



Credit Card Fraud Detection for Banks and Retailers

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Objective

- How to recognize fraud transactions.
- How to Choose a Solution For Credit Card Fraud Detection.
- Help to manage and track high-risk credit card fraud alerts and subsequent processing.

Methodology

Data:

- The main dataset contains transactions made by Capital One credit cards in 2016, including 641914 instances and 29 columns. My sample data includes 1300 instances and 29 columns.

Tools:

- Data sampling: Python
- Data cleaning and analysis: Excel, Google Sheets
- Visualizations: Excel, Google Sheets, Tableau

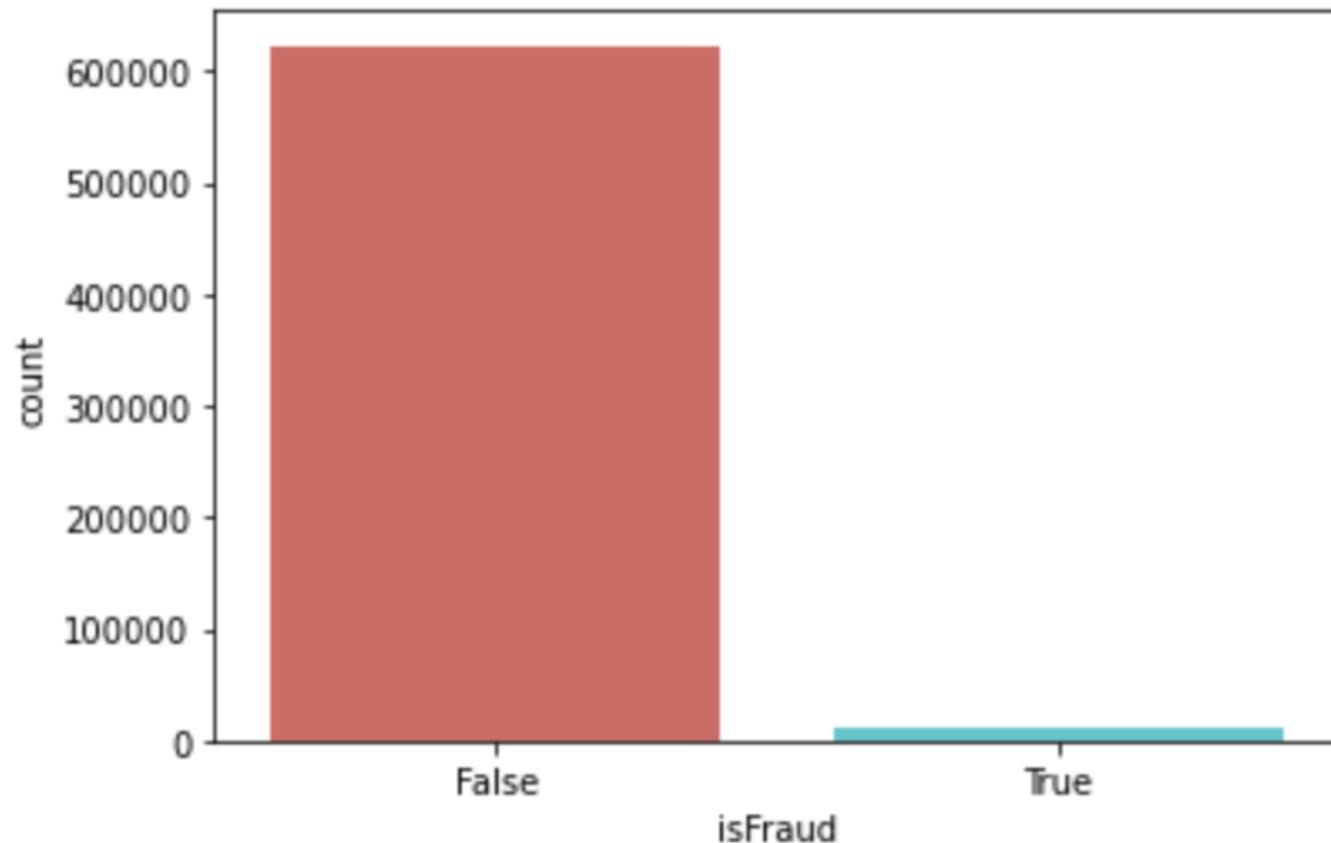
Introduction

Banks and companies initiate a payment fraud investigation, gathering information about the transaction from the cardholder.

- They review relevant details, such as whether the charge was a card-present or card-not-present transaction.
- The bank also examines whether the charge fits the cardholder's usual purchasing habits.
- Time stamps, location data, IP addresses, and other elements can be used to prove whether the cardholder was involved in the transaction or not .

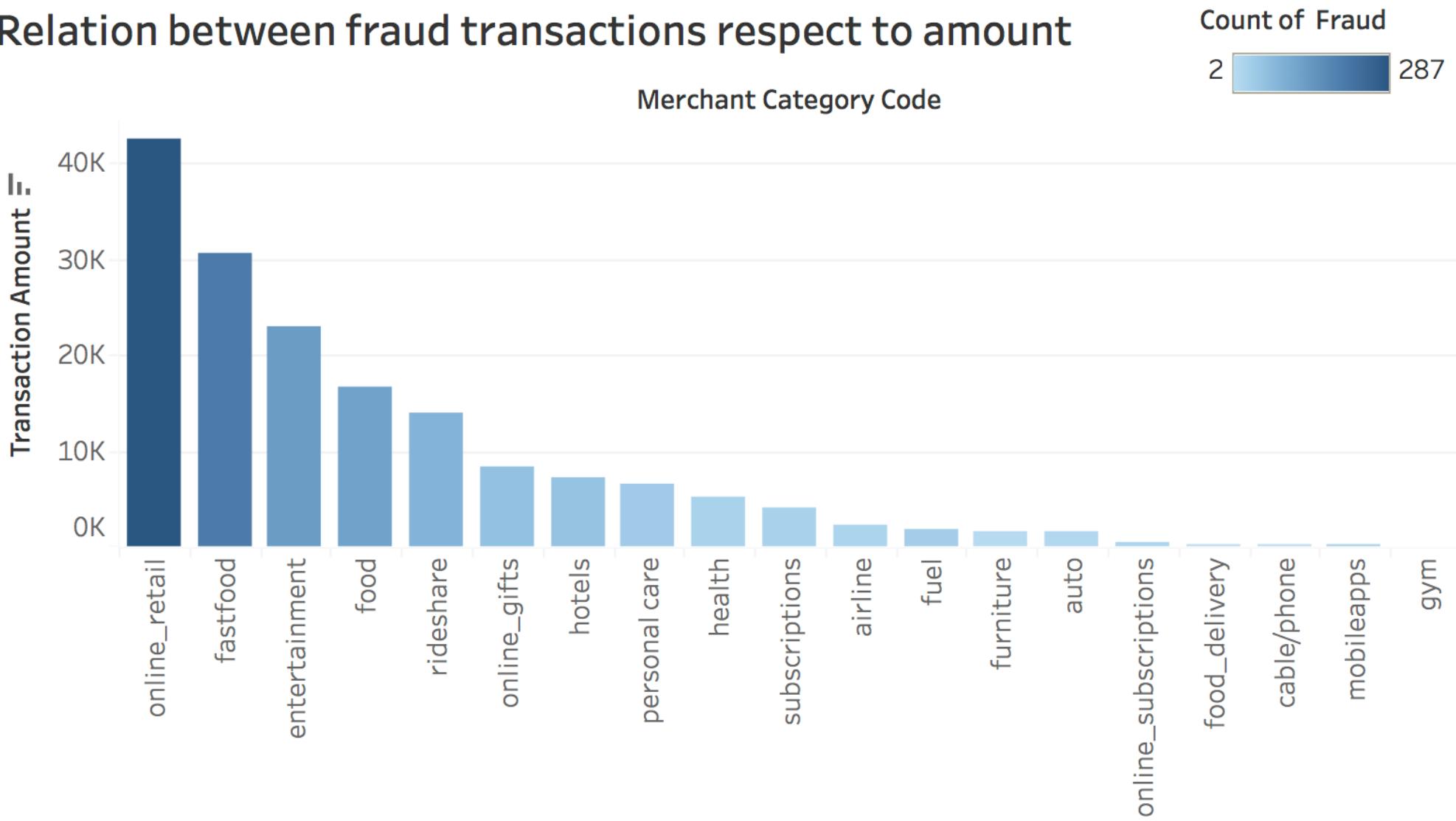
Whether a given credit card transaction will be fraudulent or not?

This graph shows that the number of fraudulent transactions is much lower than the legitimate ones. (around 1.7%)



False 622954
True 10892

Relation between fraud transactions respect to amount

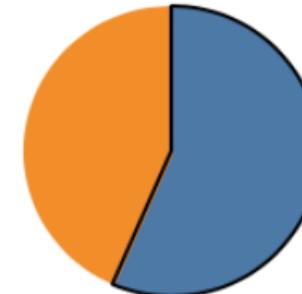


Sum of Transaction Amount for each Merchant Category Code. Color shows count of Is Fraud.

- The credit card fraud that is most prominent for online merchants is known as card-not-present fraud or CNP fraud.

CNP fraud is possible when physical card is not required to complete an online transaction.

Card Present vs Is Fraud in whole transactions



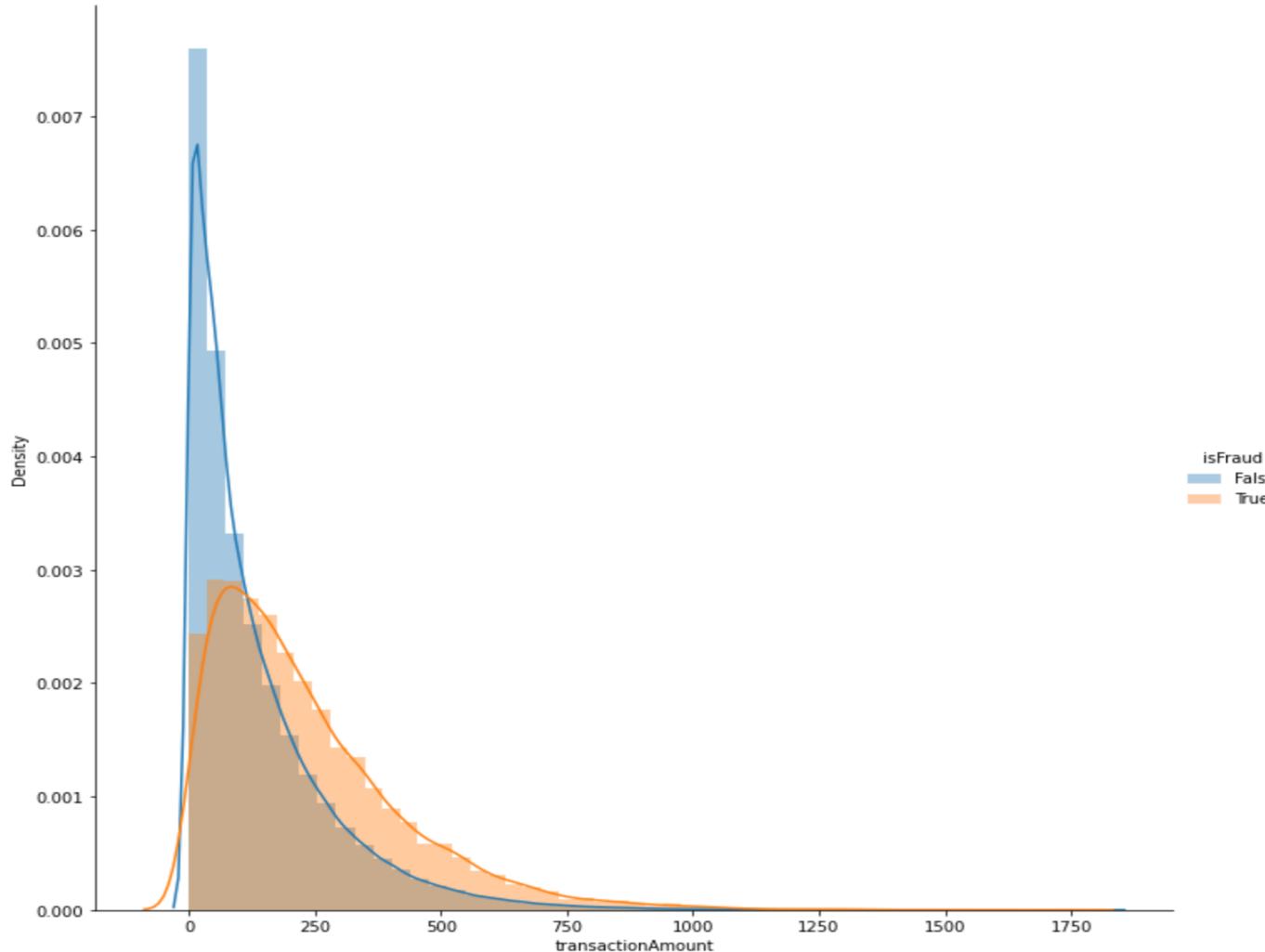
Card Present

- False
- True

Card Present:	False
Is Fraud:	13
Transaction Amount:	79,213

Card Present (color) and sum of Transaction Amount and being Fraud(size).

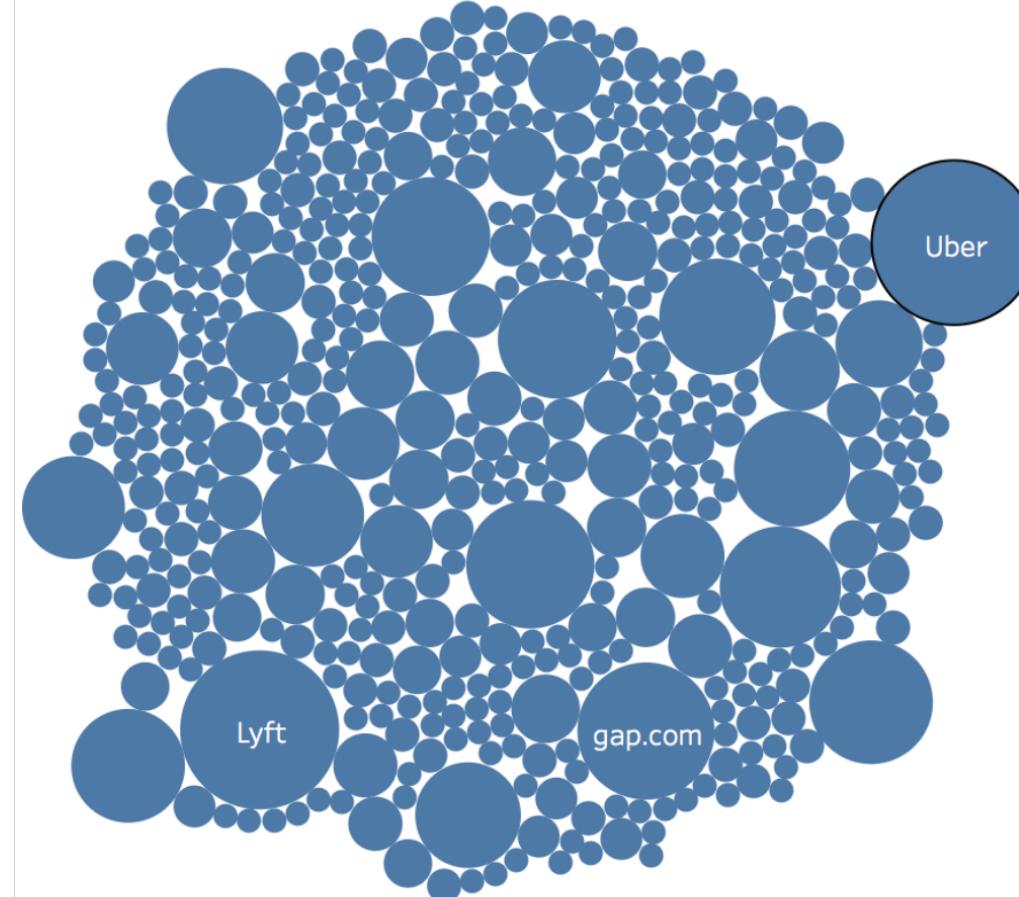
- A subset of CNP fraud is card testing, which is a method that involves making multiple small purchases on a website to determine whether a card is valid or not.



➤ **Most of the transaction have amount less than 1000 approximately and all of the fraud transactions have transaction amount less than 1750.**

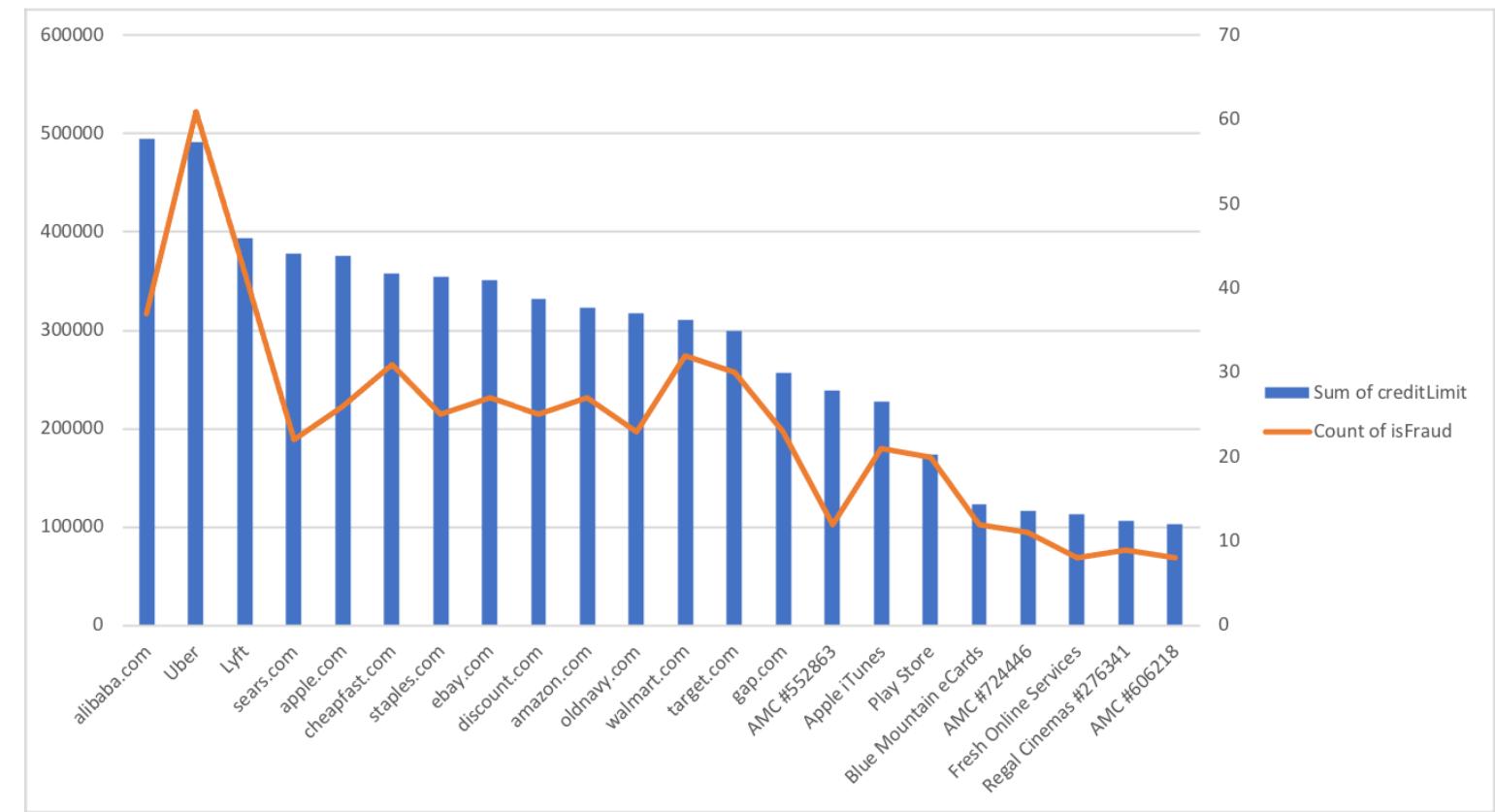
Respectively, most fraud transactions have happened in some companies where can be paid online, such as Uber, Lyft and gap.

Merchant Name. Size shows count of Fraud transactions.
The marks are labeled by Merchant Name.

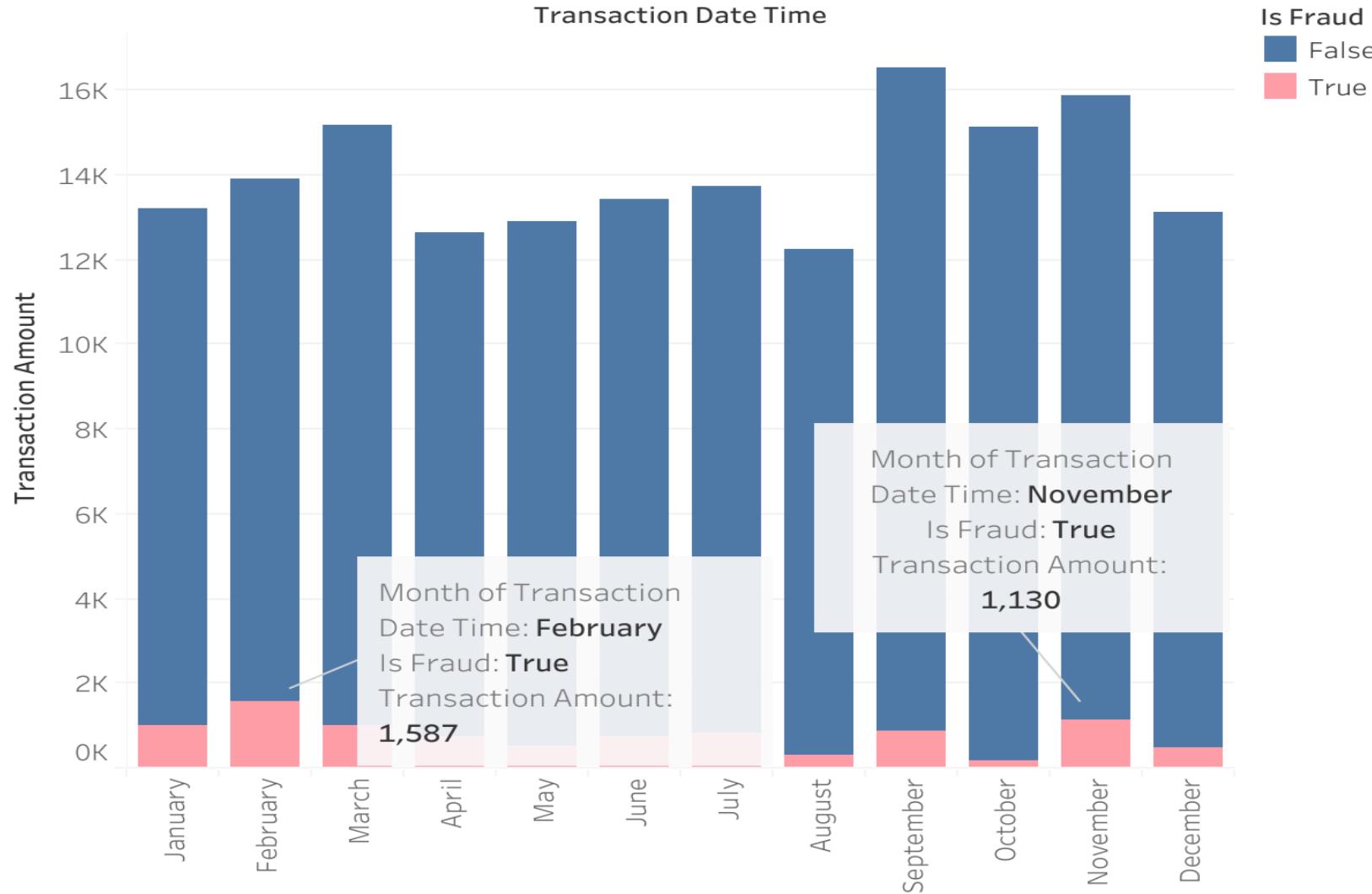


Merchant Name: **Uber**
Count of Is Fraud: **46**

Credit limit of Merchants vs Fraud transactions



Fraud and Non_Fraud Transactions per each Month of 2016



- Most Fraud transactions In February and November (almost at the beginning of year and at the end of year)

Sum of Transaction Amount for each Transaction Date Time Month. Color shows details about Is Fraud. The view is filtered on Is Fraud, Transaction Date Time Month and sum of Transaction Amount.

How to Integrate a Fraud Prevention Solution?

So how to work:

- Gather the user's card and transaction data.
- Data is compared with previous transactions.
- Then block risky users whose transactions have been fraudulent in the past.

How to Prevent Merchant Credit Card Fraud?

- Decline manual payments: This automatically stops any fraudsters with fake or doctored cards
- Install a chip reader
- If unsure, call the credit card issuer
- Implement extra security online

Future Work

- Work on an advanced fraud analytics solution which uses a combination of supervised and unsupervised algorithms to detect outlier risky behavior indicative of credit card fraud such as:
- Unusual account / profile changes
- Abnormal high value transactions
- Geo-location anomaly
- Unusual device usage
- Suspicious charges from merchants, etc.

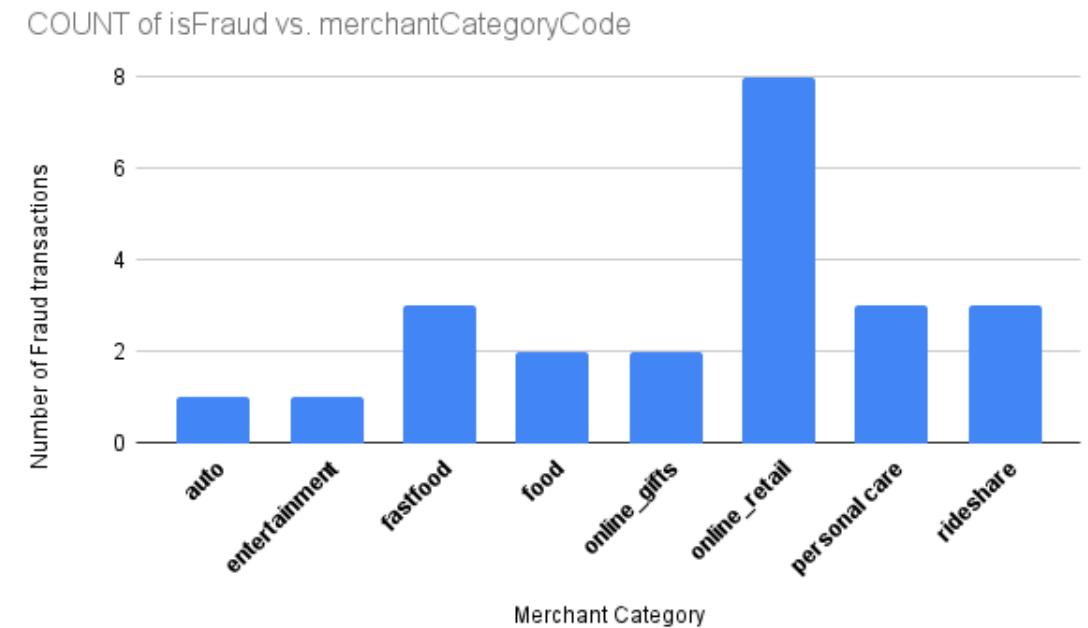
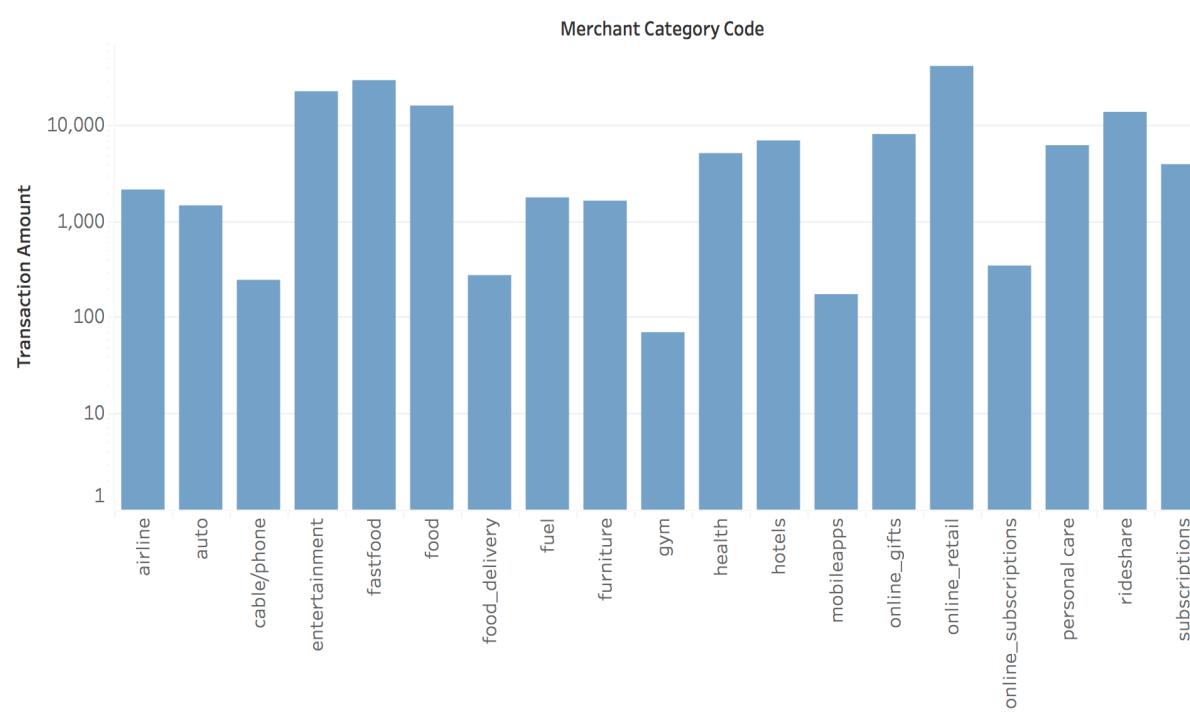
Thank you!

Sources Cited:

- <https://fraud-detection-handbook.github.io/fraud-detection-handbook/Foreword.html>
- <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.403.2235&rep=rep1&type=pdf>
- <https://www.kaggle.com/code/janiobachmann/credit-fraud-dealing-with-imbalanced-datasets>
- <https://github.com/ghimiresunil/Credit-Card-Fraud-Detection/blob/master/Exploring-the-analysis-of-data.ipynb>
- <https://seon.io/resources/fraud-detection-and-prevention/#h-what-are-the-common-types-of-fraud>

Appendix

Transaction amount for each Merchant category

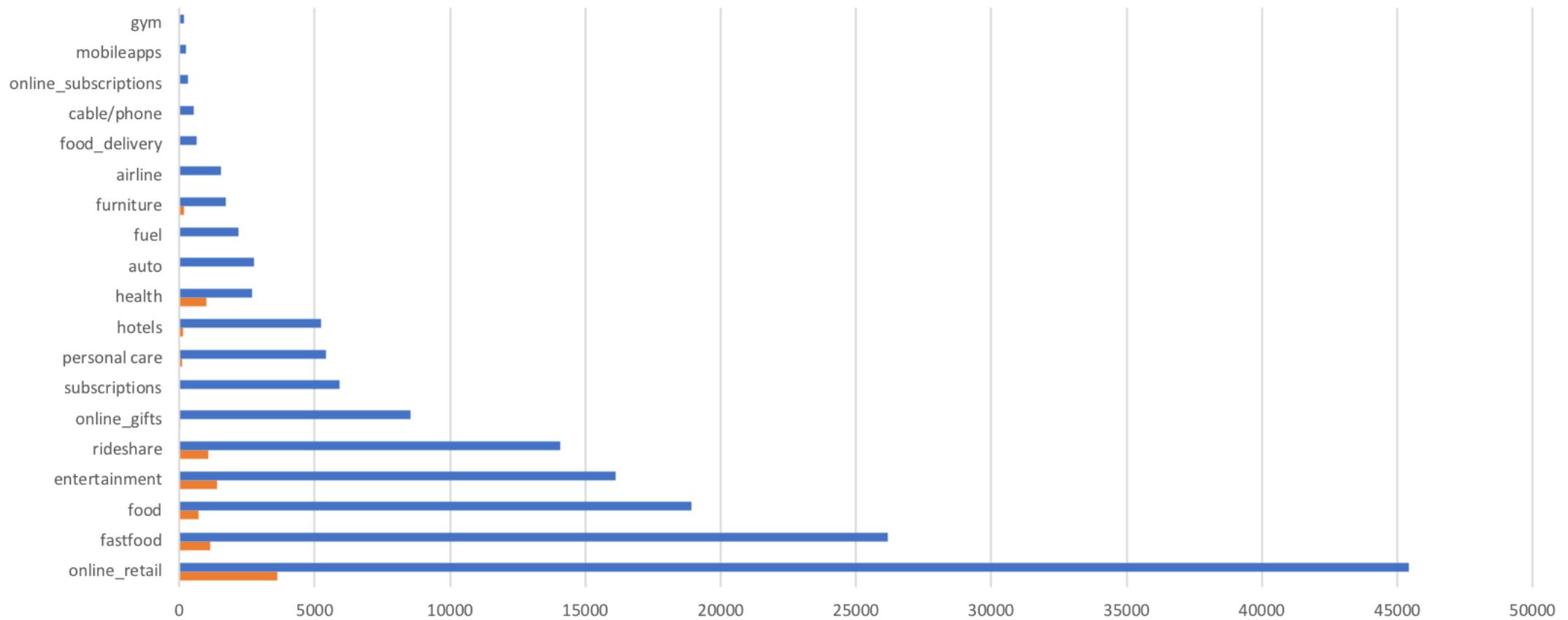


Fraud vs Non-Fraud Transactions



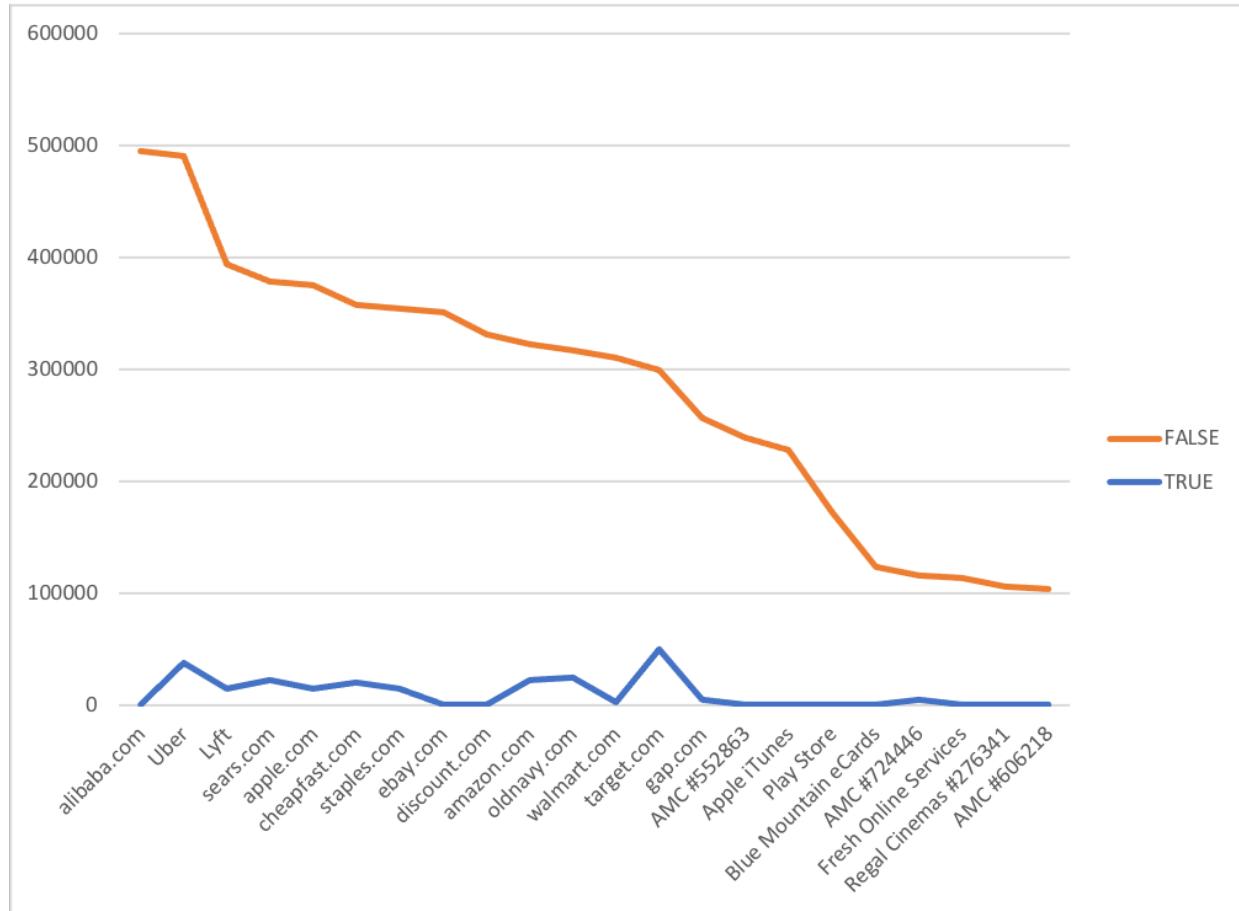
- Most transaction amount and fraud transactions:
 - 1- online retail
 - 2- fast-food
 - 3- entertainment

Frequency of being fraud for merchantCategoryCode

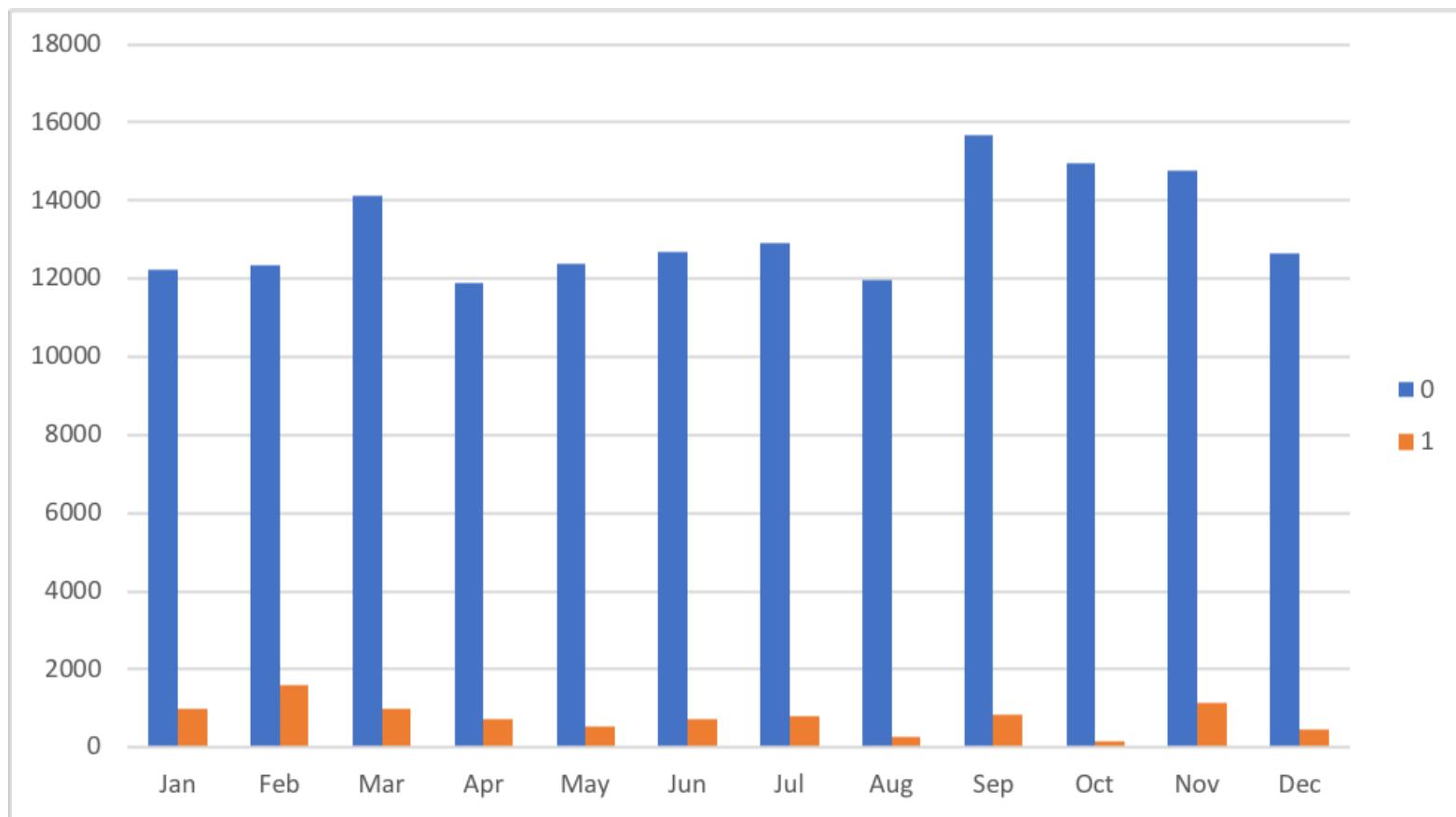


	online_retail	fastfood	food	entertainment	rideshare	online_gifts	subscriptions	personal_care	hotels	health	auto	fuel	furniture	airline	food_delivery	cable/phone	online_subscriptions	mobileapps	gym
■ FALSE	45418.44	26167.04	18913.05	16127.72	14072.43	8530.61	5932.73	5428.07	5234.06	2670.19	2773.94	2192.24	1710.62	1527.76	645.44	522.66	303.72	232.94	155.01
■ TRUE	3622	1137.1	702.61	1377.94	1062.87	30.3		99.03	150.14	986.78			155.92						

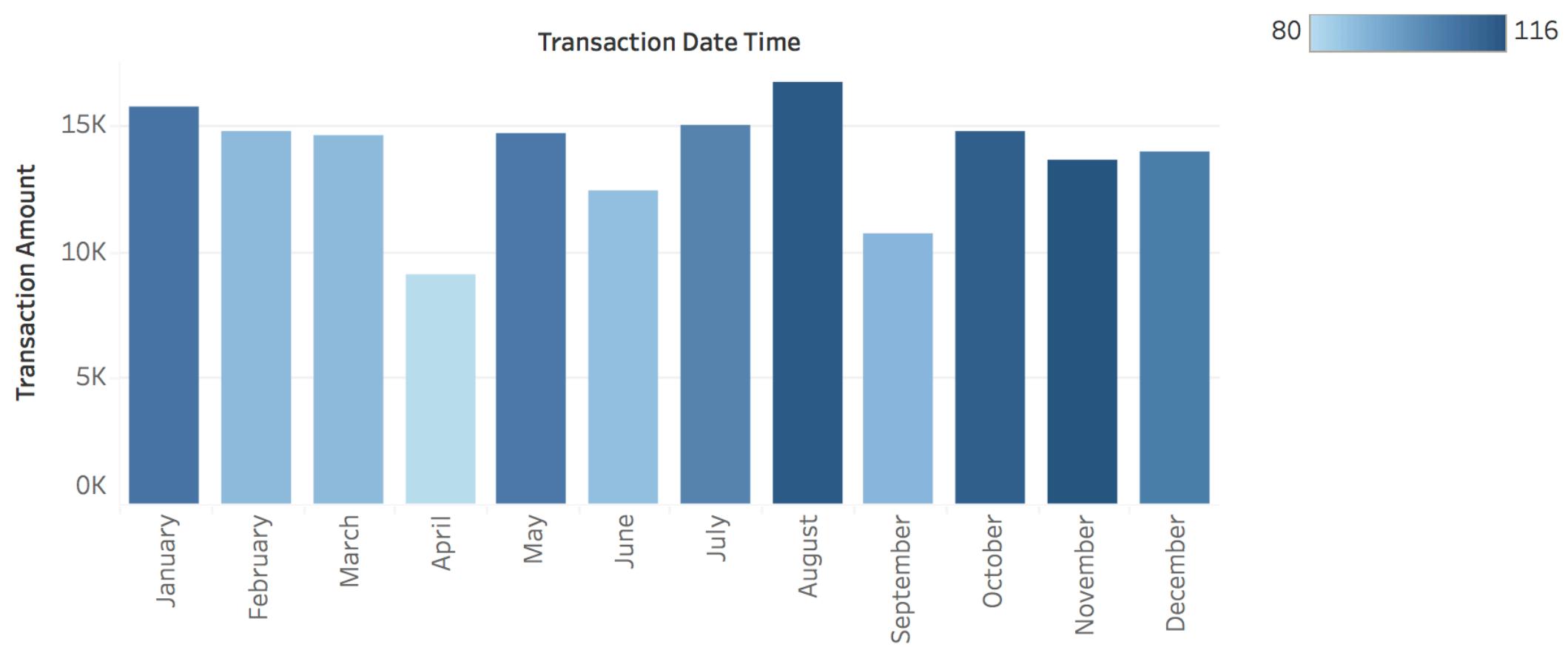
Credit limit of Merchant name vs having Fraud transactions



Fraud and Non_Fraud Transactions per each Month of 2016

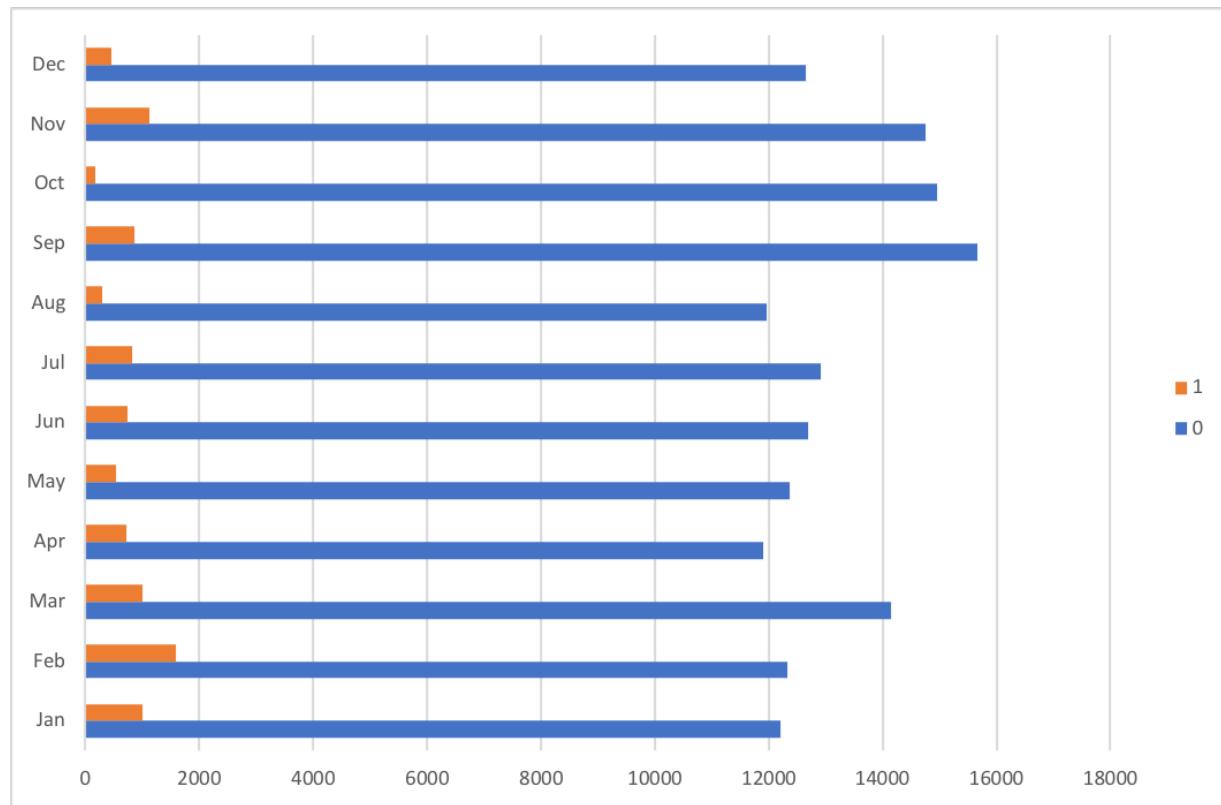


Fraud transactions between Amount with respect to Month



Sum of Transaction Amount for each Transaction Date Time Month. Color shows count of Is Fraud.

Fraud and Non_Fraud Transactions per each Month of 2016



Fraud vs Non_fraud transaction amount in each month of the year of 2016

