Data Collection Report

Github repo link: https://github.com/mubasharjaved3567/Project-Data-Mosaic

Group Information:

- **Group Number:**16
- **Student 1:** Zafir Muhammad, ID: 24280031
- **Student 2:** Muhammad Mubashar Ali, ID: 24280037

Contributions:

- **Zafir Muhammad:** Implemented data collection scripts, integrated APIs.
- **Muhammad Mubashar Ali:** Conducted data analysis, performed dataset cleaning, and wrote the report.

1. **Overview of the Topic Chosen Topic:** Electric Vehicles (EVs)

Reason for Selection: Electric Vehicles (EVs) are a rapidly growing industry due to their environmental benefits and technological advancements. The transition to sustainable transportation is a critical global movement. Understanding the adoption, market trends, and public perception of EVs can provide valuable insights into the future of this industry.

Expected Data:

- **Reddit Discussions:** Public sentiment, common concerns, and emerging trends.
- **Stock Market Data:** Trends in EV company stocks such as Tesla, General Motors, and Ford.
- **EV Sales Data:** Growth trends, country-wise adoption, and model-wise sales.

2. Data Collection Process

Reddit Data:

- **Sources:** r/ElectricVehicles, r/TeslaMotors
- **Keywords Used:** "electric vehicle," "Tesla," "EV charging"
- **Fields Collected:** title, text, author, date, upvotes, subreddit
- **Challenges Faced:** Reddit API rate limits, missing or deleted posts, and ensuring compliance with Reddit's Terms of Service.

Yahoo Finance Data:

- **Tickers Monitored:** "TSLA" (Tesla), "GM" (General Motors), "F" (Ford), "NIO" (Nio)

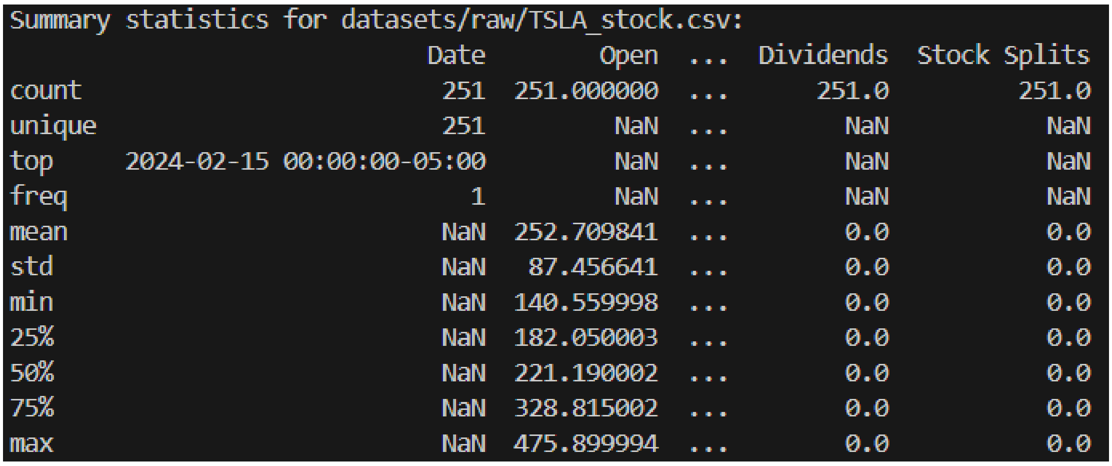
- **Fields Collected:** date, open, high, low, close, volume
- **Challenges Faced:** Missing data points in stock history, handling API failures, and ensuring data consistency.

EV Sales Dataset:

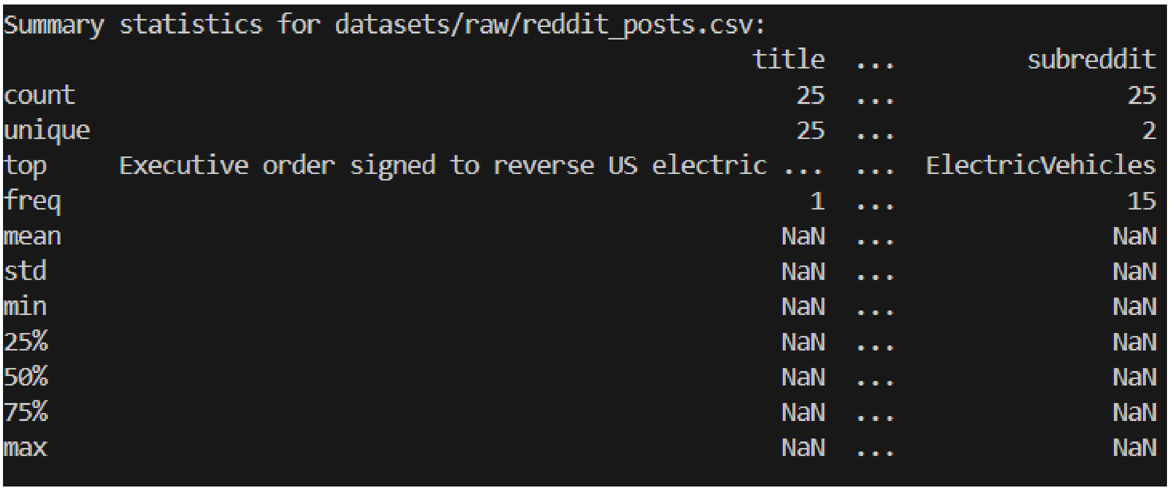
- **Source:** datahub.io (historic-sales-of-electric-vehicles)
- **Fields Collected:** Sales by country, model, and year
- **Challenges Faced:** Some missing values, inconsistent formatting, and ensuring proper dataset versioning.

3. **Initial Observations** Using pandas, we generated summary statistics of the datasets. Below is a brief overview:

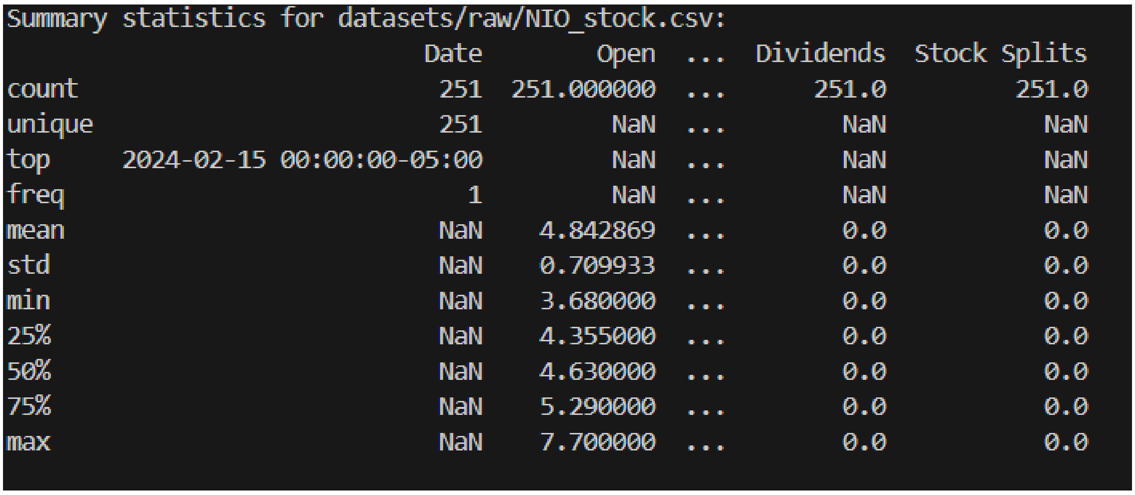
- **Reddit Data:** High engagement in discussions around charging infrastructure and range anxiety.
- **Yahoo Finance Data:** Tesla stock experiences significant fluctuations around major EV announcements.
- **Public EV Sales Data:** A strong upward trend in EV adoption, with China and the US leading in sales.



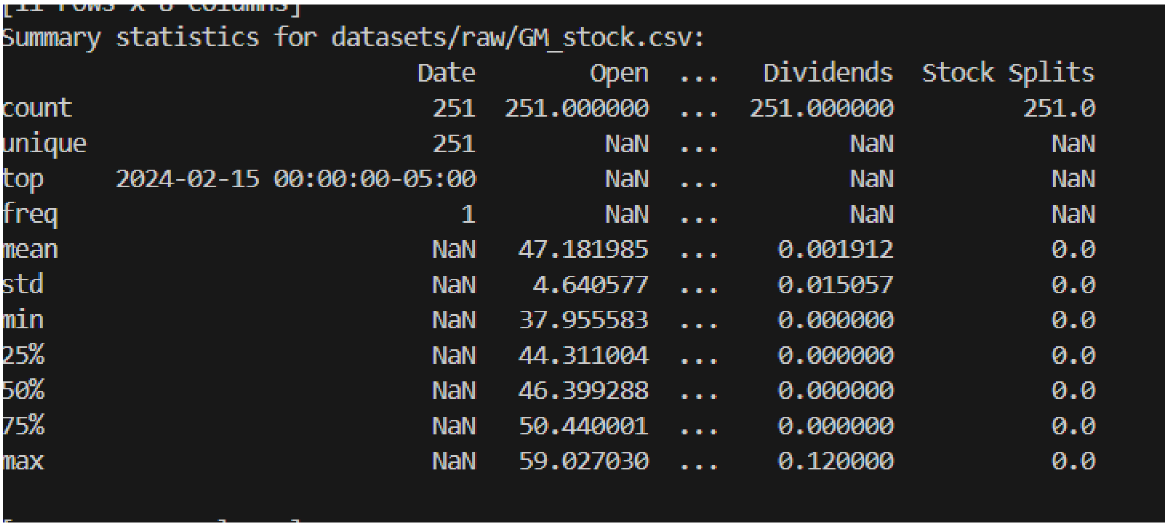
```
Summary statistics for datasets/raw/TSLA_stock.csv:
                             Date        Open  ...  Dividends  Stock Splits
count                         251  251.000000  ...      251.0         251.0
unique                        251         NaN  ...        NaN           NaN
top     2024-02-15 00:00:00-05:00         NaN  ...        NaN           NaN
freq                            1         NaN  ...        NaN           NaN
mean                          NaN  252.709841  ...        0.0           0.0
std                           NaN   87.456641  ...        0.0           0.0
min                           NaN  140.559998  ...        0.0           0.0
25%                           NaN  182.050003  ...        0.0           0.0
50%                           NaN  221.190002  ...        0.0           0.0
75%                           NaN  328.815002  ...        0.0           0.0
max                           NaN  475.899994  ...        0.0           0.0
```



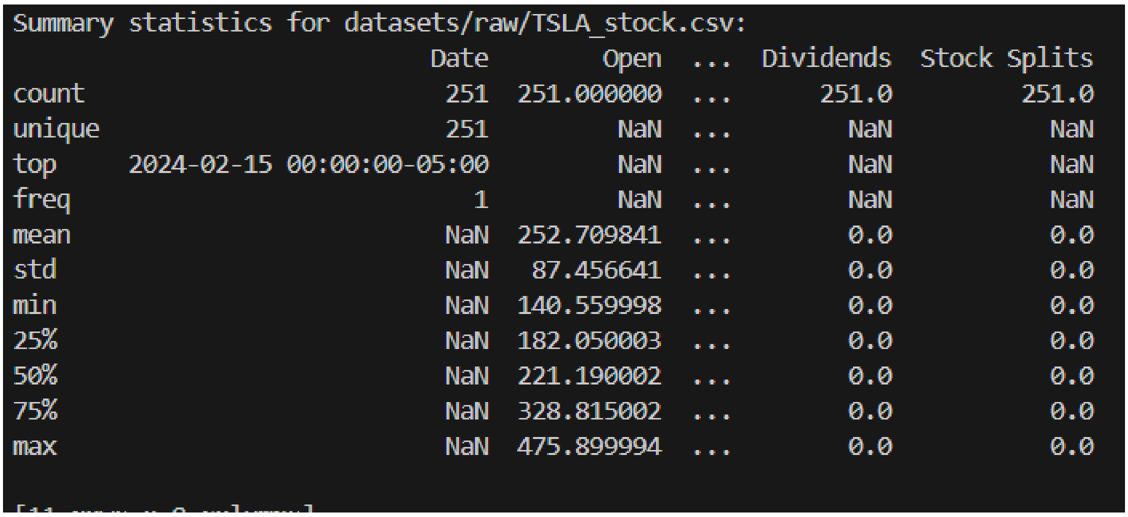
```
Summary statistics for datasets/raw/reddit_posts.csv:
                                                    title  ...         subreddit
count                                                  25  ...                25
unique                                                 25  ...                 2
top     Executive order signed to reverse US electric ...  ...  ElectricVehicles
freq                                                    1  ...                15
mean                                                  NaN  ...               NaN
std                                                   NaN  ...               NaN
min                                                   NaN  ...               NaN
25%                                                   NaN  ...               NaN
50%                                                   NaN  ...               NaN
75%                                                   NaN  ...               NaN
max                                                   NaN  ...               NaN
```



```
Summary statistics for datasets/raw/NIO_stock.csv:
                             Date        Open  ...  Dividends  Stock Splits
count                         251  251.000000  ...      251.0         251.0
unique                        251         NaN  ...        NaN           NaN
top     2024-02-15 00:00:00-05:00         NaN  ...        NaN           NaN
freq                            1         NaN  ...        NaN           NaN
mean                          NaN    4.842869  ...        0.0           0.0
std                           NaN    0.709933  ...        0.0           0.0
min                           NaN    3.680000  ...        0.0           0.0
25%                           NaN    4.355000  ...        0.0           0.0
50%                           NaN    4.630000  ...        0.0           0.0
75%                           NaN    5.290000  ...        0.0           0.0
max                           NaN    7.700000  ...        0.0           0.0
```



```
Summary statistics for datasets/raw/GM_stock.csv:
                             Date       Open  ...  Dividends  Stock Splits
count                         251  251.000000  ...  251.000000         251.0
unique                        251         NaN  ...        NaN           NaN
top     2024-02-15 00:00:00-05:00         NaN  ...        NaN           NaN
freq                            1         NaN  ...        NaN           NaN
mean                          NaN   47.181985  ...   0.001912           0.0
std                           NaN    4.640577  ...   0.015057           0.0
min                           NaN   37.955583  ...   0.000000           0.0
25%                           NaN   44.311004  ...   0.000000           0.0
50%                           NaN   46.399288  ...   0.000000           0.0
75%                           NaN   50.440001  ...   0.000000           0.0
max                           NaN   59.027030  ...   0.120000           0.0
```



```
Summary statistics for datasets/raw/TSLA_stock.csv:
                             Date        Open  ...  Dividends  Stock Splits
count                         251  251.000000  ...      251.0         251.0
unique                        251         NaN  ...        NaN           NaN
top     2024-02-15 00:00:00-05:00         NaN  ...        NaN           NaN
freq                            1         NaN  ...        NaN           NaN
mean                          NaN  252.709841  ...        0.0           0.0
std                           NaN   87.456641  ...        0.0           0.0
min                           NaN  140.559998  ...        0.0           0.0
25%                           NaN  182.050003  ...        0.0           0.0
50%                           NaN  221.190002  ...        0.0           0.0
75%                           NaN  328.815002  ...        0.0           0.0
max                           NaN  475.899994  ...        0.0           0.0
```

4. Terms of Service s Privacy Issues

- **Reddit:** Reddit's API Terms of Service restrict storing and redistributing user-generated content. Data should be anonymized before analysis.

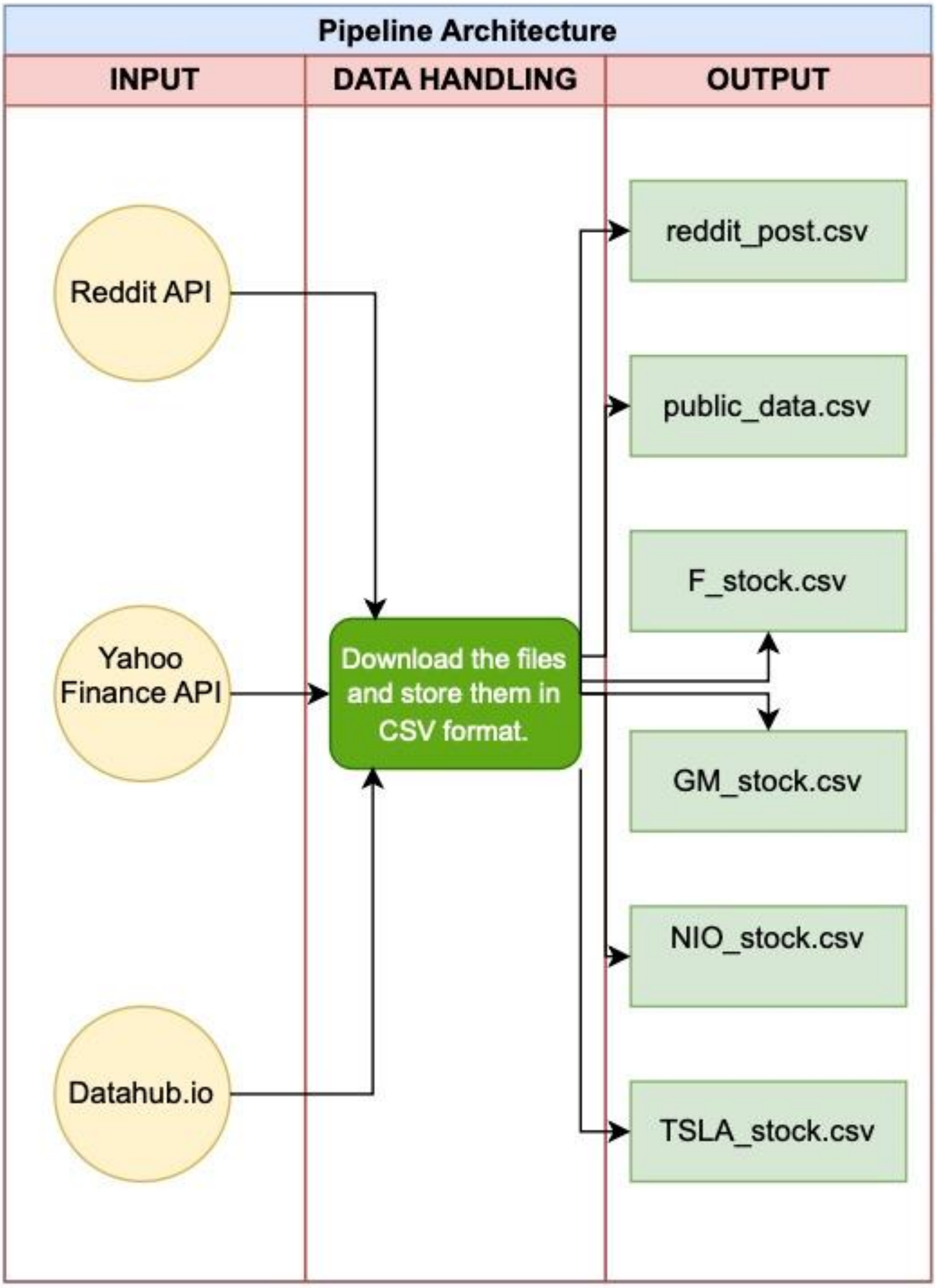
5. Multi-Source Data Integration Challenges

- **Data Inconsistencies:** Differences in sources can lead to conflicting insights.
- **Varying Data Formats:** Reddit provides unstructured text, whereas stock market and sales data are structured.
- **Bias in Data:** Online discussions may not reflect real-world adoption rates due to demographic differences.

6. Data Storage s Integration Strategy

- **PostgreSQL:** To store structured financial and sales data.
- **MongoDB:** For unstructured Reddit discussions.
- **Data Warehouse:** Combining all sources for efficient querying and analysis.

Part 3: Pipeline Architecture


Pipeline Architecture
INPUT
DATA HANDLING
OUTPUT
Reddit API
Yahoo Finance API
Datahub.io
Download the files and store them in CSV format.
reddit_post.csv
public_data.csv
F_stock.csv
GM_stock.csv
NIO_stock.csv
TSLA_stock.csv