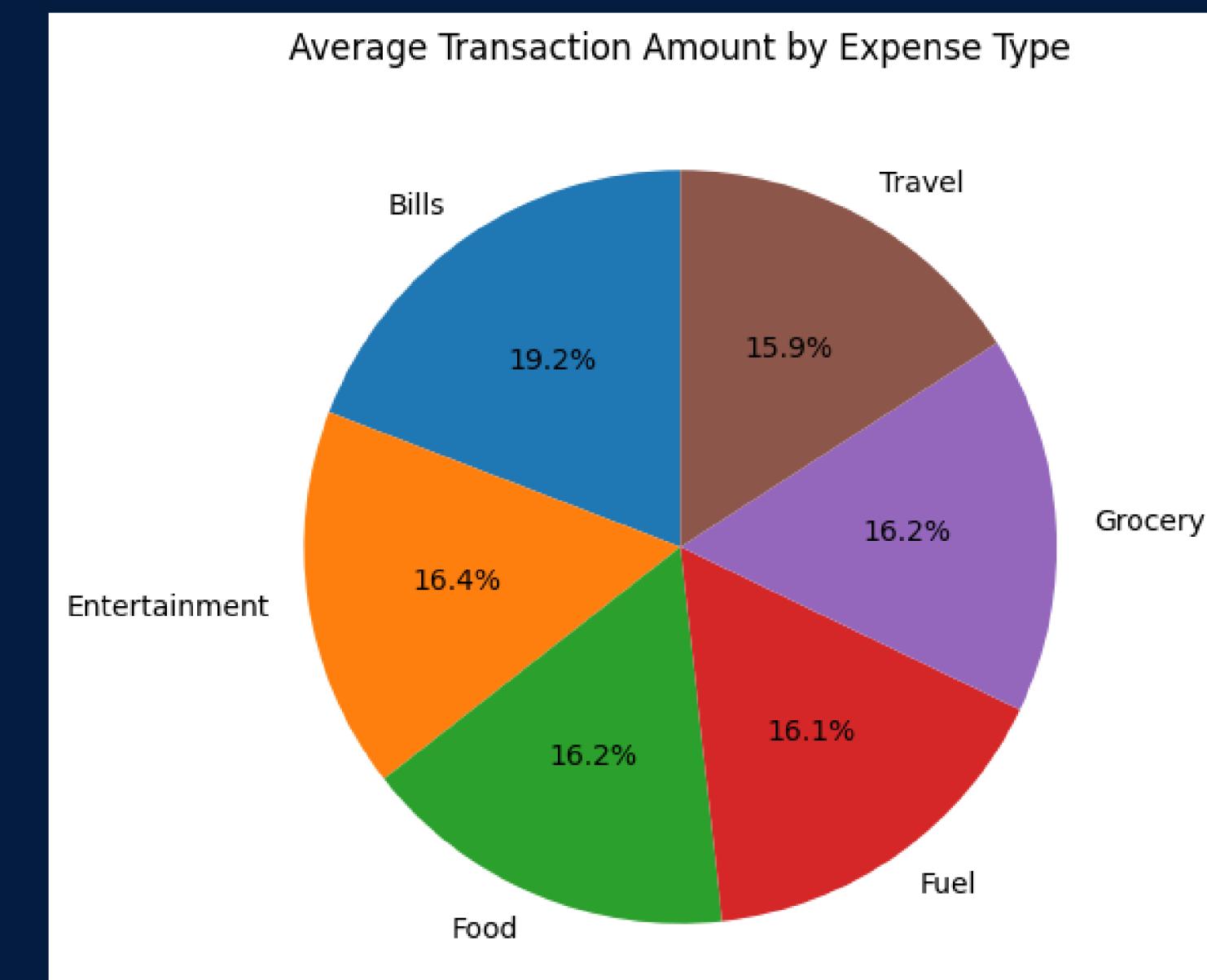


# Average Transaction Amount by Expense Type



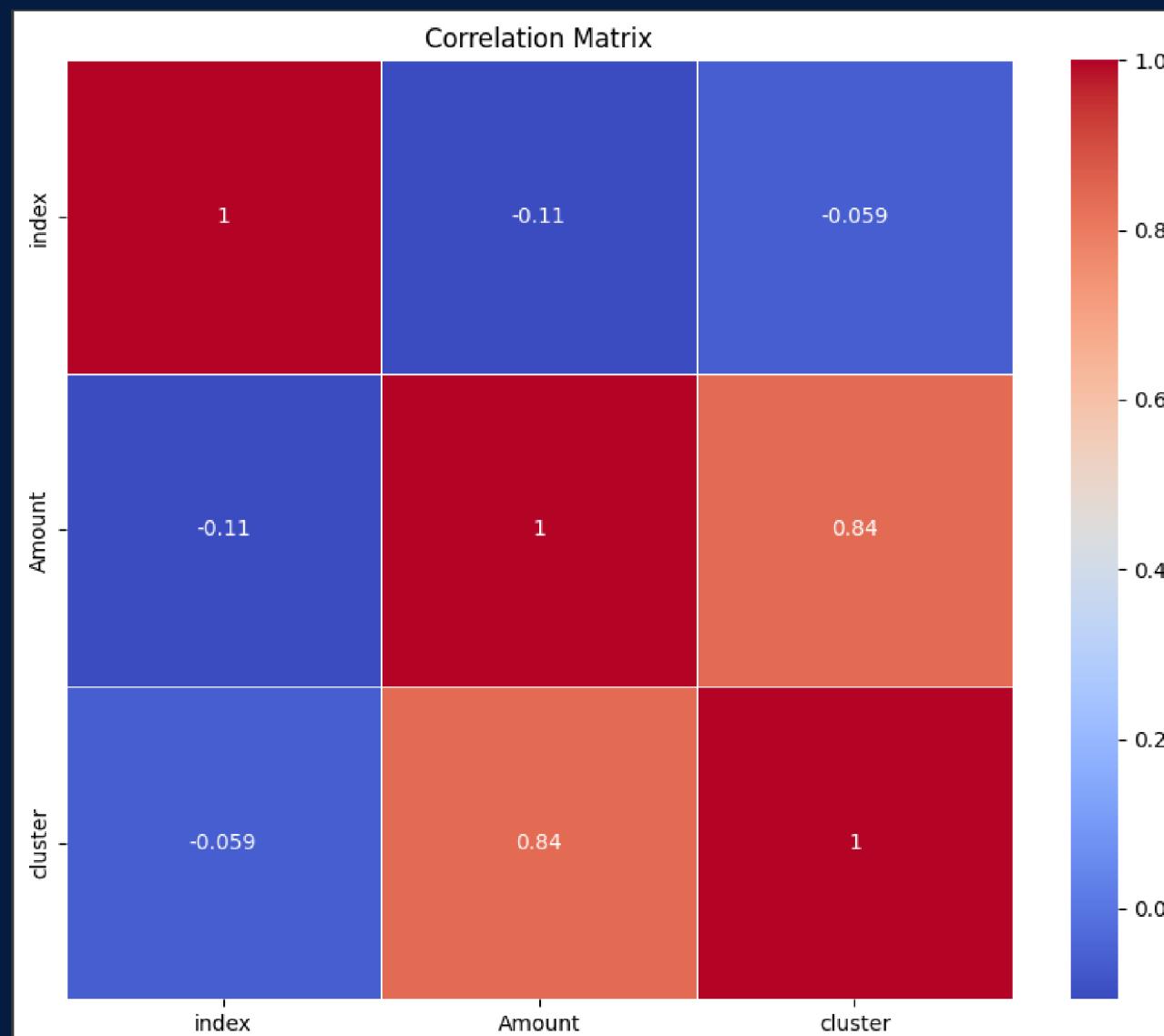
The graph is a bar plot illustrating the average transaction amount for each expense type in the dataset. The bars represent the mean transaction amounts, with their lengths corresponding to the average value.

The pie chart visualizing the distribution of average transaction amounts across different expense types in a credit card spending dataset. The size of each slice corresponds to the proportion of the total spending attributed to that category.

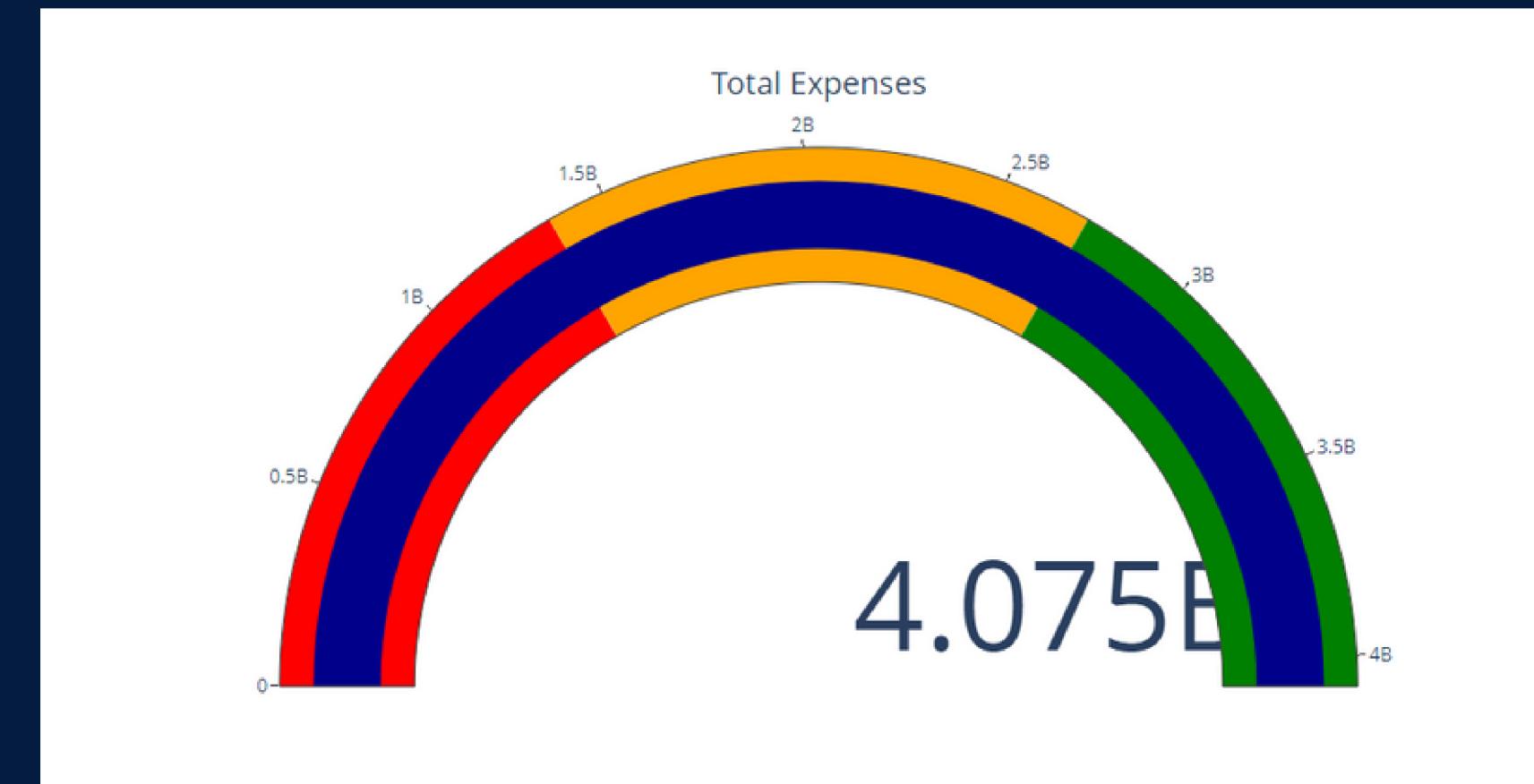


# Correlation Matrix

Correlation matrix, visually displaying the correlations between different variables in the dataset. Each square in the matrix corresponds to the correlation coefficient between two variables, with warmer colors indicating stronger positive correlations (closer to 1) and cooler colors indicating stronger negative correlations (closer to -1).

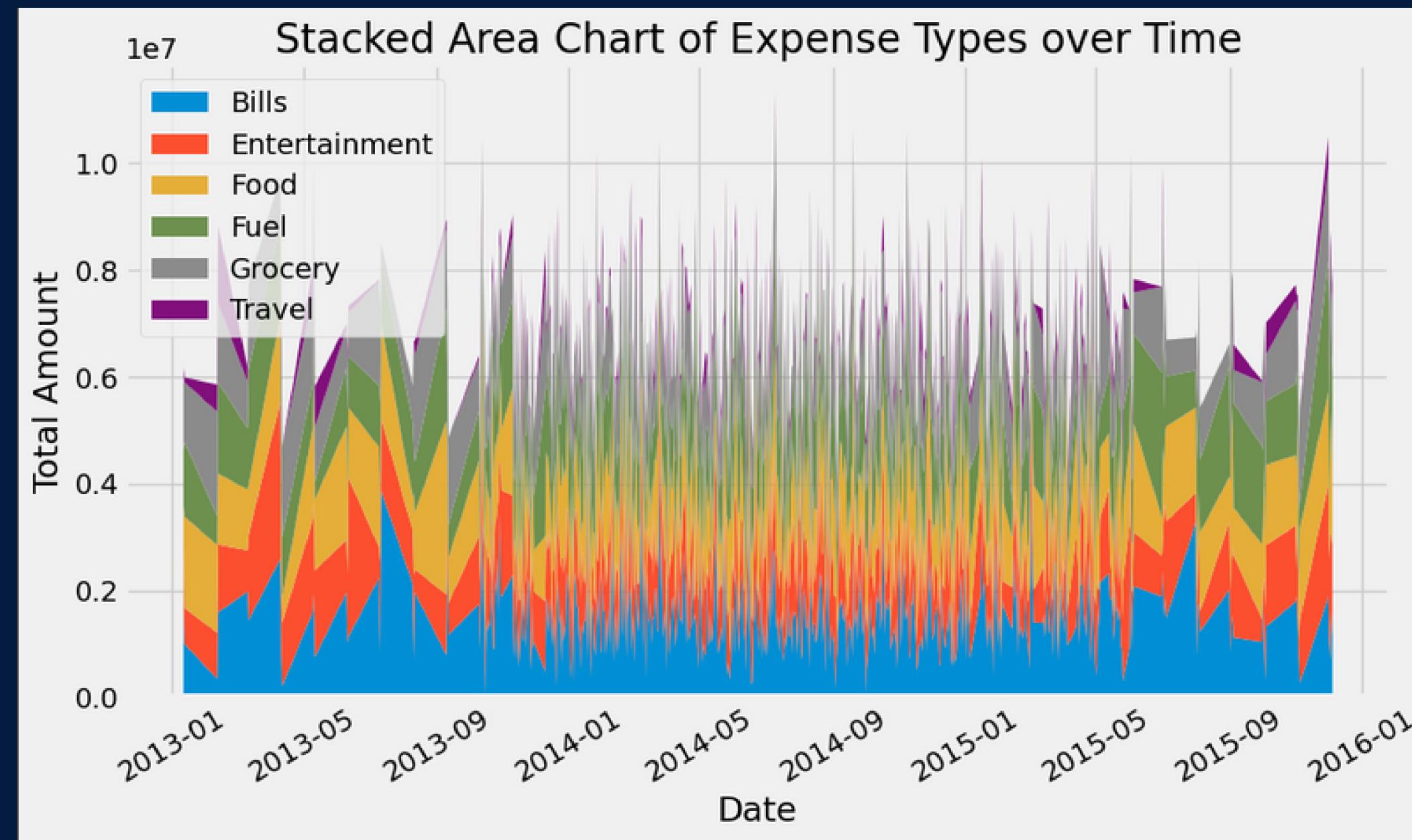


# Gauge Chart over Amount and Card Type



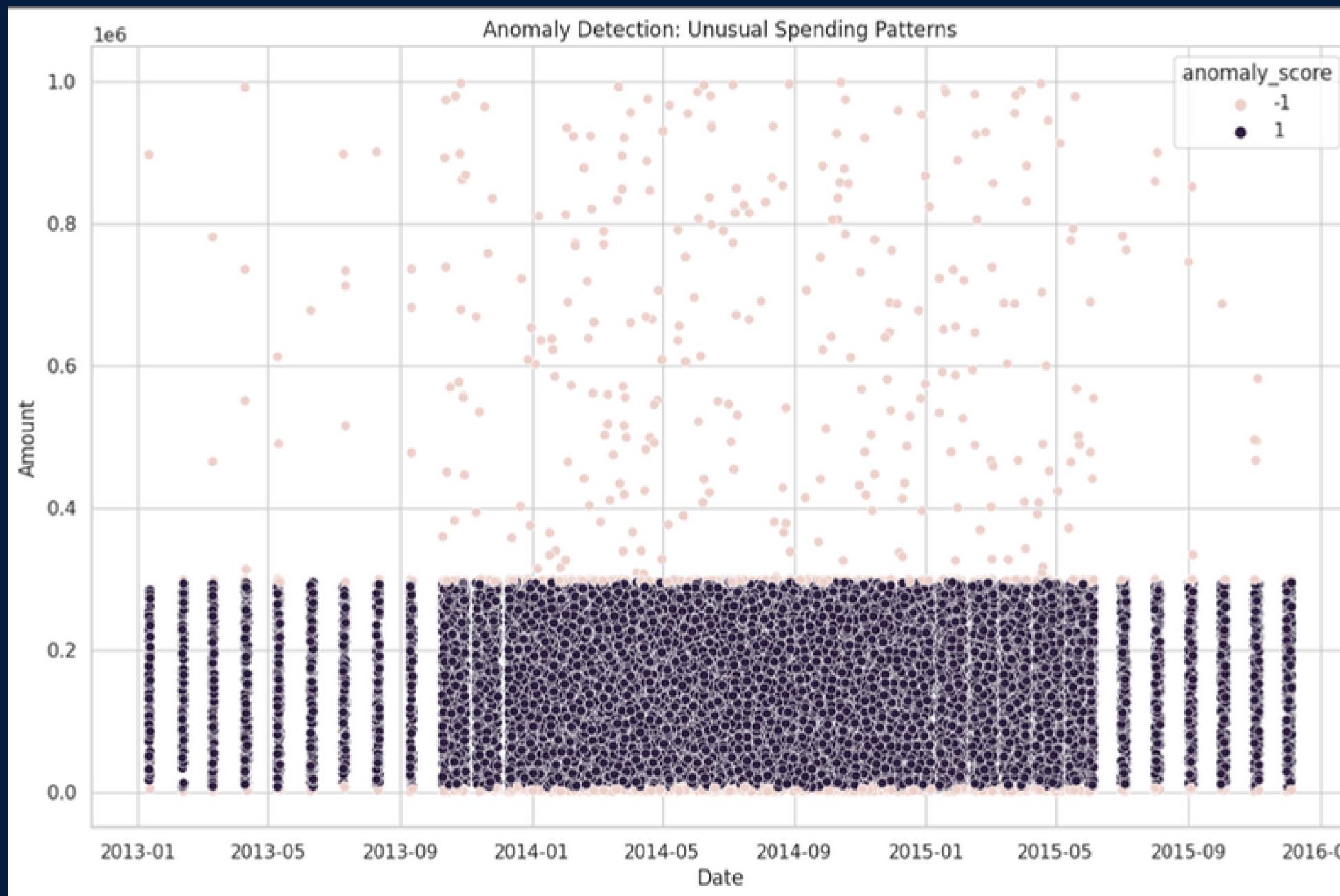
The gauge chart visually represents the total expenses based on the credit card spending data. The chart consists of a gauge with a numeric value indicating the overall total expenses.

# Stacked Area Chart of Expense Types over Time

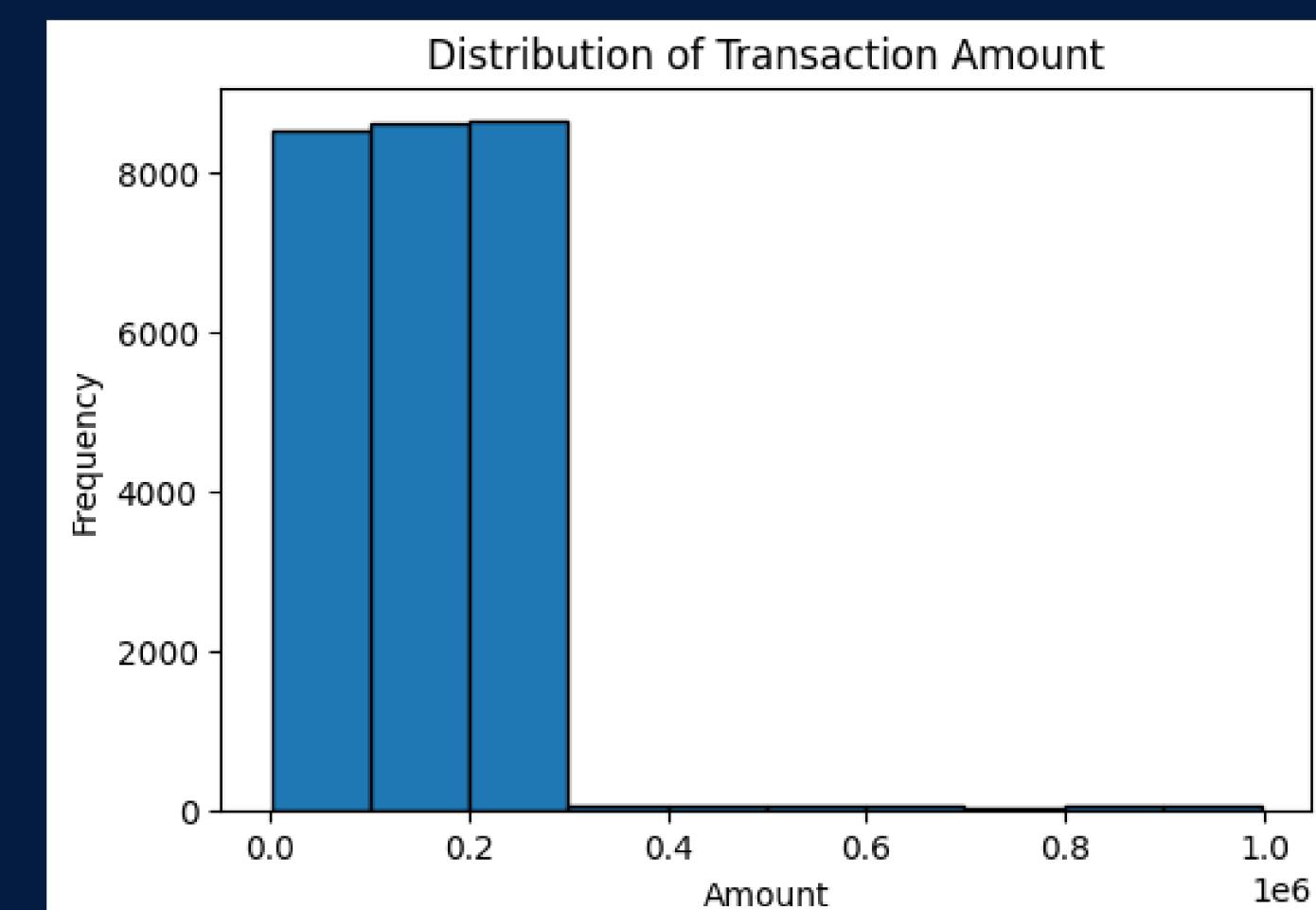


The stacked area chart visually represents the cumulative total amount spent over time, categorized by different expense types. The chart effectively conveys the changing composition of expenses over time, highlighting the relative proportions of different categories. The legend in the upper left corner identifies each colored area with its corresponding expense type. This overview of how different expense types contribute to the total spending pattern over the specified time period.

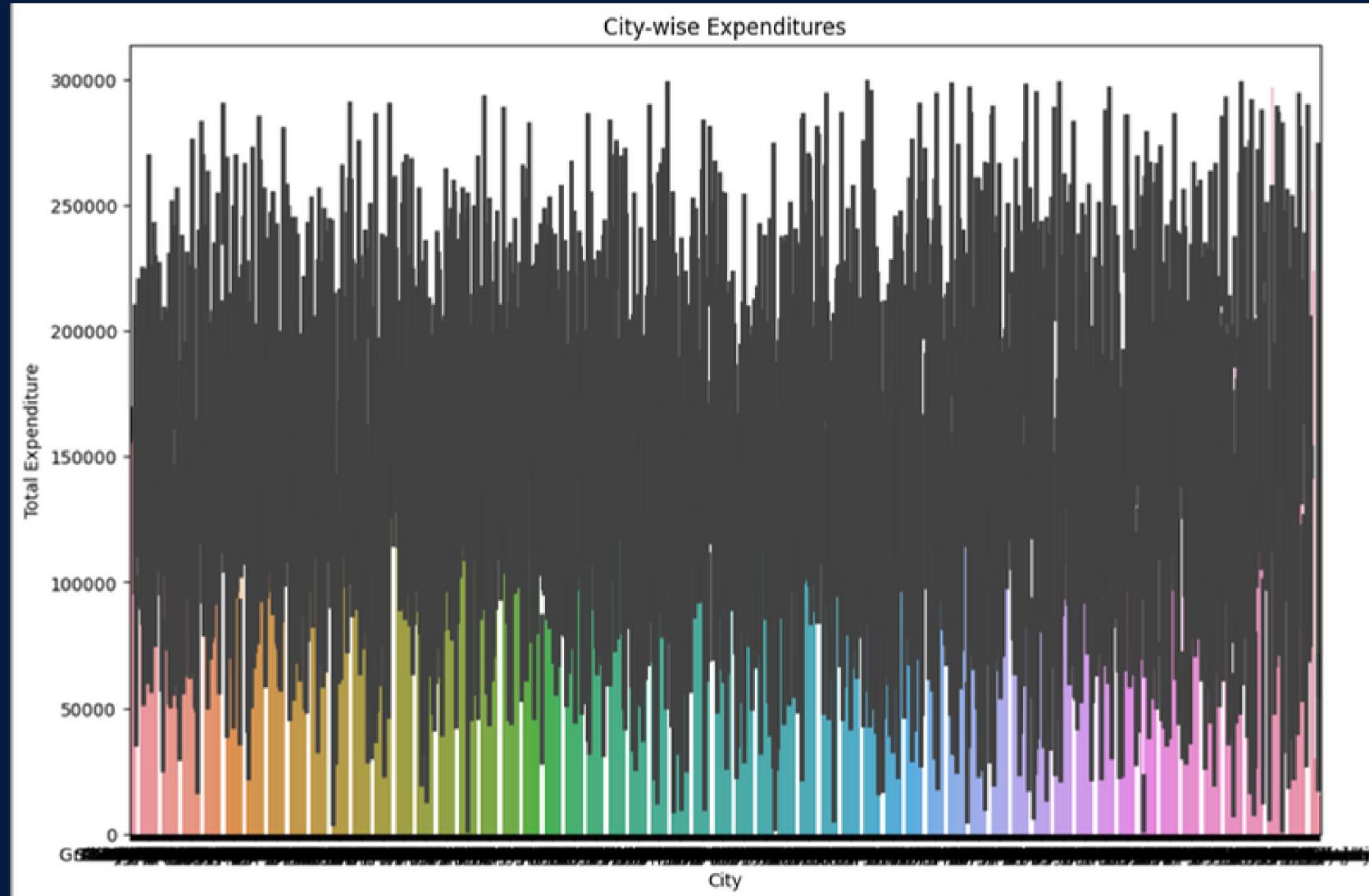
# Anomaly Detection: Unusual Spending Pattern



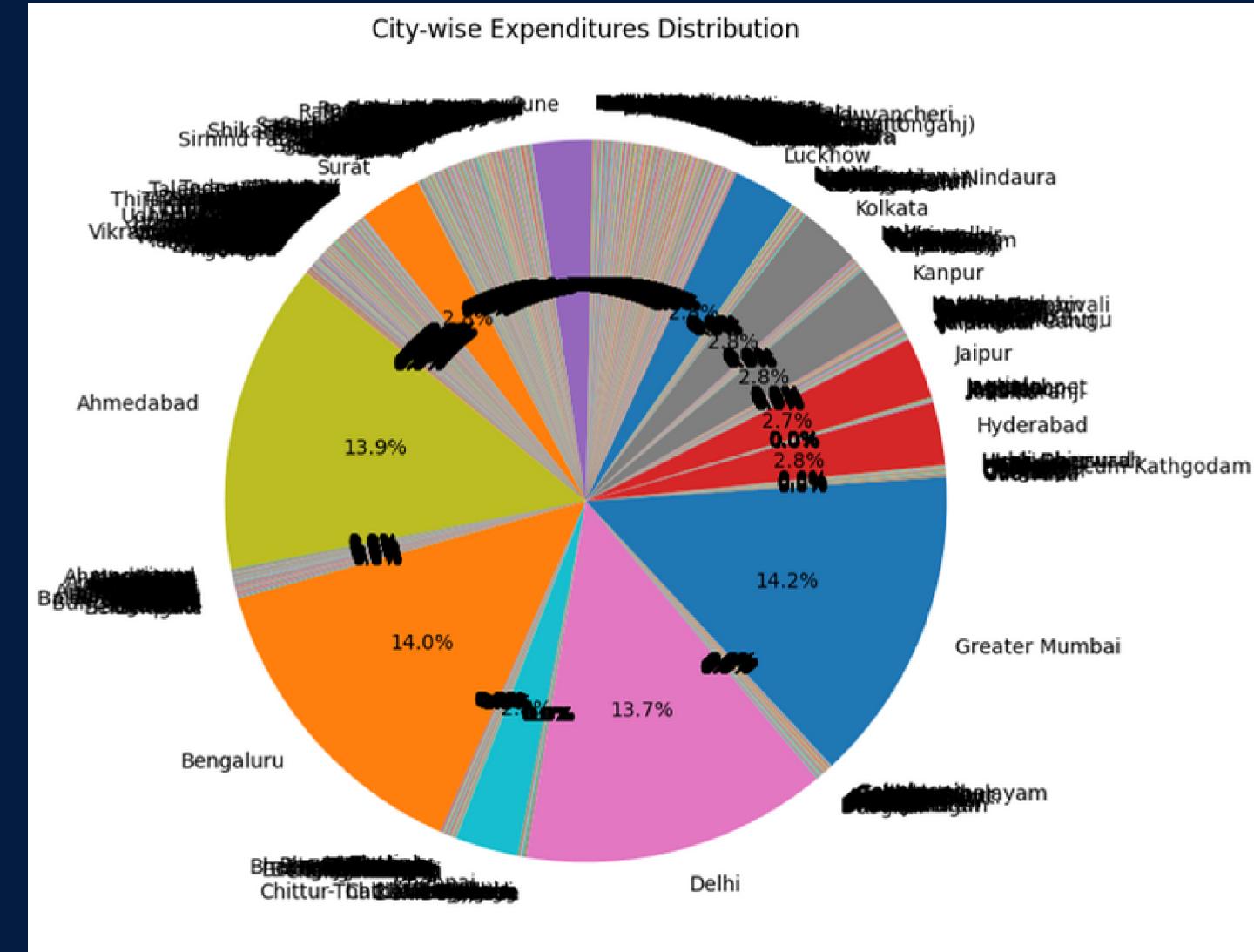
The histogram depicts the distribution of transaction amounts in the given dataset. The height of each bar corresponds to the number of transactions within a specific range of amounts. This visualization provides insights into the concentration of transaction amounts and helps identify patterns or outliers in the dataset.



# City-wise Expenditures

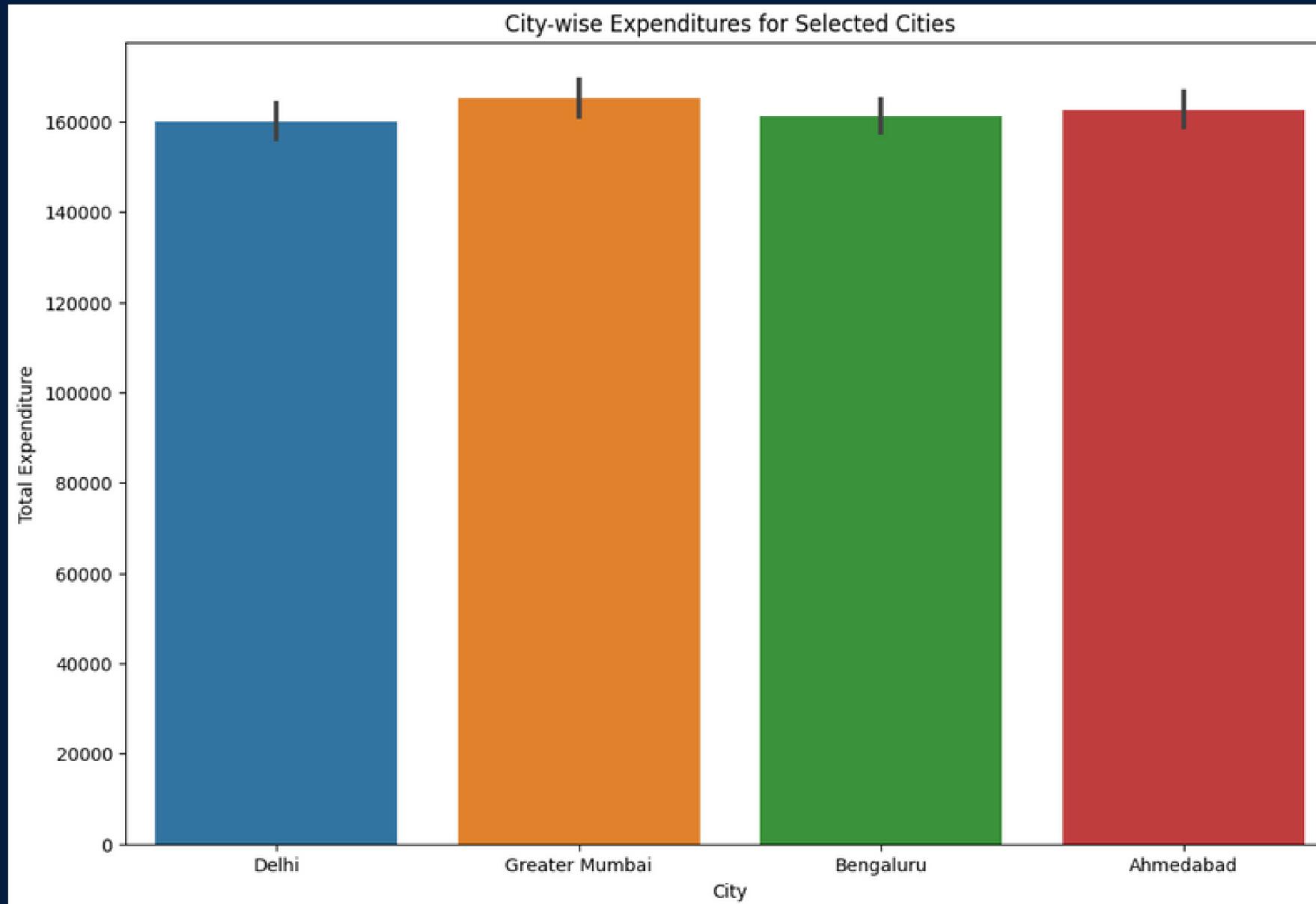


The bar plot visually represents city-wise expenditures based on credit card spending data. The plot is particularly effective for identifying cities with higher or lower total expenditures, contributing to a better understanding of spending patterns across different locations.

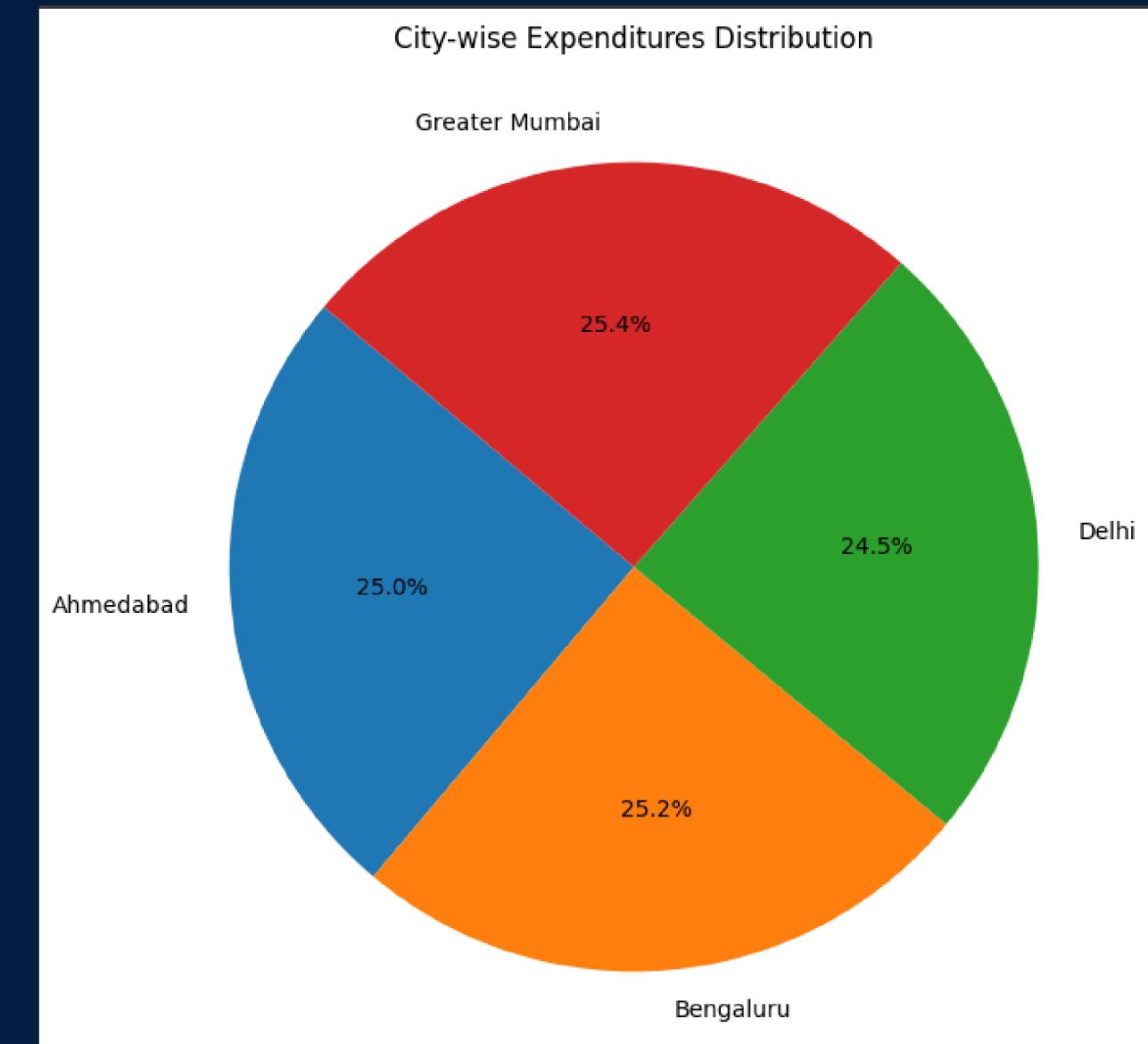


The pie chart illustrates the distribution of total expenditures across different cities based on credit card spending data. This visualization offers a quick and intuitive overview of how expenditures are distributed among different cities, making it easy to identify which cities contribute more or less to the total spending.

# City-wise Expenditures for Selected Cities



The bar plot visualizes the total expenditures for selected cities in the credit card spending dataset. This visualization is particularly useful for understanding and comparing the financial impact of credit card transactions in different cities, offering insights into the distribution of expenditures among the specified locations.



The pie chart visualizes the distribution of total expenditures across selected cities based on credit card spending data. This visualization offers a concise and intuitive representation of how spending is distributed across the specified cities, facilitating a quick comparison of their financial contributions.

# RESULTS

In the visualizations and analysis of credit card spending habits, key patterns and trends emerged, shedding light on the diverse behaviors of cardholders and providing valuable insights into the factors influencing their financial decisions.

- Across the myriad cities in our dataset, Greater Mumbai emerges as the epicenter of credit card expenditures, with the highest spending observed. Following closely are the dynamic urban centers of Delhi, Ahmedabad, and Bengaluru, collectively contributing to the significant financial activity observed in these metropolitan areas.
- In a notable trend across multiple cities, our analysis revealed a higher prevalence of female credit card holders, and intriguingly, females exhibited a propensity for higher spending compared to their male counterparts, underscoring a significant gender-based distinction in credit card usage patterns.
- An interesting pattern emerged from our analysis, showcasing a diverse distribution of credit cards among genders, where women outnumber men across all card types. Notably, while silver cards dominate in quantity, platinum cardholders stand out for their higher spending behaviors, underscoring the intriguing intersection of gender distribution and spending patterns within our credit card holder demographic.
- In examining different spending categories, we found that people make more transactions for food, indicating its regular occurrence in daily expenses. On the other hand, while bills have fewer transactions, they contribute significantly to the total amount spent, highlighting their substantial impact on overall expenditure. This dual trend provides a clear picture of how credit card users balance routine spending on food with larger, less frequent expenses on bills.
- In our graphical representation tracking daily, monthly, and yearly spending over time, a noteworthy trend emerged. The year 2014 stands out as the period with the highest amount spent, particularly concentrated in the late months of 2014 and early months of 2015. This temporal concentration suggests a distinctive peak in credit card expenditures during this specific timeframe, underscoring the significant role of bills in contributing to the overall peak in credit card expenditures.

# RECOMMENDATIONS

These recommendations aim to address various aspects of the credit card ecosystem, from security and education to customer engagement and product refinement, based on the insights gained from our data analysis.



Customized Rewards for Bills Category



Promotional Campaigns Targeting High-Spending Periods



Mobile App Notifications for Budget Management



Collaborate with Local Businesses



Fraud Prevention Workshops



City-Specific Promotions



Regular Customer Surveys

*Thank You*

