Credit Card Fraud Detection

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Introduction

- **Many individuals across the world use credit cards to manage their finances. They're convenient, help you build a credit score, and can earn you reward points. However, they're also easy to abuse, and their use can result in a downward debt spiral.**

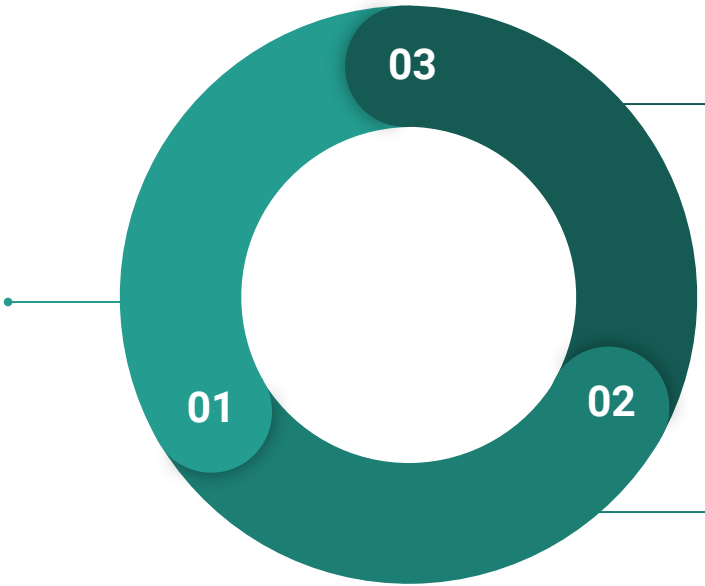
- **It is important that credit card companies can recognize fraudulent credit card transactions so that customers are not charged for items that they did not purchase.**

- **Our database consists of credit card transaction information that includes both genuine and fraudulent transactions from various countries around the globe.**

- **We aim to analyze the data to detect trends and patterns that could help banks identify and interrupt any fraudulent transactions.**

Workflow of the Project

Data Cleaning and Manipulation



Visualization and Conclusion

Analyzing data and finding trends with respect to age, gender, country, type of transactions and type of card

1. Data Cleaning and Manipulation

Transaction ID	Date	Day of Week	Time	Type of Card	Entry Mode	Amount	Type of Transaction	Merchant Group	Country of Transaction	Shipping Address	Country of Residence	Gender	Age	Bank	Fraud
#3577 209	14-Oct-20	Wednesday	19	Visa	Tap	£5	POS	Entertainment	United Kingdom	United Kingdom	United Kingdom	M	25.2	RBS	0
#3039 221	14-Oct-20	Wednesday	17	MasterCard	PIN	£288	POS	Services	USA	USA	USA	F	49.6	Lloyds	0
#2694 780	14-Oct-20	Wednesday	14	Visa	Tap	£5	POS	Restaurant	India	India	India	F	42.2	Barclays	0
#2640 960	13-Oct-20	Tuesday	14	Visa	Tap	£28	POS	Entertainment	United Kingdom	India	United Kingdom	F	51.0	Barclays	0
#2771 031	13-Oct-20	Tuesday	23	Visa	CVC	£91	Online	Electronics	USA	USA	United Kingdom	M	38.0	Halifax	1

Removed # and space

Converted Object - datetime

Replaced 24 with 0's

Removed £ and converted to float. Renamed Column

Converted to integer

***** Removed null values and checked for outliers**

2. Data Analysis

Our aim is to answer the following questions through Data Analysis and Visualizations:

1. **What age group and gender is most affected by fraud?**
2. **Which country is the source of most fraud ?**
3. **Which time of the day most fraudulent transactions occur?**

Demographic Insights:

Age Group: 30-50 most affected by fraud.

Geographical Patterns:

Source of Fraud: Credit card fraud more successful when origin country differs from the customer's country of residence.

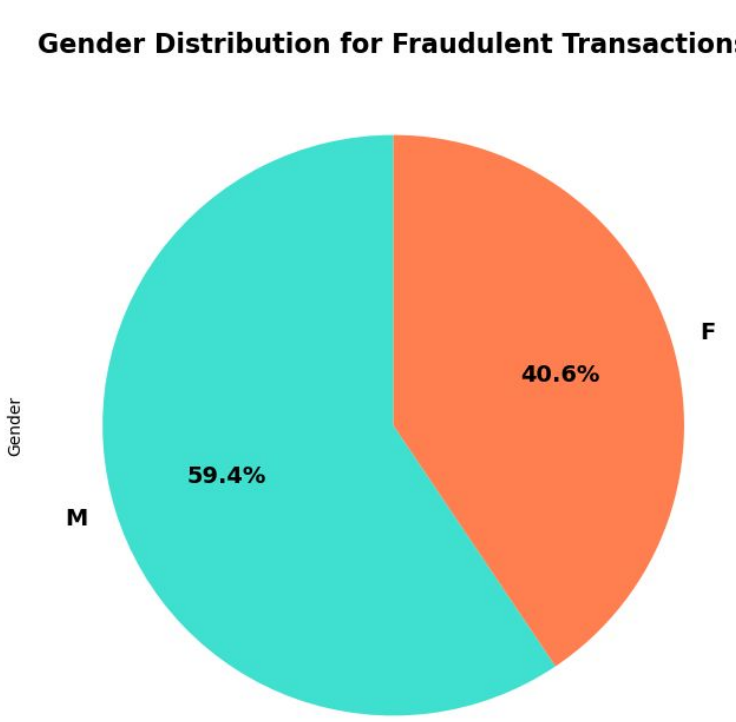
Temporal Trends:

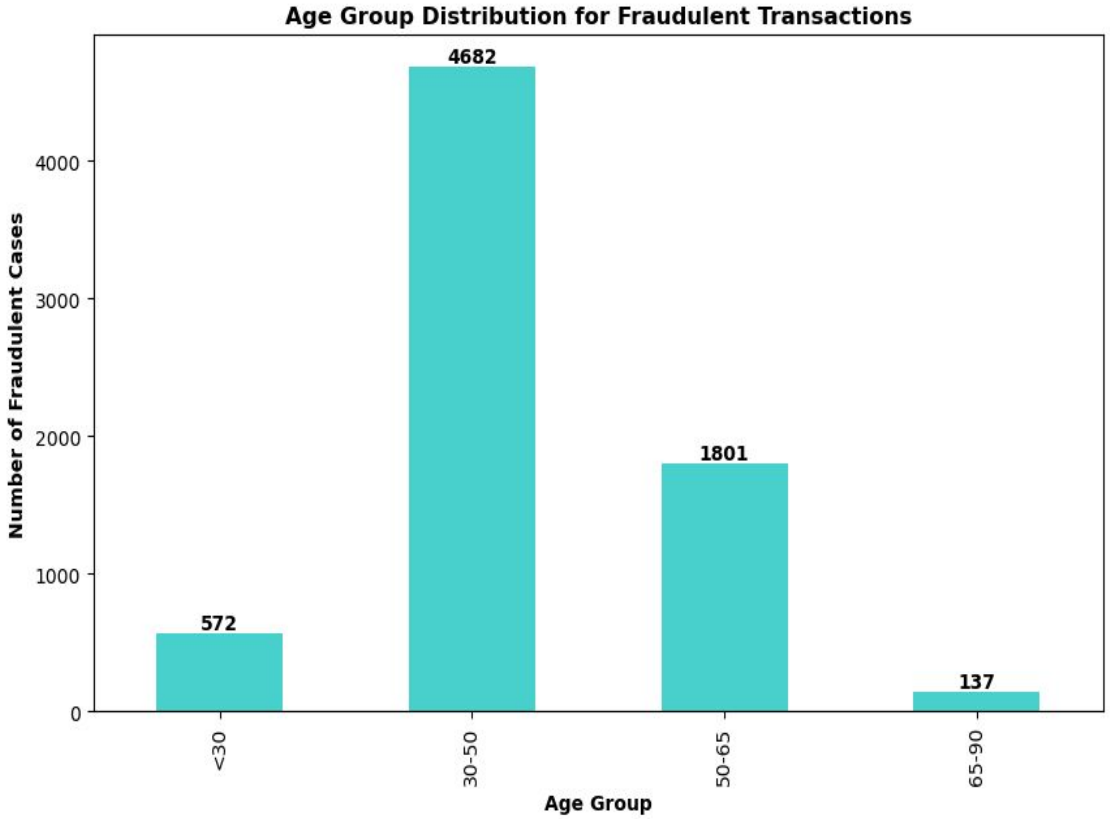
Time of Day: Fraudulent transactions peak after 6:00 AM. Fraud transactions post-6:00 AM have a lower percentage compared to total transactions, indicating potentially lower average values.

Analysis Summary:

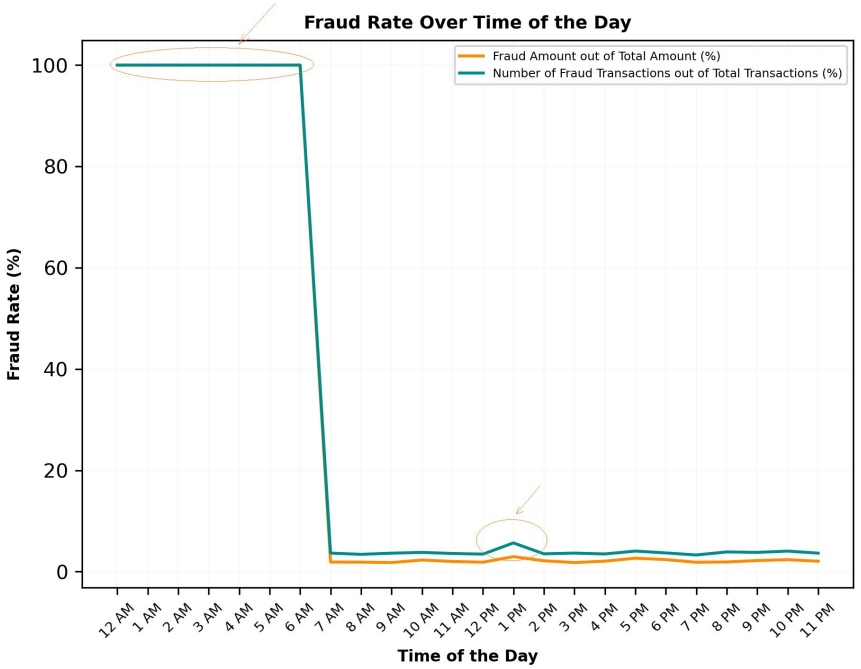
- **99,977 credit card transactions analyzed.**
- **7,192 fraud transactions (7.19% of total).**
- **£459,495 lost to fraud (4.08% of total transaction amount).**
- **Individual fraud amounts range from £5 to £400.**

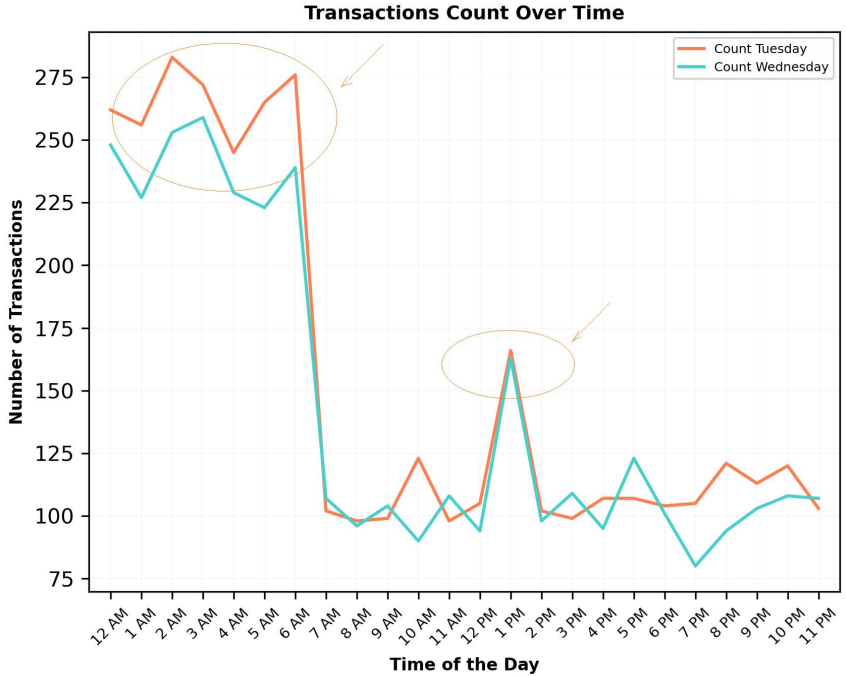
3. Visualization





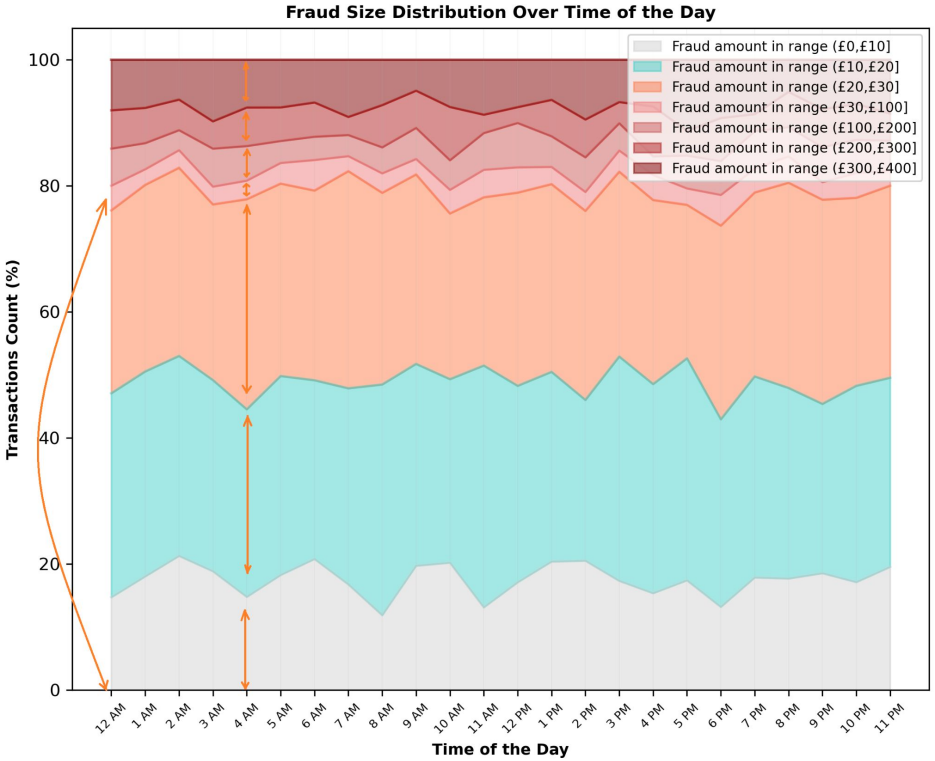
At what times of the day is credit card fraud most frequently observed?





- **Night time** shows the ***highest rate and count*** of fraudulent transactions
- **Lunch** time tend to have a ***high risk*** for fraudulent activity during the day time

At what times of the day is credit card fraud most frequently observed?

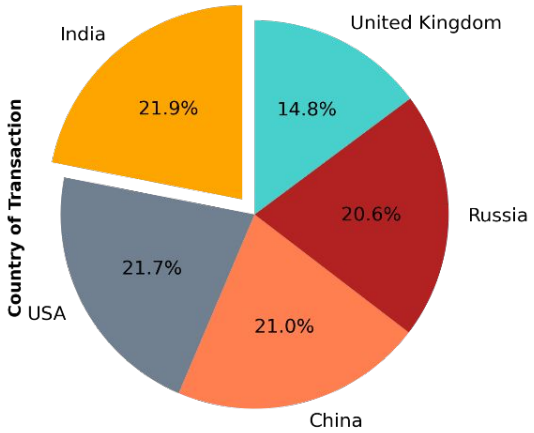


Average values of fraud transactions are:

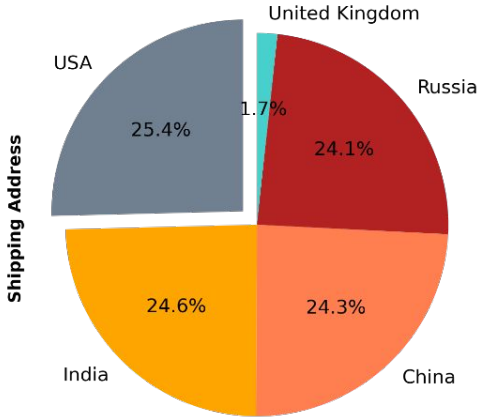
- relatively **consistent** during the day
- typically **lower than £30**

Which Countries are most frequently associated with Fraud transactions?

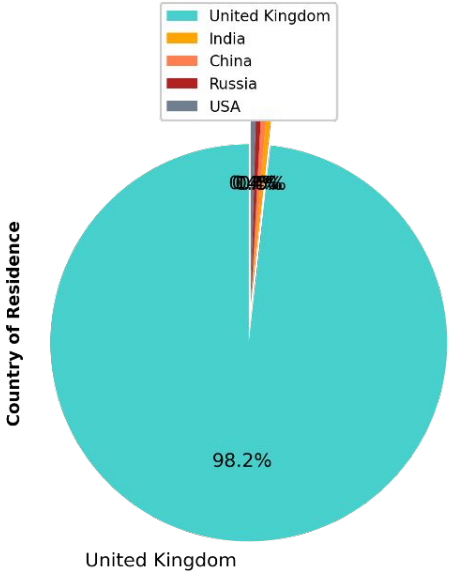
Country of Transaction distribution within Fraud Transactions



Shipping Address distribution within Fraud Transactions

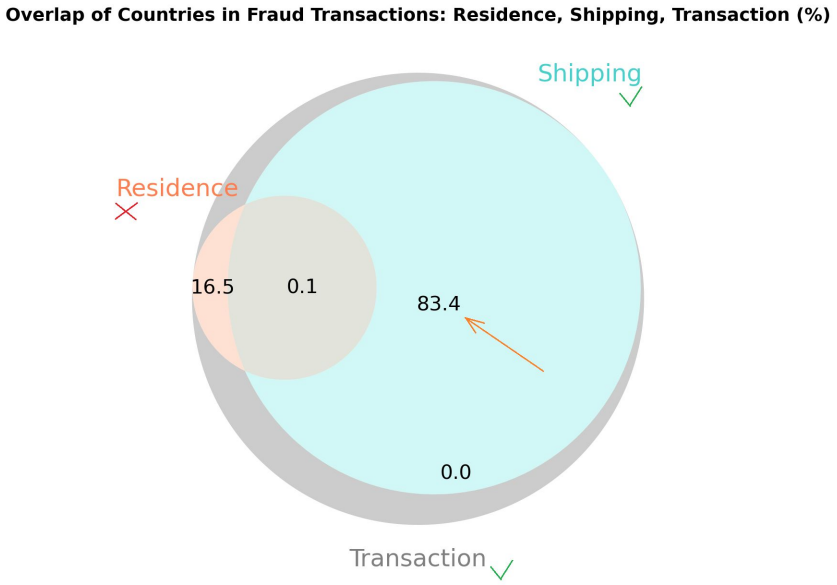


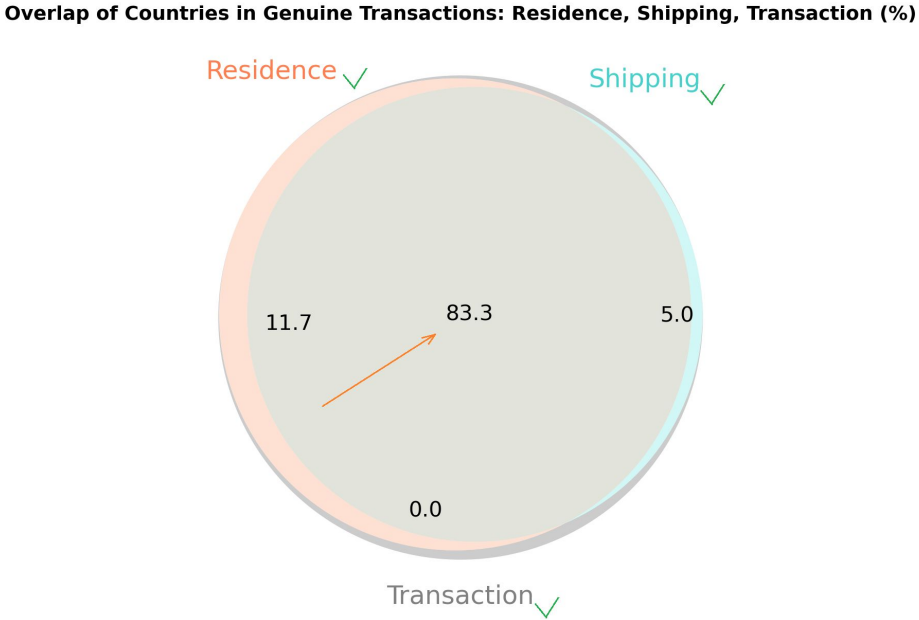
Country of Residence distribution within Fraud Transactions



- The majority of fraud victims are Residents of United Kingdom
- Among other countries, the distribution of fraud associations is approximately equal

Which Countries are most frequently associated with Fraud transactions?



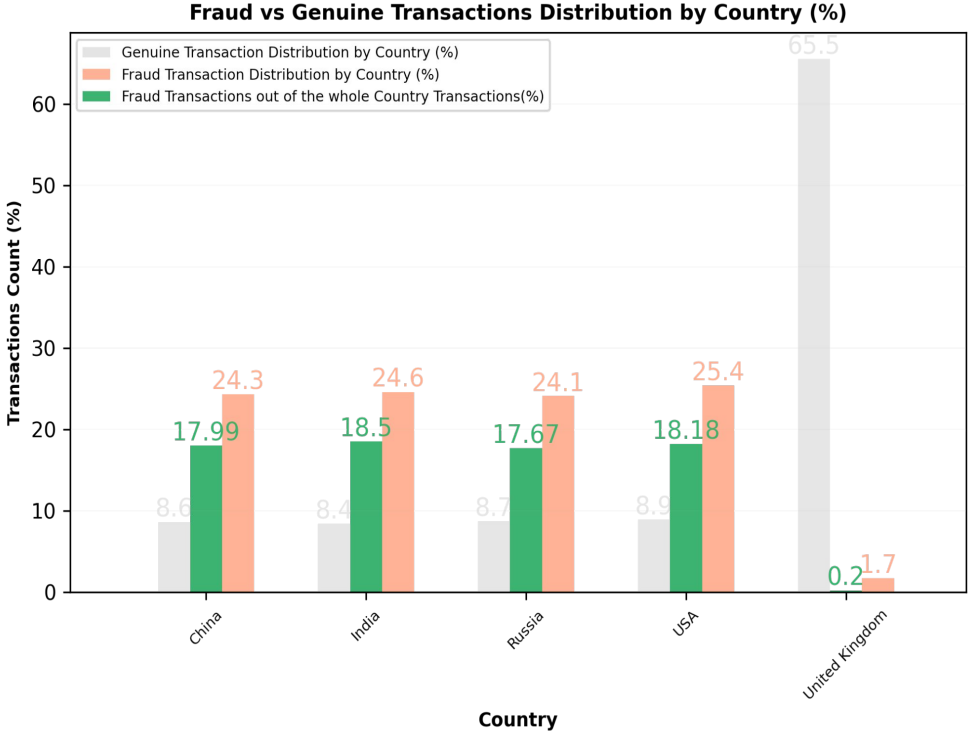


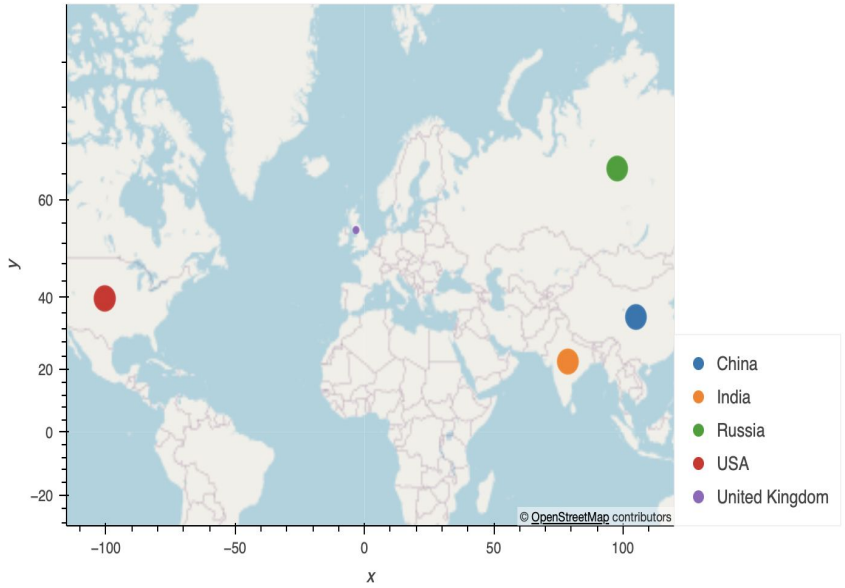
Specific characteristics of **Fraud** transactions:

(1) **Shipping address=Transaction address**, both of which are **outside of UK**

(2) Shipping address is different from both Residence and Transaction addresses, which are located in UK

Which Countries are most frequently associated with Fraud transactions?





The majority of those, responsible for Fraud originate from **outside the UK** with India, USA, China and Russia almost **equally distributed**

Next Steps

- **These findings lay the groundwork for improving fraud detection and implementing targeted preventive measures**

- **In future we can proceed for creating a machine learning project(by dividing our data as training data and test data) for fraud detection**

- **Machine Learning will help Credit Card Companies and Banks as it has following features:**
  1. **Faster Detection : quickly identify any drifts from regular transactions and user behaviours in real time**
  2. **Higher Accuracy: achieve higher accuracy and precision, reducing errors along with the time required to be spent on performing manual analysis**
  3. **Improved Efficiency with Larger Data: analyse huge amounts of data in seconds while offering real-time insights for improved decision-making capabilities**

Conclusions

Credit Card companies need to focus on creating awareness about frauds to users by constantly reminding them about:

- **Safeguarding sensitive documents and credit cards in a secure place**
- **Having different, strong passwords for accounts and devices**
- **Loading anti-spyware programs on their computers**
- **Checking account statements each month for any suspicious activity**
- **Reporting any suspected frauds right away**
- **Harnessing the power of two-factor identification**
- **Steering clear of suspicious links, emails or texts(phishing)**
- **Checking ATMs, POS for signs of tampering before use**

Questions

Thank You!!!