

PAIN PILLS IN THE USA

Authors: Anusha Valasapalli, Naga Sai Lohitha Karmuru, Ruta Antaliya, Surya Kiran Golagani
Department of Information Systems, California State University Los Angeles

CIS5200-03 System Analysis and Design

avalasa@calstatela.edu, nkarmur@calstatela.edu, rantali@calstatela.edu, sgolaga2@calstatela.edu

Abstract: The Pain pill database is maintained by the Drug Enforcement Department. The Department tracks all painkillers that manufacturers and distributors sell to pharmacies in all cities in the United States. The database also contains information about the number of people consuming them in particular states and cities in the USA. In addition to that, analysis of this data is conducted using Tableau and Excel depicting visuals such as Geo maps, bar graphs, and pie charts on pain pills in the USA. With this database, readers can see how much hydrocodone and oxycodone went to individual states and counties, and which companies and distributors were responsible.

1. Introduction

A database maintained by the Drug Enforcement Administration that tracks the way each single Pain pill is sold within the United States by producers and wholesalers to drug stores in each city and state has been made open to the public.

The dataset mainly consists of information regarding Painkillers consumed in particular states and cities in the USA, the most popular Pain pills in the USA, and a few particular states in the USA. We chose this topic because readers can see how much hydrocodone and oxycodone went to individual states and counties, and which companies and distributors were responsible.

2. Related work

The Pain pill dataset is maintained by the Drug Enforcement Administration but now it has been made open to the public to spread awareness due to the high consumption and death rate. America's largest drug companies saturated the country with 76 billion oxycodone and hydrocodone pain pills from 2006 through 2012 as the nation's deadliest drug epidemic spun out

of control, according to previously undisclosed company data released as part of the largest civil action in U.S. history. This is the reason why the Drug Enforcement Administration is tracking the oath of every single Pain pill that is being sold in the USA. Further, this decreases consumption and the death rate. As it is now open to the public, readers can see how much hydrocodone and oxycodone went to individual states and countries, and which companies and distributors were responsible.

3. Specifications

The dataset comprises the pain pills report related to consumption, distribution, and popularity. Before few years, the pain pill database had been maintained by the Drug Enforcement Department but now as it has been made open to the public, we could use all the data and gather the required information. The dataset is of the size 80GB and covers all the information regarding the consumption of pain pills in the USA. Table 1 shows the files and size of the files from the dataset.

Table 1 Data Specification:

Data Set	Size- 80GB
Platform	AWS EMR

Table 2 H/W Specification:

Cluster Version	Hadoop 3.2.1-amzn-3.1
Number of Nodes	7 Nodes
Memory Size	500 GB
Number of CPU Cores	4 Cores
CPU Speed	2.50Hz

4. Implementation Flowchart

The Pain pills in the USA dataset was initially downloaded from the Kaggle website. Later we copied the dataset from the local system to the Linux system. We created the HDFS directories and then copied the data from Linux to HDFS. After that we created the hive tables and using HiveQL we performed the analysis. We exported the result and performed the Visualization using Tableau and Excel's 3D Map. The whole process of data manipulation is shown in the below flowchart (Figure-1).

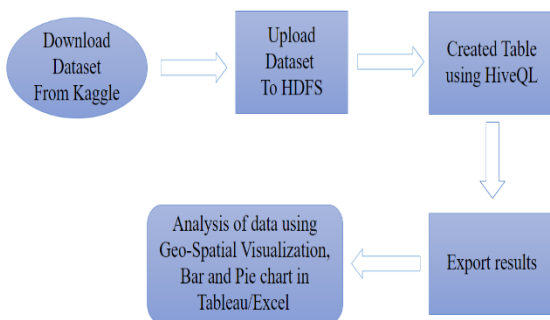


Figure 1- Implementation Flowchart

5. Analysis and Visualization

The files were then extracted into Excel and Tableau, and we performed the analysis of data using Geo-Spatial Visualization, Bar graph, Pie chart in Tableau, and Excel's 3D Map.

5.1- Bar Graph in Tableau

In the first visualization (Figure 2), a Bar Graph was made in Tableau which shows the number of Pain pills consumed in particular states in the USA. The reason we used the Bar Graph, in particular, is to show the count of pills consumed in particular states. We used the x-axis to show the states and the y-axis to show the drug count. In Figure 2 we can clearly see that California state has the highest drug count of 54,057,115 and we can find out the same in other states too.

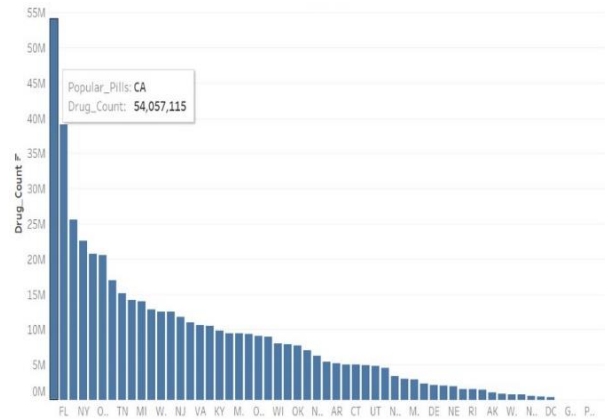


Figure 2- Bar graph of Pain pills consumed in particular states in the USA

5.2- 3D Map in Excel

Figure 3 shows the 3D Map visualization which was made in Excel, and it shows the Pain pills consumed in particular states in the USA. The marked areas (blue bar) are the states where Pain pills are consumed. California state having the highest Pain pill consumption count followed by Florida and New York. AE and PW states are the least consumption states.

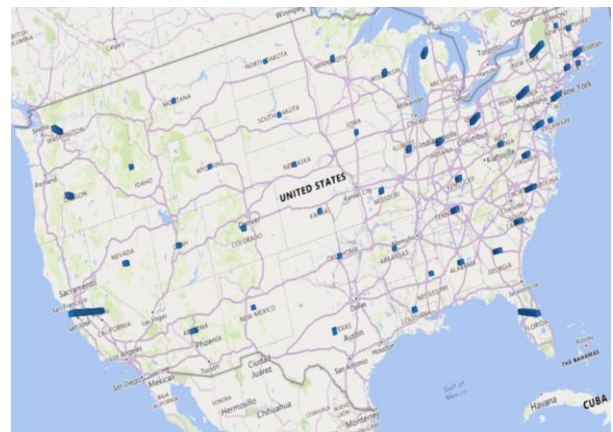


Figure 3- Pain pills consumed in particular states in the USA in Excel 3D Map

5.3- Bar Graph in Tableau

This Bar Graph Visualization (Figure 4) shows the number of Pain pills consumed in particular cities in the USA. The x-axis represents the Drug count, and the y-axis represents the cities in the USA. From the bar graph, we can clearly see that the consumption of Pain pills is more in Livermore city followed by North Charles.

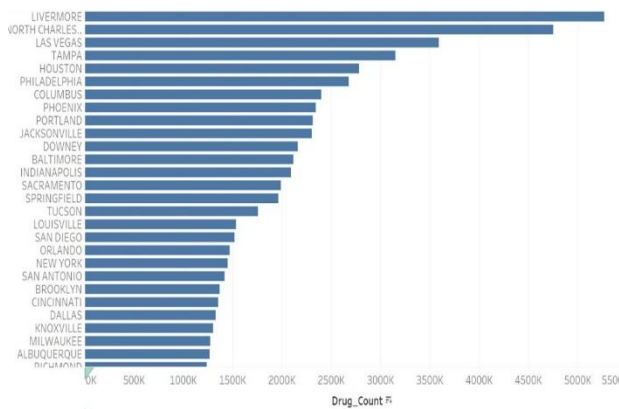


Figure 4- Bar graph of Pain pills consumed in particular cities in the USA

5.4- 3D Map in Excel

Figure 4 shows the 3D Map visualization which was made in Excel, and it shows the Pain pills consumed in particular cities in the USA. In Livermore city, the consumption of Pain pills is more where the drug count is 5266209.0, followed by North Charles and Las Vegas. Barnstead, Polk, and Haddam cities are the least consumption cities where the drug count is 1.0 per city.

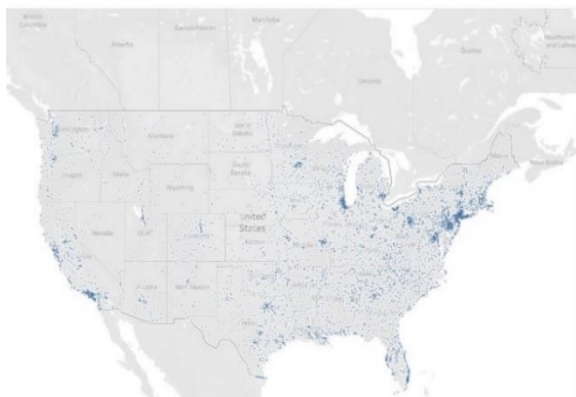


Figure 5- Pain pills consumed in particular cities in the USA in Excel 3D Map

5.5- Pie chart

The most popular Pain pills in the USA report is categorized in two different parts, as there are only two popular Pain pills consumed in the USA which are Hydrocodone and Oxycodone. The pie chart (Figure 6) shows the count of Hydrocodone drugs, and the pie chart (Figure 7) shows the count of Oxycodone drugs. From the pie charts, we can conclude that Hydrocodone drug is the most popular drug that is consumed in the USA.

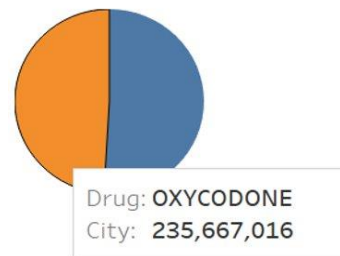


Figure 6- Hydrocodone Drug



Figure 7- Oxycodone Drug

5.6- Most popular Pain pills in FL, TX, and CA

The Bar graphs (Figure 8 and Figure 9) show the most popular Pain pills in particular states i.e., FL, TX, and CA. Hydrocodone drug count is 74,041,178 whereas oxycodone drug count is 44,674,545. We can conclude by saying that Hydrocodone drug is the most popular drug when compared to the Oxycodone drug in FL, TX, and CA.

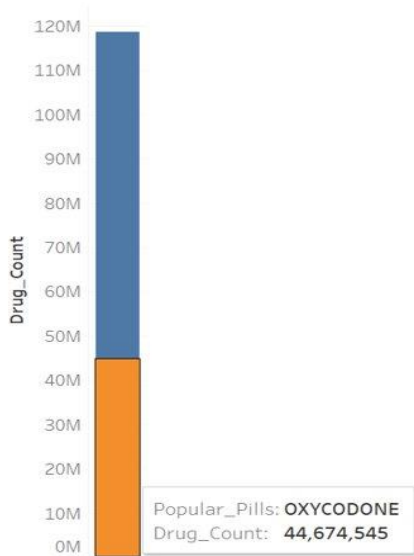


Figure 8- Hydrocodone drug count

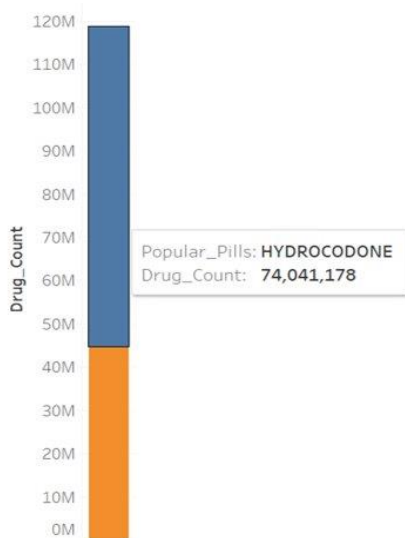


Figure 9- Oxycodone drug count

5.7 Total Pain Pills Sold Per year in State (California and Florida)

We have considered two states i.e., California and Florida to find out the yearly count of Pain pills sold per year per state from 2005 to 2013. California increased from 5M to 8M in the years 2006 to 2012 whereas Florida increased from 4M

to 5.3M in the years 2006 to 2010 and thereafter it gradually decreased to 3.5M until 2012.

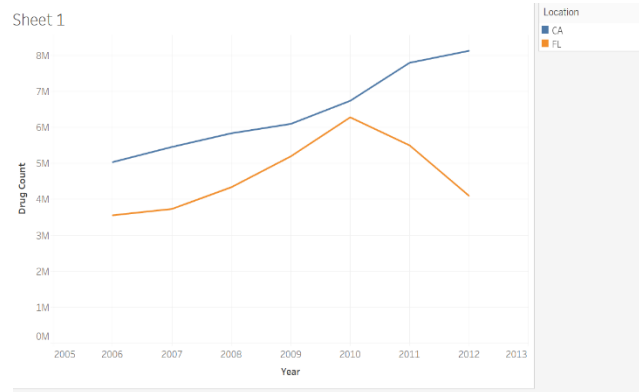


Figure 10- Yearly count of Pain pills sold in state

6. Conclusion

From all the above work we can conclude the following:

- California is the most Pain pills consumed state in the USA.
- Livermore is the most Pain pills consumed city in the USA.
- Hydrocodone is the most popular drug in the USA.
- Hydrocodone is the most popular drug in FL, TX, and CA.

For more information, dashboards, and codes visit the project's GitHub link.

7. Github Link

<https://github.com/ruta2709/Pain-Pills-in-USA>

8. References

- [1] We retrieved the dataset information from <https://www.kaggle.com/datasets/paultimothymooney/pain-pills-in-the-usa>
- [2] For more information, we drilled into the DEA's Pain pill database <https://archive.ph/eQMVt#selection-3349.16-3349.410>
- [3] Information regarding the drugs, dask and plotly <https://www.kaggle.com/code/paultimothymooney/pain-pills-in-the-usa-dask-plotly>