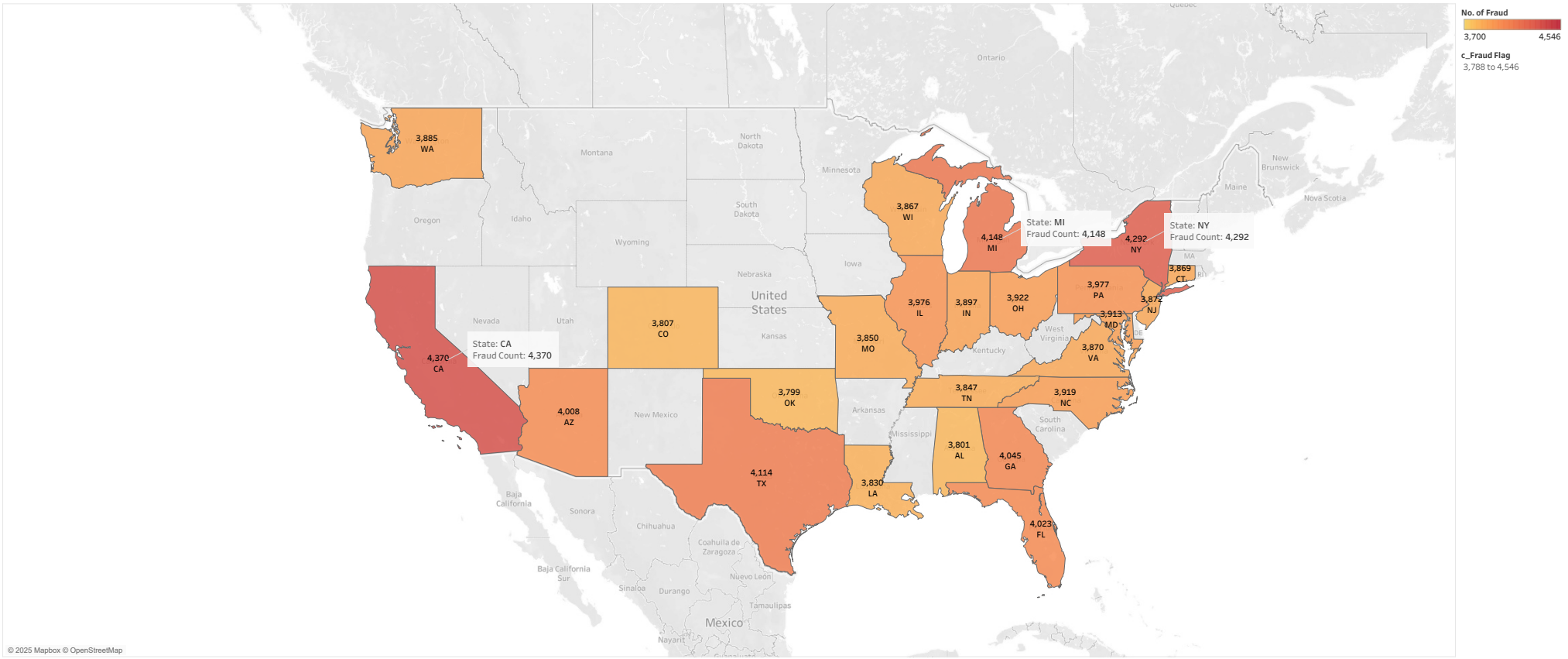
In recent years, the financial sector has witnessed significant technological advancements in digital banking. But, alongside these innovations, concerns about the rise of fraudulent activities have also grown. Financial fraud is rising fast. It no longer targets just high-risk profiles or low-limit credit cards—**everyone is a potential target**.

By examining key metrics and trends over time, we aim to identify any patterns that may indicate shifts in the volume or frequency of fraudulent transactions. This analysis seeks to explore a critical question:

Has there been an observable increase in fraudulent transactions within the banking system?

Key Visual 1: Regional Fraud Distribution

To understand where these fraudulent transactions are occuring, we mapped fraud volume across the different states.
States like **California (4,370), New York (4,292), and Michigan (4,148)** recorded the highest number of fraud cases.
These hotspots may indicate weak fraud detection or high transaction activity.

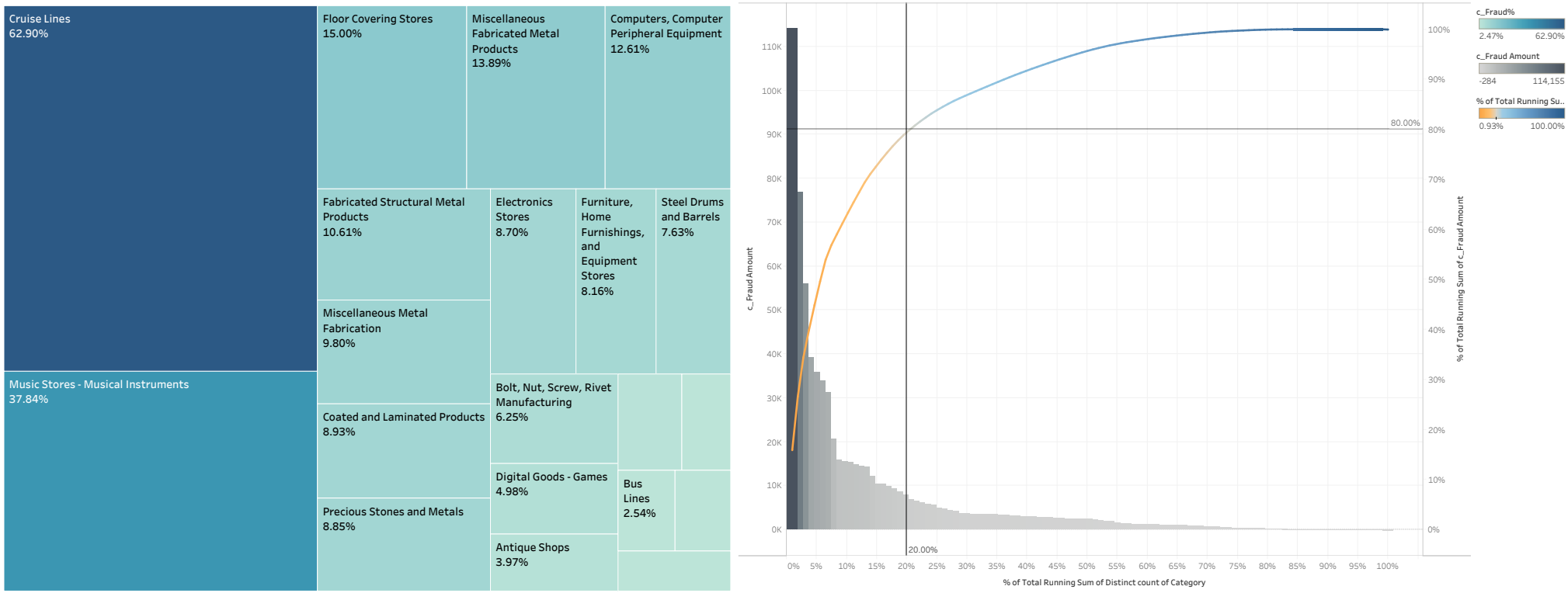


Key Visual 2: Industry Vulnerability (Fraud by Category)

Next we examined which types of businesses are experiencing the highest rates of fraudulent transactions.

The treemap visualizes the fraud rate for the top 20 categories most affected by fraud, displaying the transaction volume and fraud rate via size and color of each square respectively.
We can also use the Pareto chart to show which 20% of categories drive 80% fraud losses.

Cruise Lines and **Music Stores** are outliers with extremely high fraud rates — highlighting vulnerable sectors. This highlights that certain industries are disproportionately targeted by fraudulent activities and may require specific security enhancements.



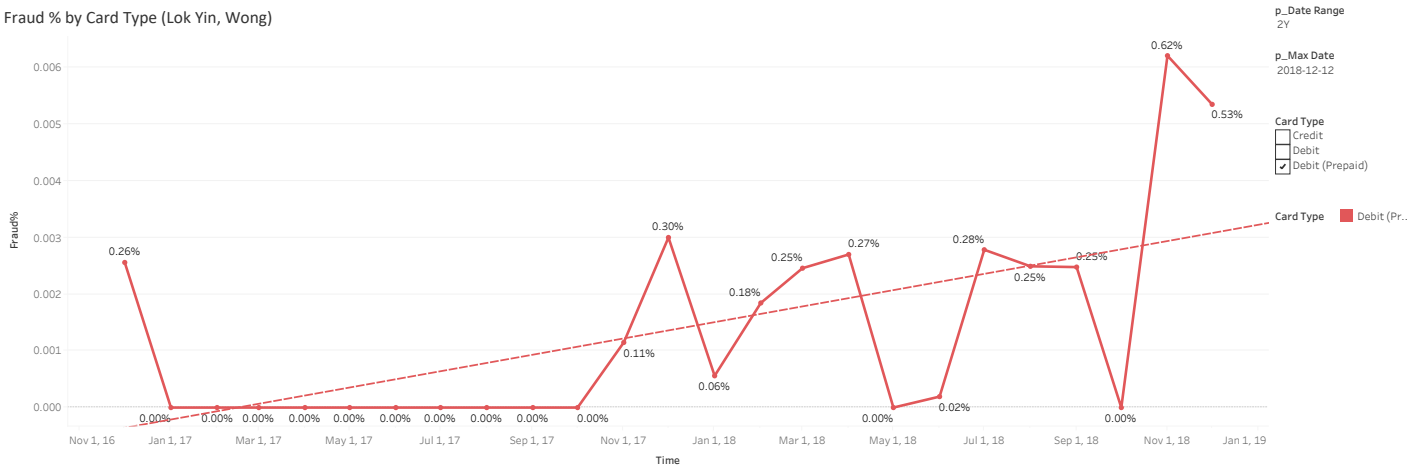
Key Visual 3: Card Type Trends

To understand how fraud trends vary across different payment methods over time, we examined both the percentage and the total amount of fraudulent transactions by card type.

Debit (Prepaid) cards experienced fraud spikes, notably in **Nov-Dec 2018**, as identified by Tableau outlier detection

This indicates that even if the proportion of fraudulent debit card transactions isn't consistently high, the financial impact of debit card fraud is growing over time and demands attention.

Fraud % by Card Type (Lok Yin, Wong)

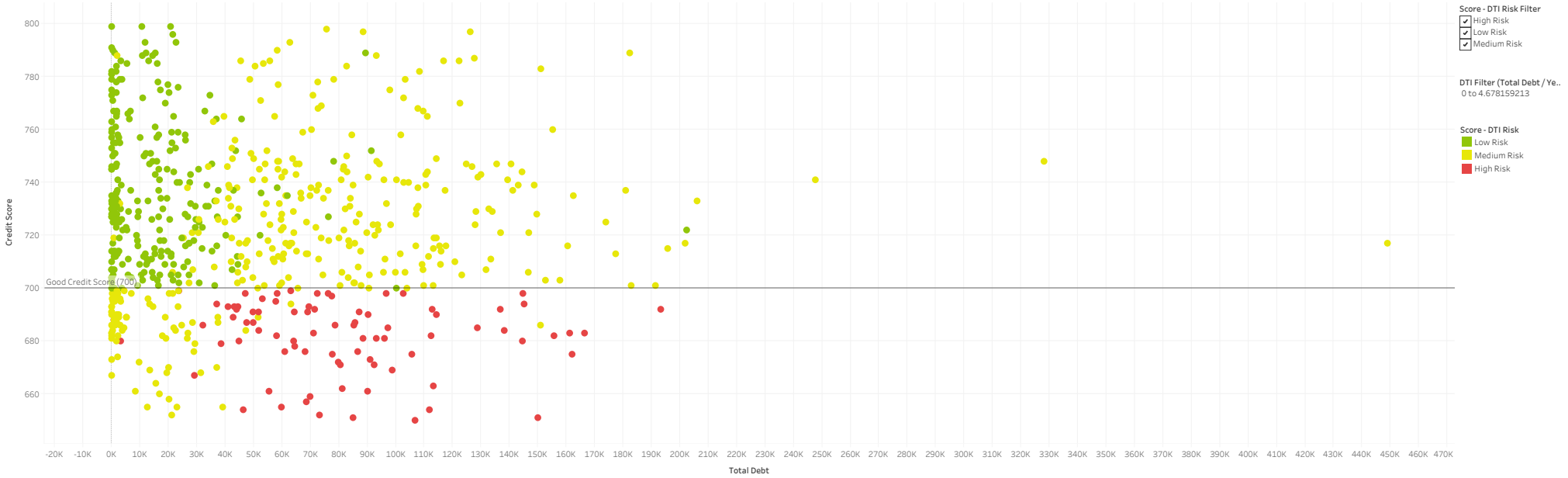


Fraud Amount by Card Type (Gharacheh, Lily)

Key Visual 4: User-Level Analysis

To explore potential user-level risk factors, we analyzed the relationship between the total fraud amount and different user information: credit score, DTI (calculated using total debt / yearly income), age group.

Most of the fraud amounts come from users with the **age over 35**, and an average **credit score from 650 - 750**. We can closely analyze each user based on their user ID from the scatterplot after filtering based on credit score - age group table.



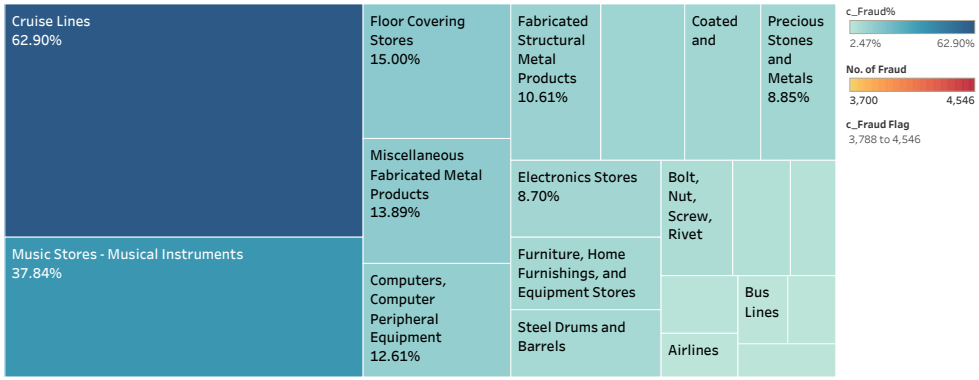
Conclusion

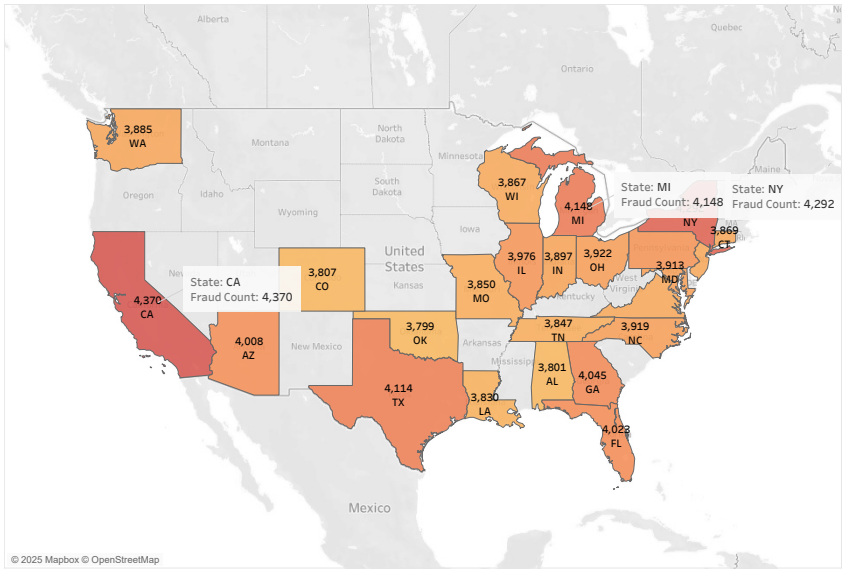
Findings:

- Fraud is heavily concentrated in certain states and MCC Categories.
- Prepaid debit cards are a significant fraud channel.
- A small number of categories account for most losses (Pareto).
- Credit limit–income mismatches can identify fraud risk.

Recommendations:

- Enhance fraud screening in **top 5 MCC Categories.**
- Focus on **state-specific** anti-fraud measures (e.g., CA, NY).
- Improve **income verification** before approving high credit limits.
- Add machine learning–based fraud detection for prepaid card transactions.





Thank you for exploring our analysis!

Financial fraud continues to evolve — but with data-driven insights, we can proactively combat it.

We urge financial institutions to act now: prioritize high-risk sectors, improve screening, and adopt AI-powered detection systems to stay ahead.

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