

Fraud Transaction Analysis and Patterns



About the dataset

The data provided offers a comprehensive analysis of fraudulent transactions, focusing on transaction amounts, time periods, and frequency. The "Fraud Analysis Summary" highlights that 61% of fraud cases involve small transactions between \$0-\$10, indicating a prevalence of micro-transaction fraud. Meanwhile, 22% of fraud transactions exceed \$100, suggesting riskier fraudulent attempts, and only 17% fall within the \$10-\$100 range.

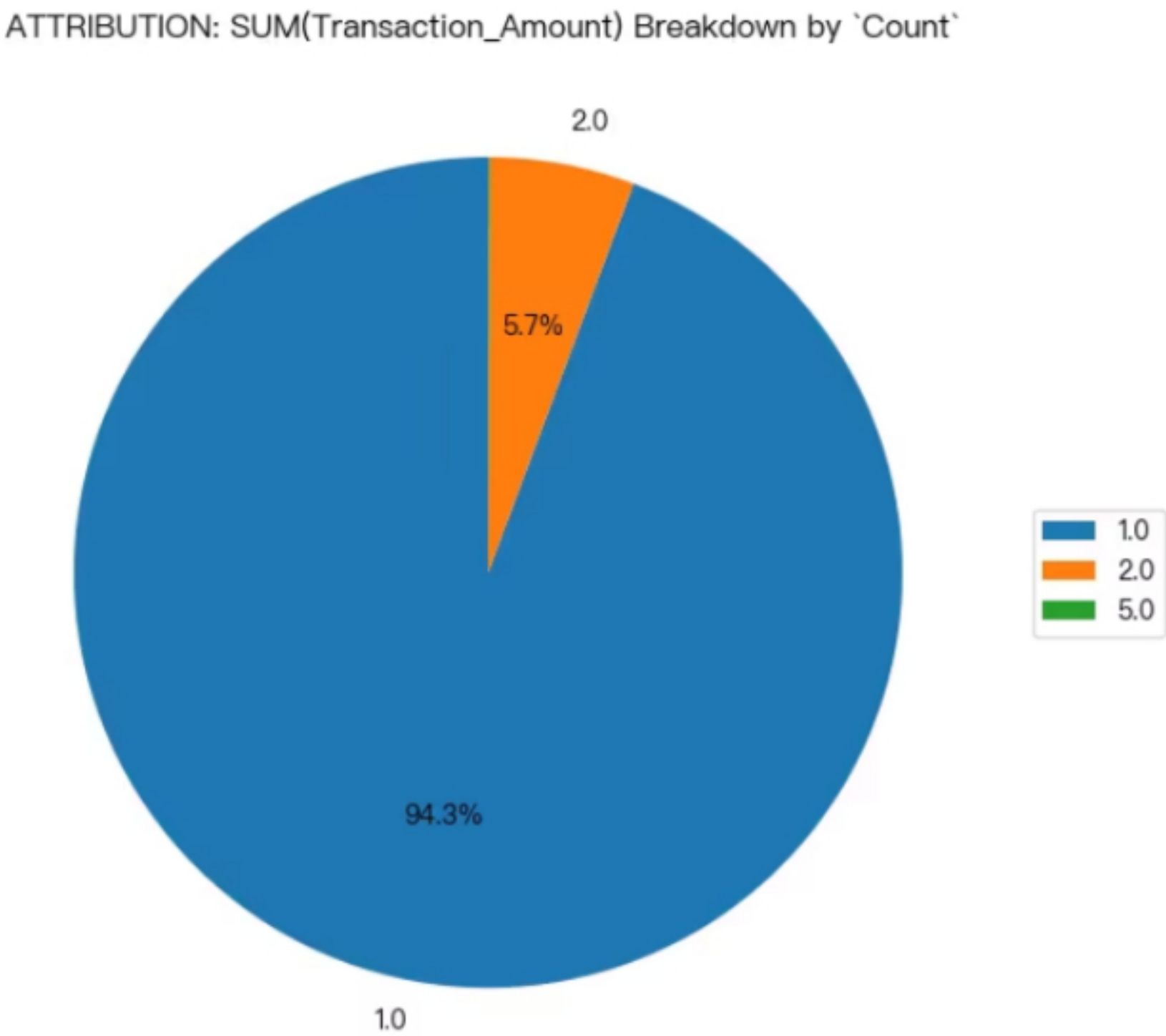
The "Fraud Transactions" dataset reveals that the average transaction amount is \$135.97, with a maximum of \$592.90, indicating a wide range of transaction values. The "Fraud Time Analysis" shows that fraudulent activities are distributed across different times of the day, with the highest total amount of \$544.16 occurring in the afternoon.

In the "Fraud Amount Category," low-value transactions ($\leq \$50$) are the most frequent, with 12 cases, while high-value transactions ($> \$500$) are less common but significant in total amount. The "Fraud Transaction Frequency" data indicates a consistent number of 10 fraud cases across different time periods, with the highest count occurring during late night hours.

Overall, the data suggests that while micro-transactions are the most common form of fraud, high-value transactions pose a significant risk. The distribution of fraud across various times of the day highlights the need for continuous monitoring to mitigate risks effectively.

Relevant Inquiries

Q1.[INSIGHT] Transaction Amount Attribution Analysis by Count

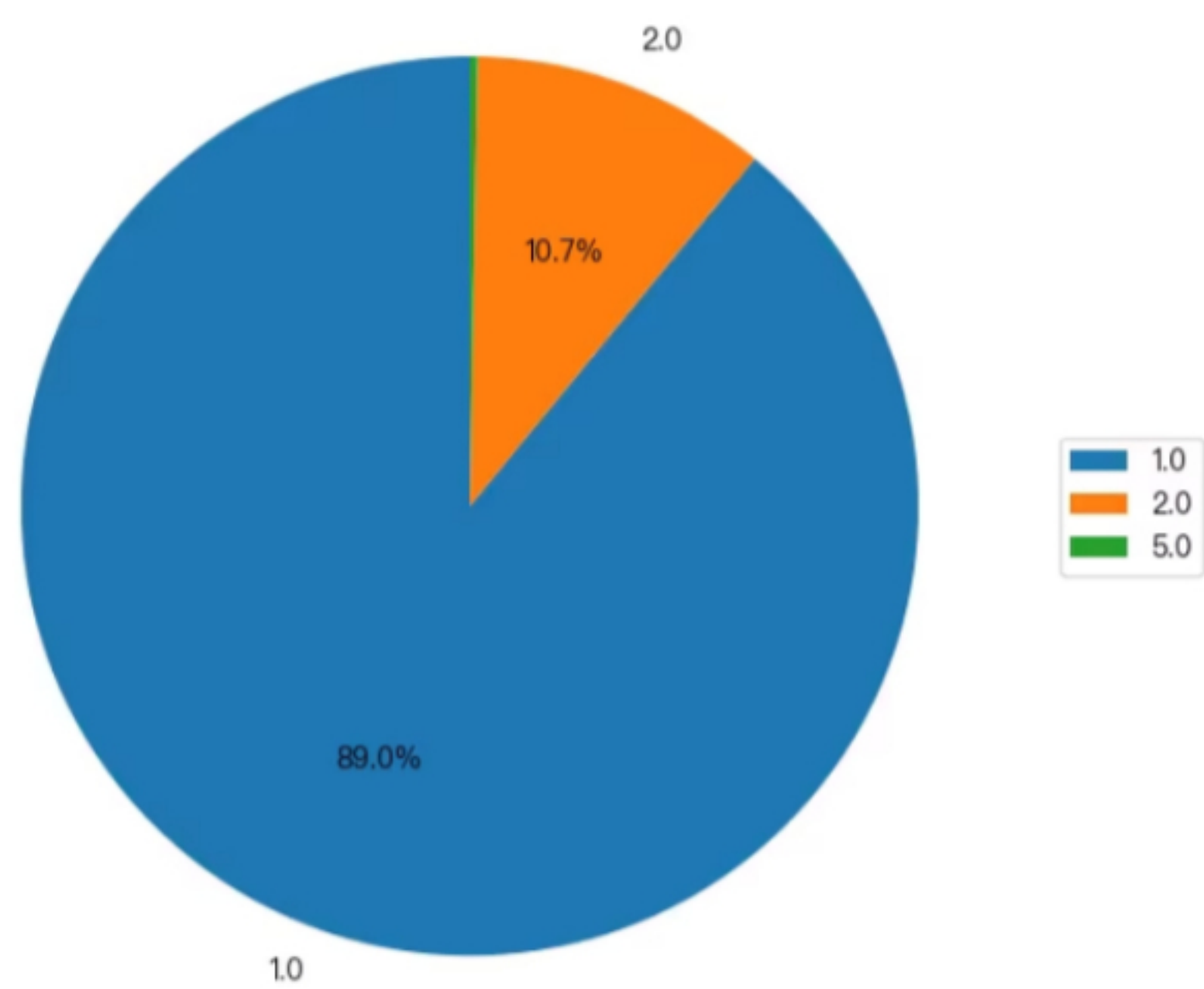


The visualization presents a clear breakdown of transaction amounts categorized by their respective counts. The pie chart indicates that the majority of the transaction amounts, approximately 94.3%, are attributed to a count of 1.0, suggesting that single transactions dominate the dataset. This could imply a high frequency of low-value transactions, which may be a critical insight for understanding customer behavior or sales patterns.

In contrast, the counts of 2.0 and 5.0 represent a significantly smaller portion of the total transaction amounts, with only 5.7% and a negligible percentage, respectively. This disparity highlights the potential for further investigation into the factors that contribute to higher transaction counts. Businesses may want to explore strategies to encourage more multi-item purchases or higher-value transactions to enhance overall revenue. Overall, the data suggests a strong reliance on single transactions, which could inform future marketing and sales strategies.

Q2.[INSIGHT] Analysis of Total Amount Attribution by Count

Attribution: SUM(Total_Amount) Breakdown by 'Count'

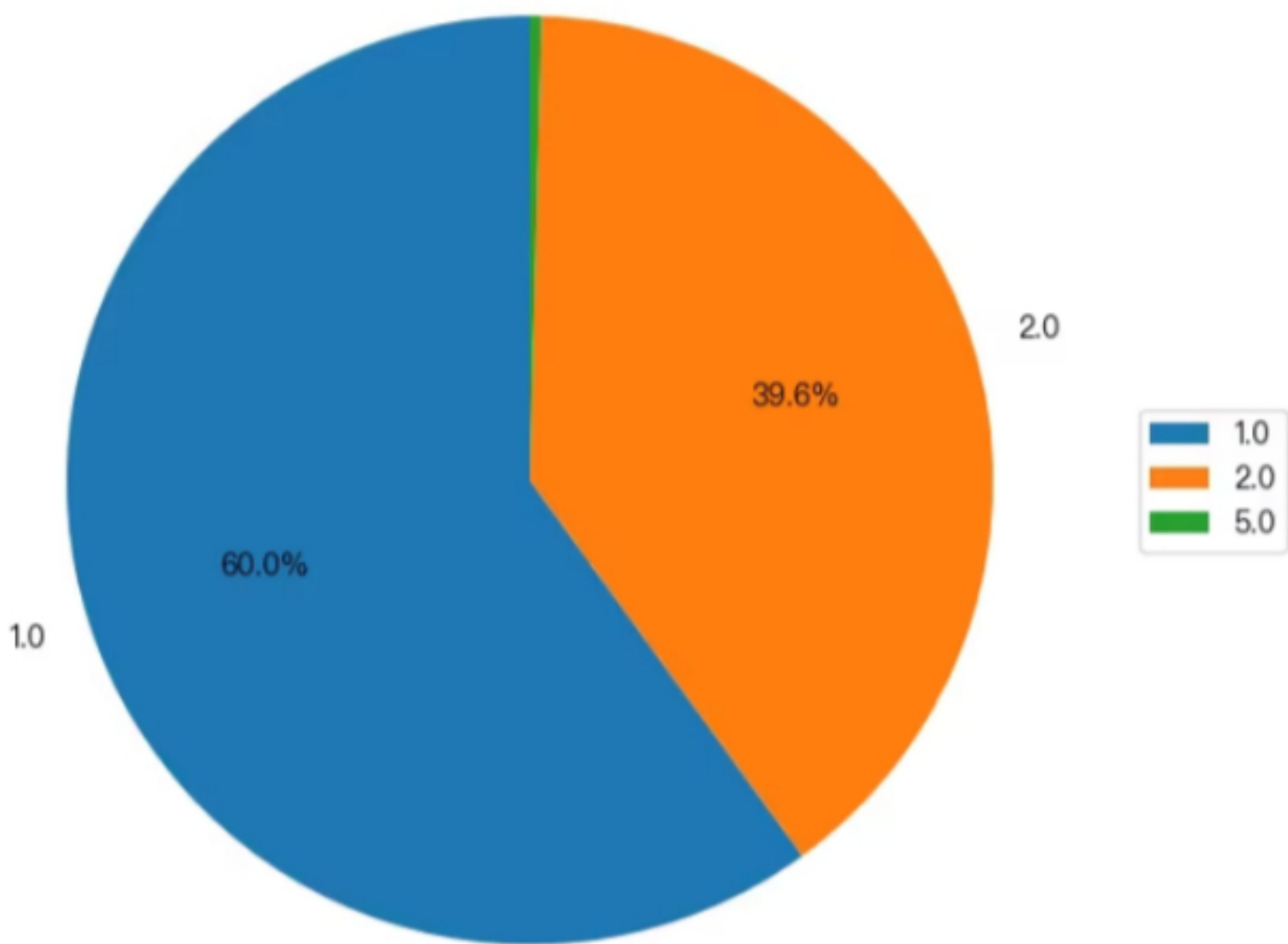


The visualization presents a clear breakdown of the total amount attributed to different counts, highlighting a significant concentration in the category labeled "1.0." This category accounts for a substantial 89% of the total amount, indicating that the majority of the financial contributions or transactions are concentrated in this segment.

In contrast, the "2.0" category represents only 10.7% of the total, suggesting that while it does contribute to the overall total, it is a minor player compared to the "1.0" category. The "5.0" category is not represented in the visualization, indicating that it may not have any contributions or is negligible in this context. This distribution suggests a potential area for further investigation, as understanding the reasons behind the dominance of the "1.0" category could provide insights into customer behavior or transaction patterns.

Q3.[INSIGHT] Analysis of Average Amount Attribution by Count

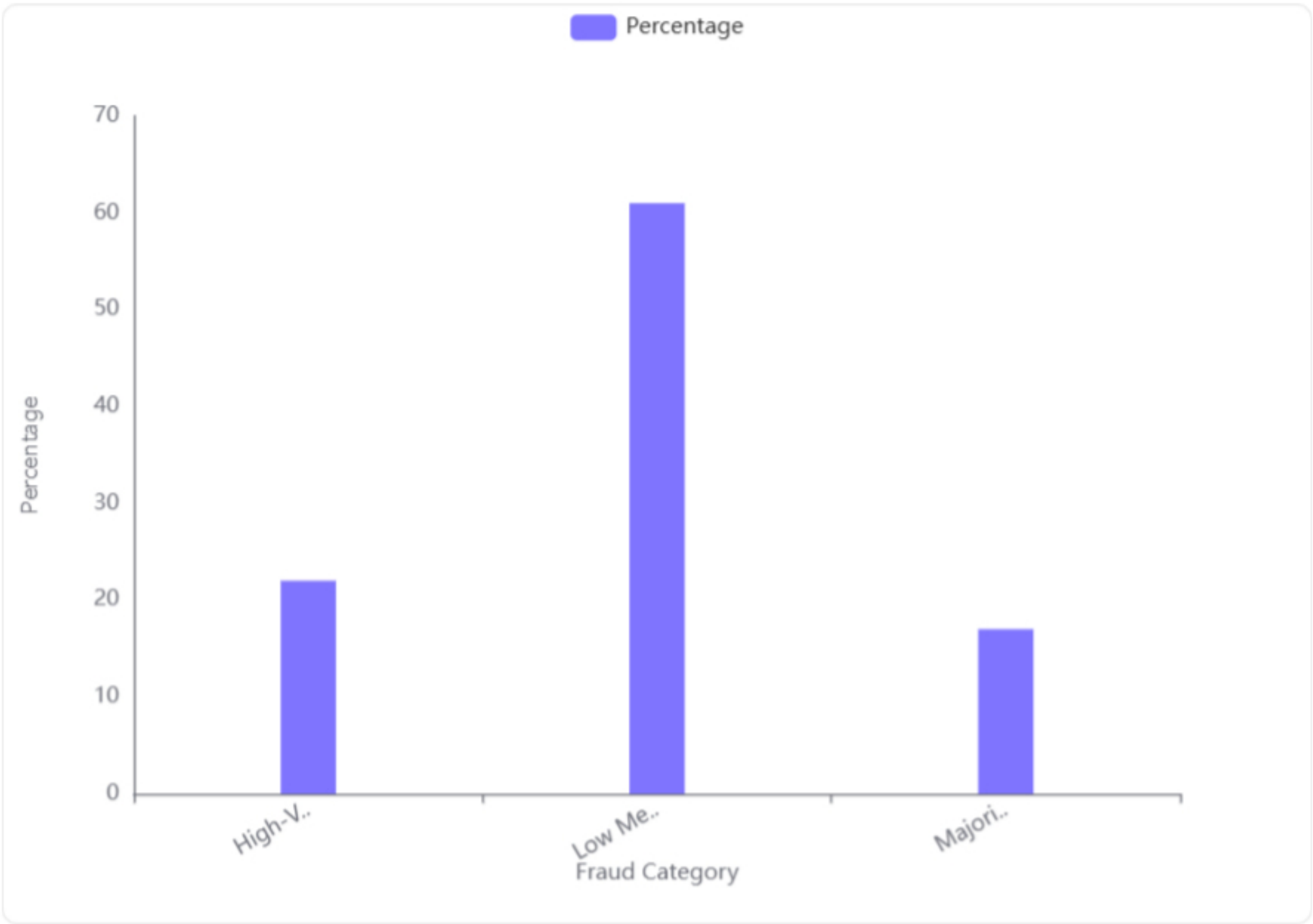
Attribution: MEAN(Avg_Amount) Breakdown by 'Count'



The visualization presents a breakdown of the average amount attributed to different counts, highlighting a significant disparity in the distribution. The pie chart indicates that 60% of the average amounts are associated with a count of 1.0, while only 39.6% corresponds to a count of 2.0. This suggests that the majority of the average amounts are concentrated in the lower count category, indicating a potential skew in the data.

This concentration in the 1.0 count category may imply that a smaller number of transactions or instances are driving the average amounts higher. It raises questions about the nature of these transactions and whether they represent outliers or a consistent trend. Further investigation into the underlying factors contributing to this distribution could provide valuable insights into the overall data dynamics and inform future decision-making processes.

Q4.What percentage of fraud transactions are high-value, and how does this compare to low and medium-value fraud transactions?



High-Value Fraud Transactions

- **Percentage:** 22% of fraud transactions are high-value, exceeding \$100.

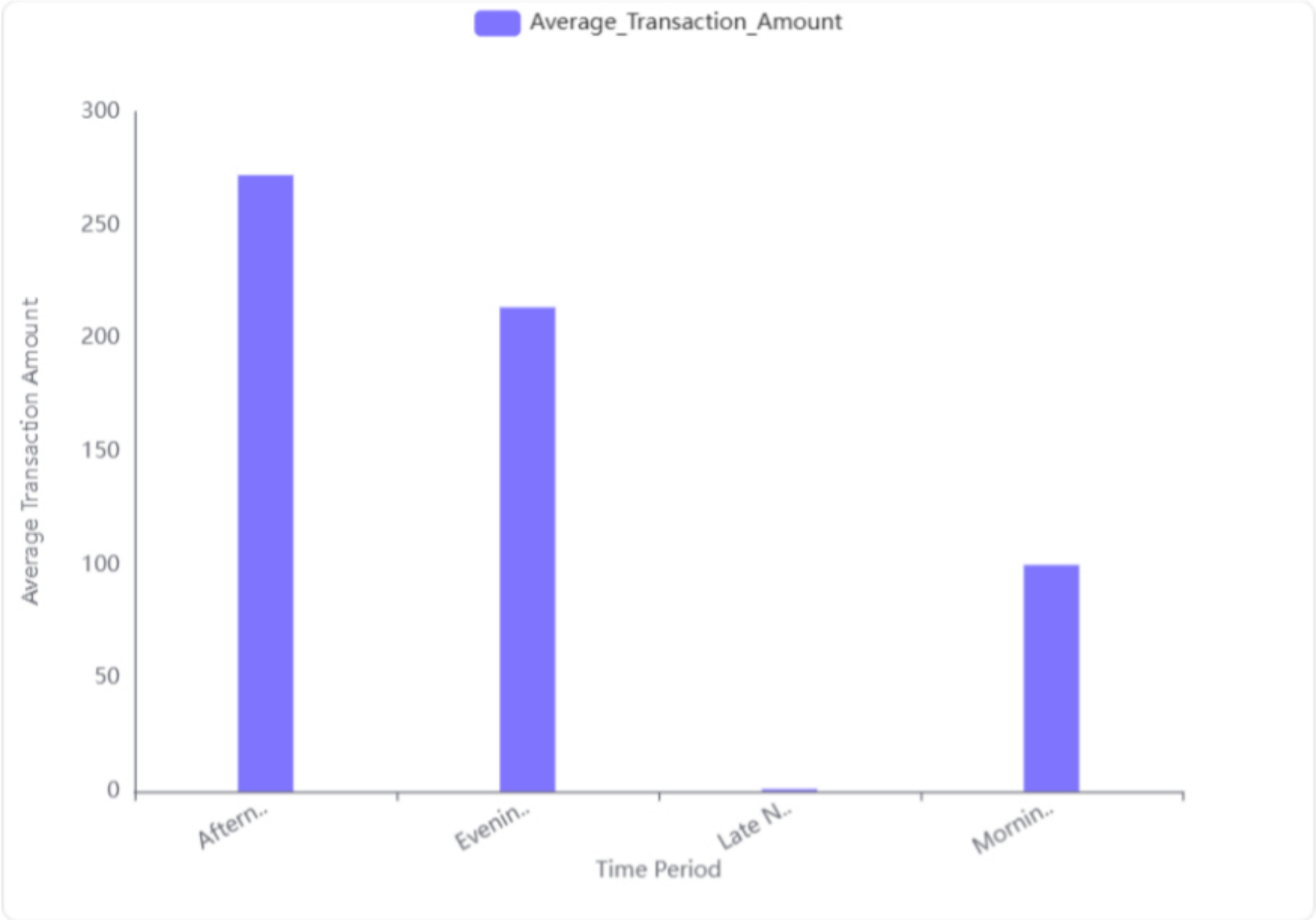
Low and Medium-Value Fraud Transactions

- **Low-Value Fraud:** 61% of fraud cases involve amounts between \$0-\$10, indicating the majority are low-value transactions.
- **Medium-Value Fraud:** 17% of fraud cases fall in the \$10-\$100 range.

Conclusion and Insights

- **Comparison:** Low-value fraud transactions are the most prevalent, comprising 61% of cases. High-value fraud transactions account for 22%, while medium-value fraud transactions make up 17%.
- **Insight:** The data suggests a significant focus on low-value fraud, which could indicate a strategy of micro-transaction fraud attempts.

Q5.How does the average transaction amount vary across different time periods of the day?



Analysis of Average Transaction Amounts

- **Afternoon (12PM-6PM):** The highest average transaction amount is observed during this period, with an average of **272.08**.
- **Evening (6PM-12AM):** The average transaction amount is **213.7**, which is the second highest among the time periods.
- **Morning (6AM-12PM):** This period has a lower average transaction amount of **99.99**.
- **Late Night (12AM-6AM):** The lowest average transaction amount is recorded during this time, at **1.0**.

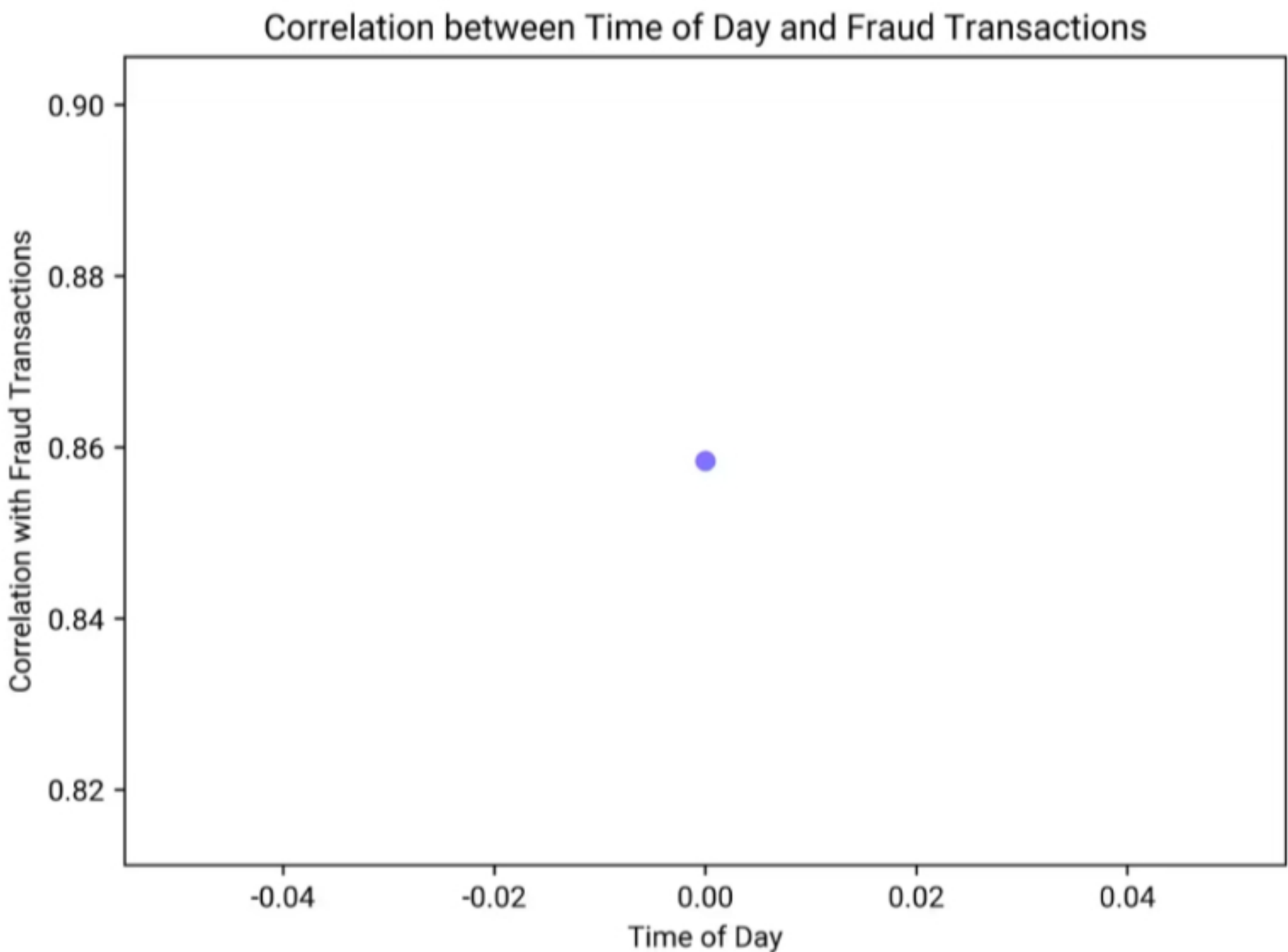
Visualization Insights

- **Bar Chart Representation:** The bar chart clearly shows the variation, with the afternoon period having the highest bar, indicating the highest average transaction amount, followed by the evening, morning, and late night periods.

Conclusion and Insights

- **Peak Transaction Period:** The afternoon period (12PM-6PM) experiences the highest average transaction amounts, suggesting increased transaction activity or higher-value transactions during this time.
- **Low Activity Period:** The late night period (12AM-6AM) has the lowest average transaction amounts, indicating minimal transaction activity or lower-value transactions during these hours.

Q6.Is there a correlation between the time of day and the total amount of fraud transactions?



Correlation Metrics

- **Correlation Value:** The correlation between the time of day and the total amount of fraud transactions is approximately **0.86**. This indicates a strong positive correlation, suggesting that certain times of day are associated with higher fraud amounts.

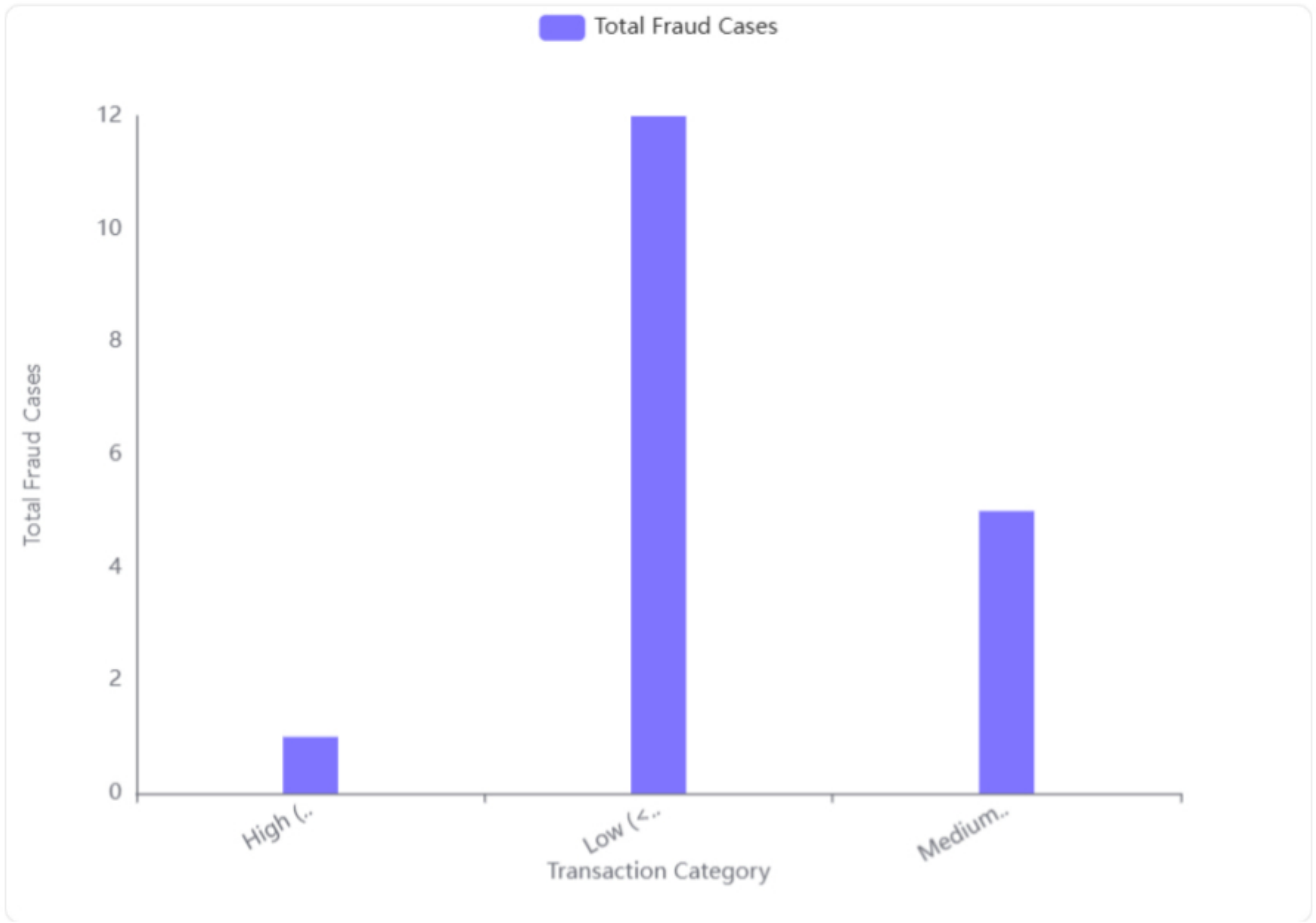
Visualization

- **Scatter Plot:** The visualization shows a single point representing the correlation value, reinforcing the strong positive relationship between the time of day and fraud amounts.

Conclusion and Insights

- **Strong Correlation:** There is a significant correlation between the time of day and the total amount of fraud transactions, with certain periods likely experiencing higher fraud activity.
- **Further Analysis:** To understand the specific time periods contributing to this correlation, a detailed examination of the data for each time period is recommended.

Q7.What is the distribution of fraud cases across different transaction amount categories?



Data Analysis

- **Transaction Categories:** The fraud cases are categorized into three transaction amount categories: 'High (>500)', 'Low (<=50)', and 'Medium (51-500)'.
- **Total Fraud Cases:** The distribution of fraud cases is as follows:
 - **High (>500):** 1 case
 - **Low (<=50):** 12 cases
 - **Medium (51-500):** 5 cases

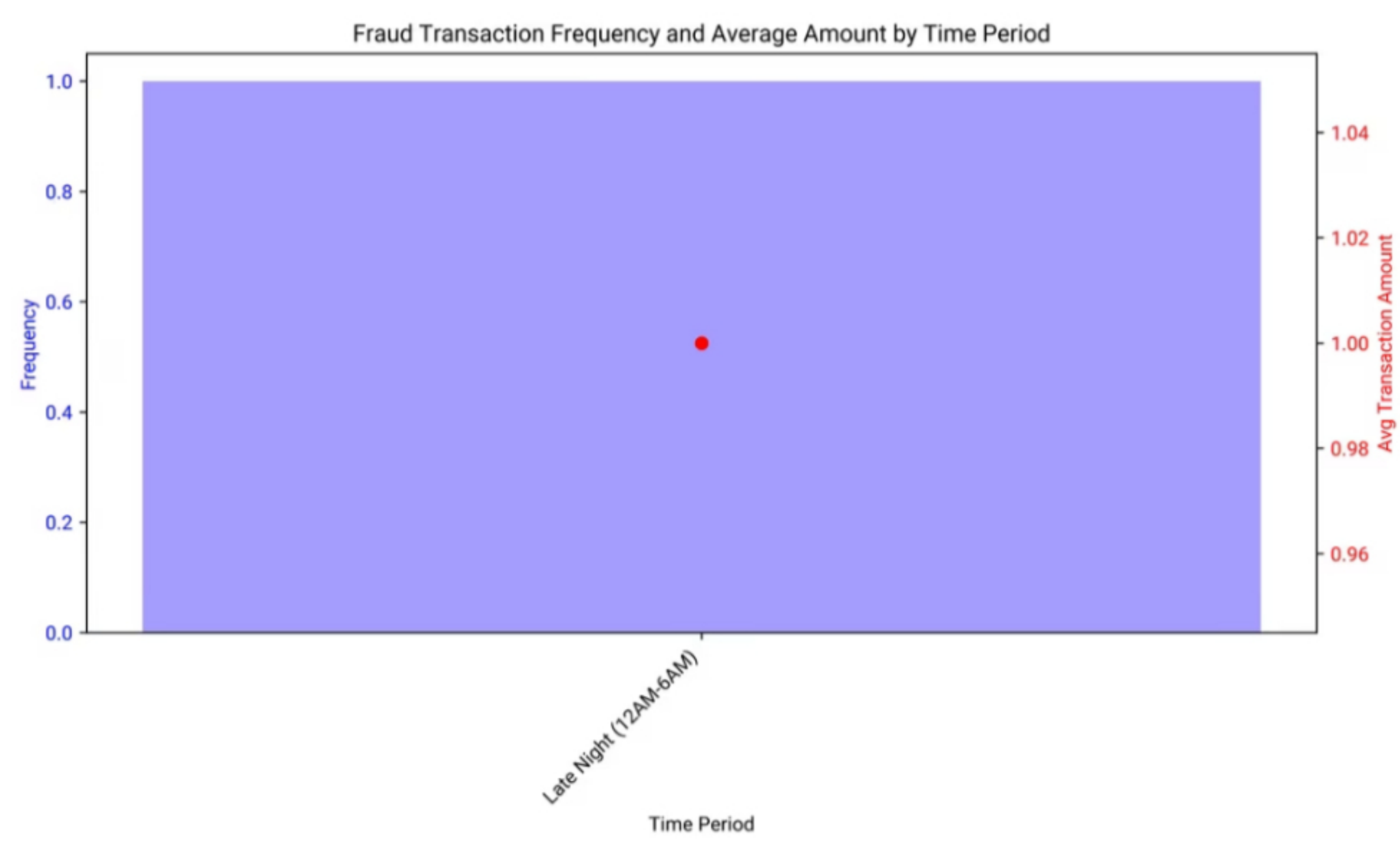
Visualization

- **Bar Chart Representation:** The bar chart illustrates that the majority of fraud cases fall into the 'Low (<=50)' category, followed by 'Medium (51-500)', and the least in 'High (>500)'.

Conclusion and Insights

- **Majority in Low Category:** The 'Low (<=50)' category has the highest number of fraud cases, indicating a trend towards smaller transaction fraud.
- **Significant Medium Category:** The 'Medium (51-500)' category also shows a notable number of fraud cases, suggesting some focus on mid-sized transactions.
- **Minimal High Category:** The 'High (>500)' category has the least fraud cases, possibly due to higher scrutiny on larger transactions.

Q8.Which time period has the highest frequency of fraud transactions, and what is the average transaction amount during this period?



Time Period with Highest Frequency

- **Time Period:** The time period with the highest frequency of fraud transactions is **Late Night (12AM-6AM)**.

Average Transaction Amount

- **Average Transaction Amount:** During the Late Night period, the average transaction amount is **1.0**.

Visualization Insights

- **Highlighted Period:** The visualization confirms that the Late Night period has the highest frequency, marked by a red dot indicating the average transaction amount.

Conclusion and Insights

- **Highest Frequency Period:** The Late Night (12AM-6AM) period experiences the most fraud transactions.
- **Transaction Amount:** The average transaction amount during this period is notably low at 1.0, suggesting potential patterns in fraudulent activity.

Q9.How do the total and average amounts of fraud transactions differ between high, medium, and low transaction categories?



High Transaction Category

- **Total Amount:** \$592.90
- **Average Amount:** \$592.90
- **Insight:** This category has the highest total and average amounts, indicating significant individual transaction values.

Medium Transaction Category

- **Total Amount:** \$1218.42
- **Average Amount:** \$243.68
- **Insight:** The medium category has the highest total amount but a moderate average, reflecting a larger number of mid-range transactions.

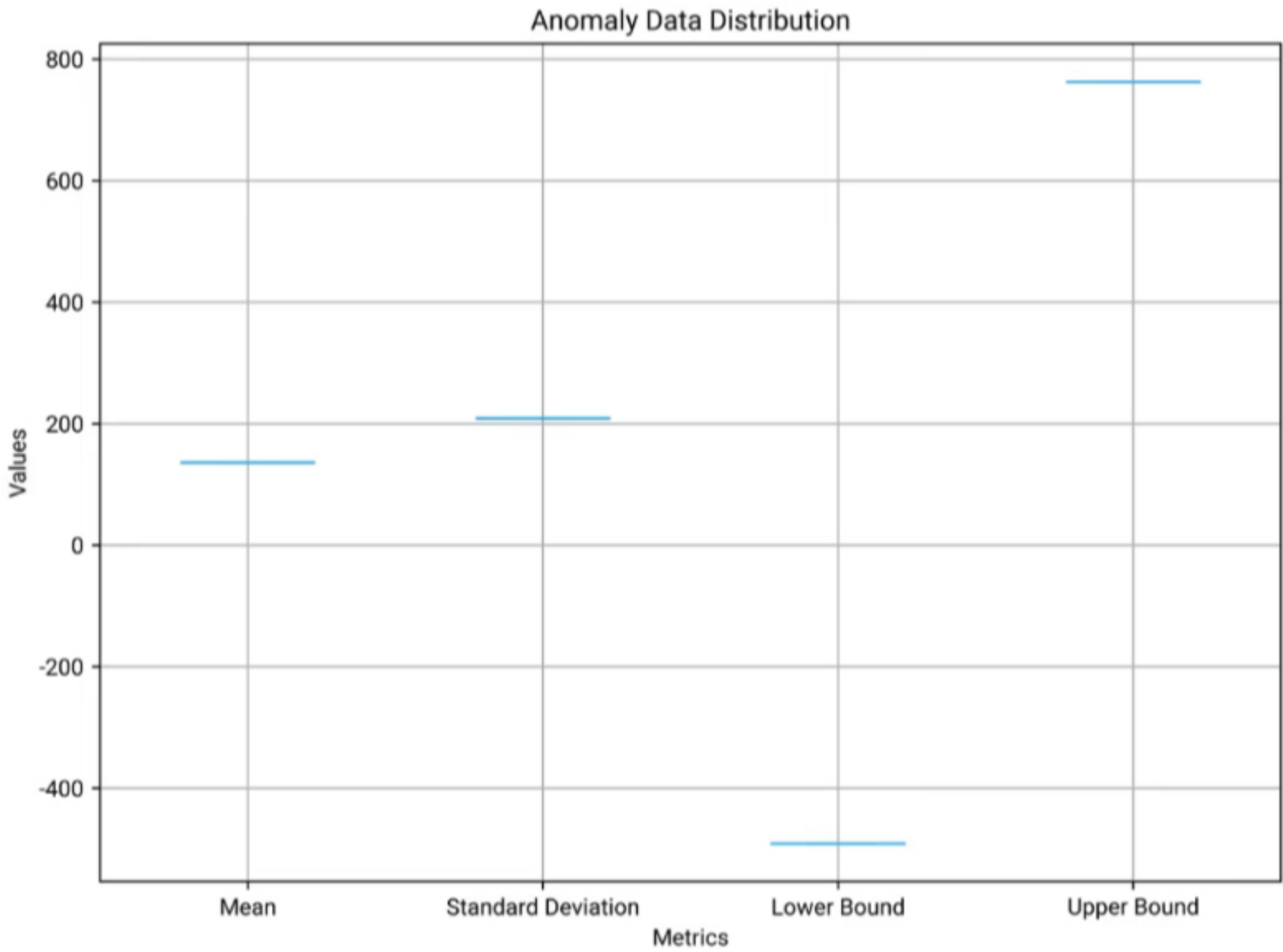
Low Transaction Category

- **Total Amount:** \$60.34
- **Average Amount:** \$5.03
- **Insight:** This category has the lowest total and average amounts, consistent with smaller transaction values.

Conclusion and Insights

- **High Category Dominance:** The high transaction category shows significant individual transaction values, contributing to a high average amount.
- **Medium Category Volume:** Despite having the highest total amount, the medium category's average is lower, suggesting a higher volume of transactions.
- **Low Category Minimal Impact:** The low category contributes minimally to the total fraud amount, with both total and average amounts being the lowest.

Q10.Are there any anomalies in the transaction amounts that could indicate unusual or suspicious activity?



Statistical Analysis

- **Mean and Standard Deviation:** The mean transaction amount is approximately \$135.97, with a standard deviation of \$209.00. This indicates a wide spread in transaction amounts.
- **Outliers:** No outliers were identified within the calculated bounds (-\$491.03 to \$762.98).

Visualization Insights

- **Distribution:** The visualization shows the range of transaction amounts, highlighting the mean, standard deviation, and bounds. No significant outliers are visually apparent.

Detailed Analysis

- **High-Value Transactions:** Transactions close to the maximum value of \$592.90 could be considered potential anomalies due to their deviation from the mean.
- **Micro-Transaction Fraud:** 61% of fraud cases involve amounts between \$0-\$10, suggesting a pattern of micro-transaction fraud.
- **Riskier Transactions:** 22% of fraud transactions exceed \$100, indicating higher-risk fraudulent attempts.

Conclusion and Insights

- **Potential Anomalies:** Transactions near the maximum value and those exceeding \$100 are potential anomalies, as they deviate significantly from the mean.
- **Fraud Patterns:** The prevalence of micro-transaction fraud suggests a pattern that could be exploited for fraudulent activities.
- **Further Investigation:** High-value transactions and specific time periods should be scrutinized for unusual or suspicious activity.