**Documentation and Deployment:**

About:-

Anomaly detection in credit card transactions refers to the process of identifying unusual or fraudulent activities in credit card transactions. It involves applying statistical, machine learning, and Power BI techniques to detect patterns and deviations from normal behavior, helping to identify potentially fraudulent transactions in real time.

Project Steps:

* To Read the data by importing the Fraud(CSV data) data file through “Get Data” from the Home tab and Deep Diving into the data and checking the quality of the data that we received
* Clean the data as required
* Then create required Measure to create Cards, Tiles and Charts to create a meaningful insight to the data

**DAX Function:**

**Measures using DAX functions:**

* What is the average transaction amount for normal transactions versus fraudulent transactions?  
    
  **Average Normal Transaction = CALCULATE([Total Average Transaction],FILTER(Fraud,Fraud[Fraud/Not Fraud]="Not Fraud"))  
    
  Average Fraud Transaction = CALCULATE([Total Average Transaction],FILTER(Fraud,Fraud[Fraud/Not Fraud]="Fraud"))**
* How many credit card transactions were recorded in the dataset, and How many fraudulent credit card transactions were recorded in the dataset?  
    
  **Total No of CC Transaction = COUNT(Fraud[amount])  
    
  Total No of Fraud CC Transaction = CALCULATE([Total No of CC Transaction],FILTER(Fraud,Fraud[Fraud/Not Fraud]="Fraud"))**
* What is the highest Fraud transaction amount recorded?  
    
  **Highest Fraud Transaction = CALCULATE(MAX(Fraud[amount]),FILTER(Fraud,Fraud[Fraud/Not Fraud]="Fraud"))  
    
  Highest Normal Transaction = CALCULATE(MAX(Fraud[amount]),FILTER(Fraud,Fraud[Fraud/Not Fraud]="Not Fraud"))**
* Is there a significant difference in the maximum transaction amount for normal transactions compared to fraudulent transactions?  
    
  **Measure = CALCULATE([Highest Fraud Transaction] - [Highest Normal Transaction])**
* What is the percentage of fraudulent transactions in the dataset?  
    
  **Percentage of fraudulent transactions = [Total No of Fraud CC Transaction]/[Total No of CC Transaction]**

**Anomaly Visualisation:**

* What is the distribution of transaction amounts? (using Clustered column chart)  
    
  A screenshot of a computer

  Description automatically generated

* Which merchants have the highest number of transactions? (Only Top 10)   
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* Create a scatter plot to visualize the relationship between 'oldbalanceorg' and 'amount' columns.  
    
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* Use a line chart to plot the TRANSACTION AMOUNT OVER TIME (step) to identify any unusual spikes or drops in transaction amounts.  
    
  A screenshot of a graph

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* Are there any merchants with a high occurrence of fraudulent transactions?  
    
  - There Will be No occurrence of fraudulent transactions with Merchants and as per the data, there are zero occurrences.

**KEY INSIGHTS DERIVED FROM THE TRANSACTION DATA.**

* Upon analyzing credit card transactions, a significant number of fraudulent activities were uncovered within the dataset.
* The total recorded transactions amount to 630,894, with 383 identified as fraud, constituting 0.06% of the total transactions.
* Transactions were categorized into five types: cash in, cash out, debit, payment, and transfer. Notably, fraudulent transactions were predominantly detected in the 'transfer' and 'cash out' categories, with approximate values of $169 million and $168 million, respectively (the overall total fraud amount is $337 million). This underscores the importance of heightened scrutiny to ensure the safety of these transaction types.
* The 'cash out' type is the most frequently used, comprising 224,013 transactions totaling around $41 billion. In contrast, the 'debit' type is the least utilized, with only 4,769 transactions amounting to approximately $29 million. The line chart depicts a concentration of transactions within the 10 to 20 steps range, representing the highest total transaction volume of approximately $7.3 billion. A significant portion of this amount, totaling $3.3 billion, falls into the 'cash out' category, signifying a notably high-value subset.
* Three customers have committed fraud twice, with 'c185805228' standing out for the highest fraudulent amount of $1.1 million, an exceptionally large fraud amount for a single individual.

In conclusion, the analysis underscores the importance of staying vigilant and proactive in preventing fraud, particularly in 'transfer' and 'cash out' transactions. It highlights the significance of understanding the distribution of transaction volumes, identifying repeat offenders, and implementing robust fraud detection systems to safeguard financial transactions.