

Final Project Report

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1. Introduction

According to Drugbank, there are around 20,000 unique drugs used in the healthcare system.¹ To contrast, the average 20 year old American knows around 40,000 words, though not necessarily what each word means.² Therefore, if a physician were to learn all of the drug names, they would take up around 1/3 of the physician's entire vocabulary. Having full comprehension of all 20,000 drugs would likely be extremely difficult, if not impossible. Free and open access tools typically do not provide interactive visualizations of drug relationships.³⁻⁵ Instead, they may provide comparison charts or articles.⁶

This project explores the development of an interactive tool meant to aid physicians in medicine selection and comparison. The tool provides interactive visualizations meant to make the comparison of medications easier, showing how different medications relate among their attributes including: user reviews, composition, side effects, and usage.

2. Methods

2.1. Data source

The data were collected from Kaggle using the search term "medicine". The collected dataset is entitled "11000 Medicine details".⁷

After collection of the data, which were contained within a single csv file, the data were processed into an SQLite database using python and the pandas package.⁸ The database uses the database architecture defined in Figure 1. The database is then queried by the visualization tool, an R shiny app.⁹

The tool was designed to have two web pages, a "home" page, and a "data viewer" page. The home page would contain simple statistics and visualizations for the data set, including the total number of medicines, while the data viewer page would contain an interactive browser of the medication, with visualizations that change based on which medications are selected from a list. The list would be filterable, and multiple medications could be selected at once. A simple wireframe mockup is provided in Figure 2.

To further expand on the layout plan, the home page would contain 3 histograms that correspond to the available non-numeric variables in the dataset. The summary statistics will include the number of unique medications in the dataset and number of unique values for non-numeric values.

The data viewer page would contain a scatter plot depicting the review percentages given in the dataset. The points in the scatter plot would represent individual medications and would have filters to handle relationships between medications with non-numeric variables.

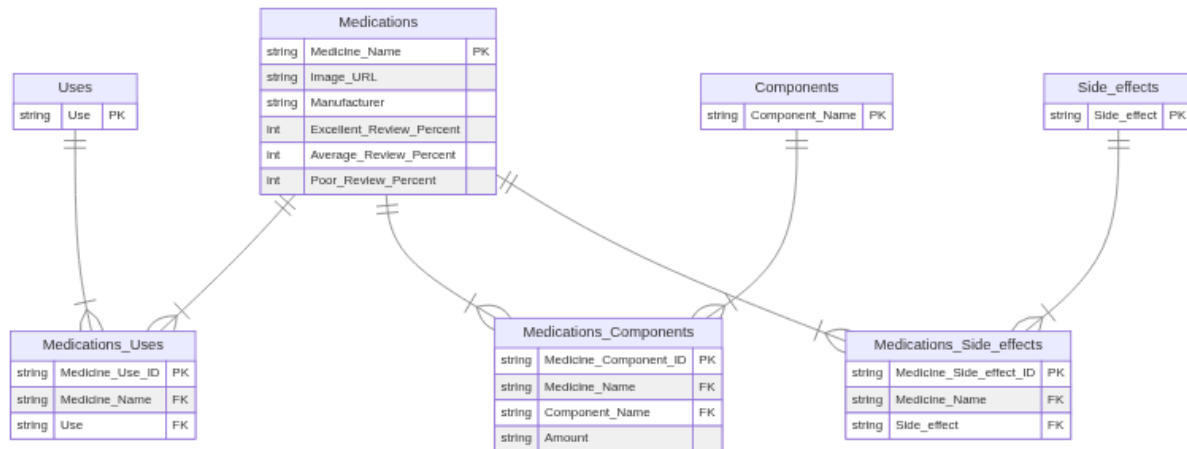


Figure 1: Entity relationship diagram showing architecture of generated SQLite database

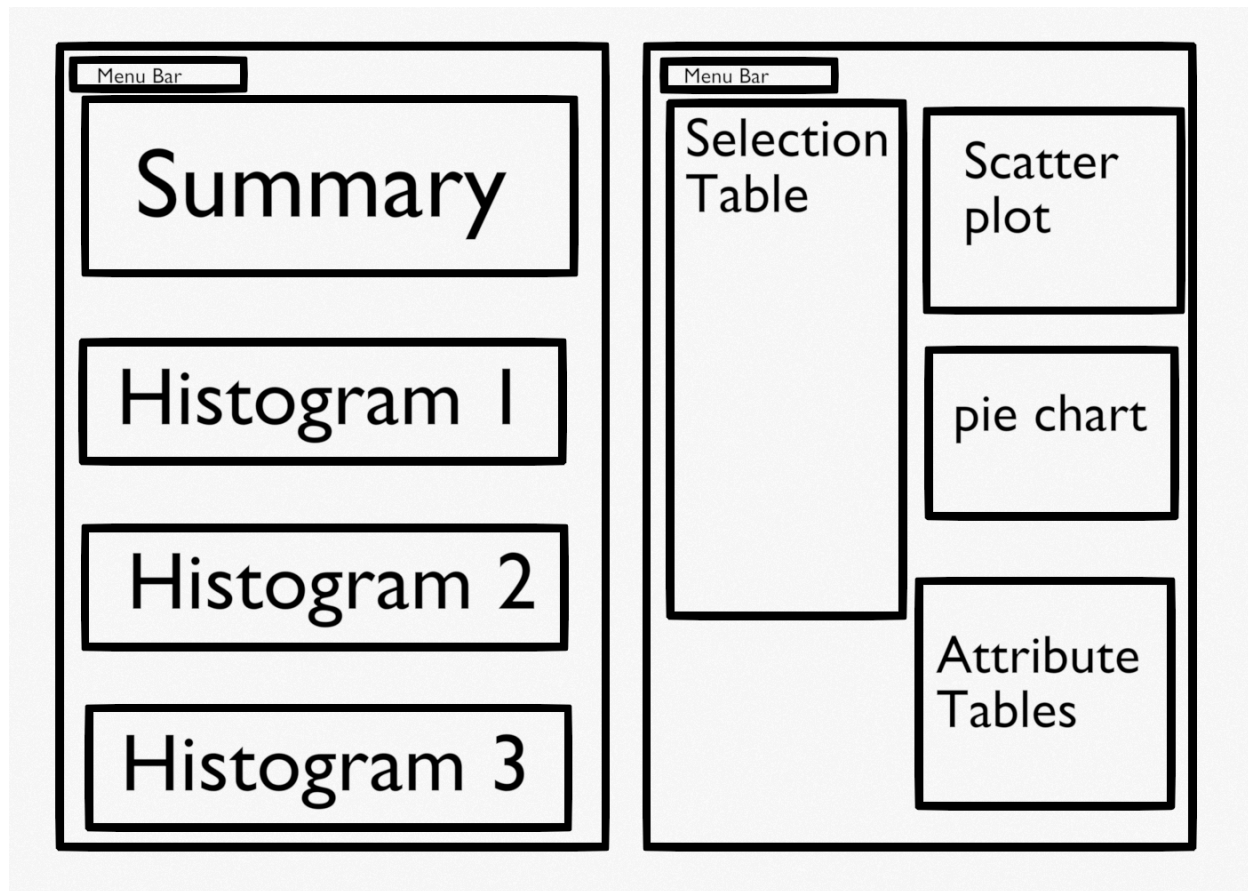


Figure 2: Mockup of shiny app design

3. Results

A live demo of the shiny app can be found on shinyapps.io at the following URL: <https://illustratedman-code.shinyapps.io/project/>. The source code for the project can be found on Github at the following URL: <https://github.com/IllustratedMan-code/ph8093-database-project>.

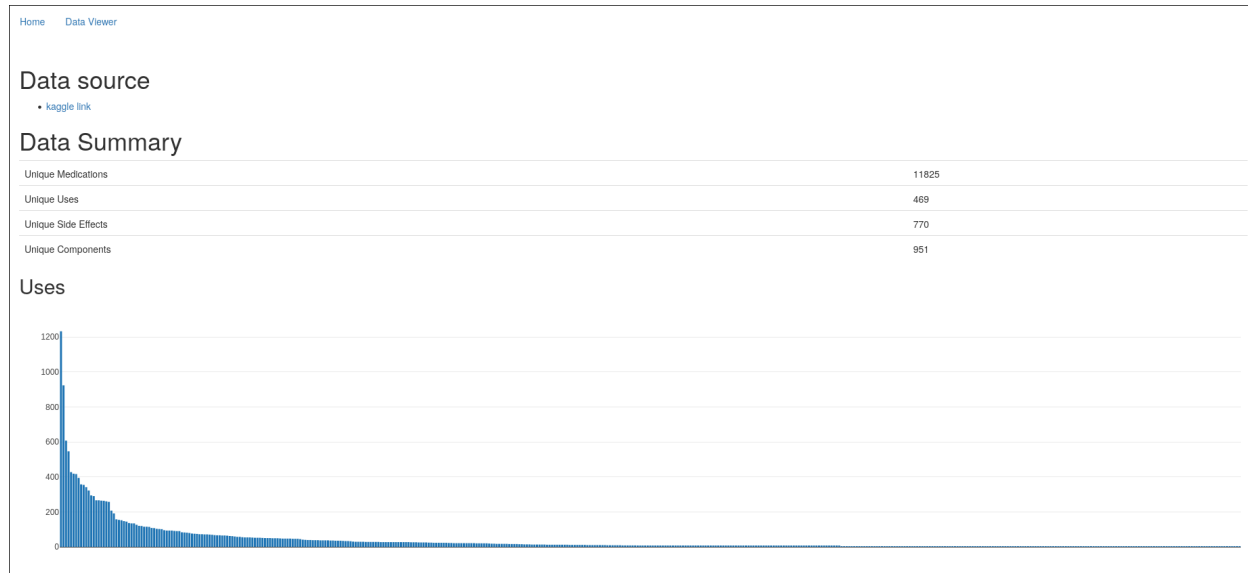


Figure 3: The first section of the home page

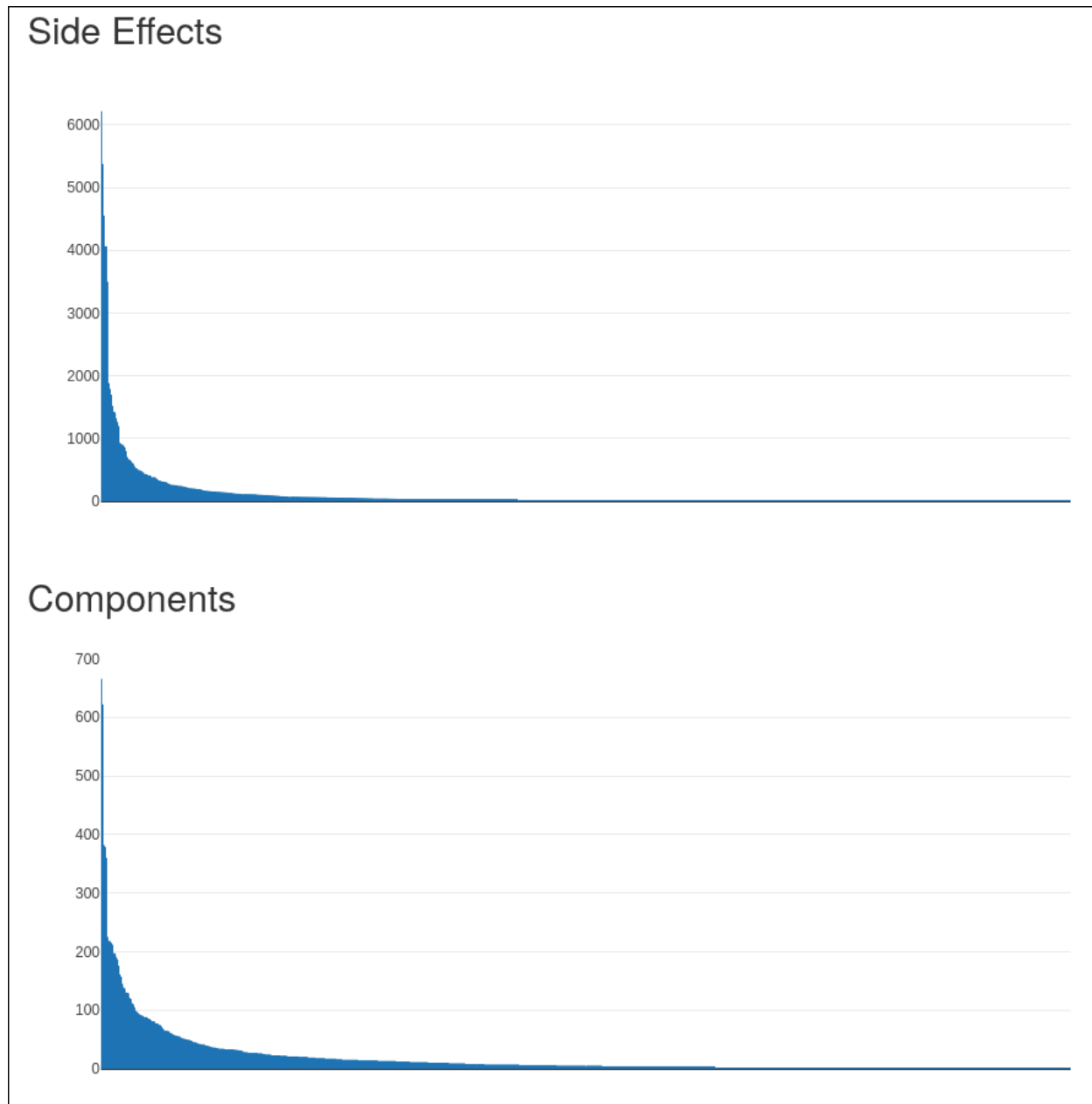


Figure 4: The second section of the home page

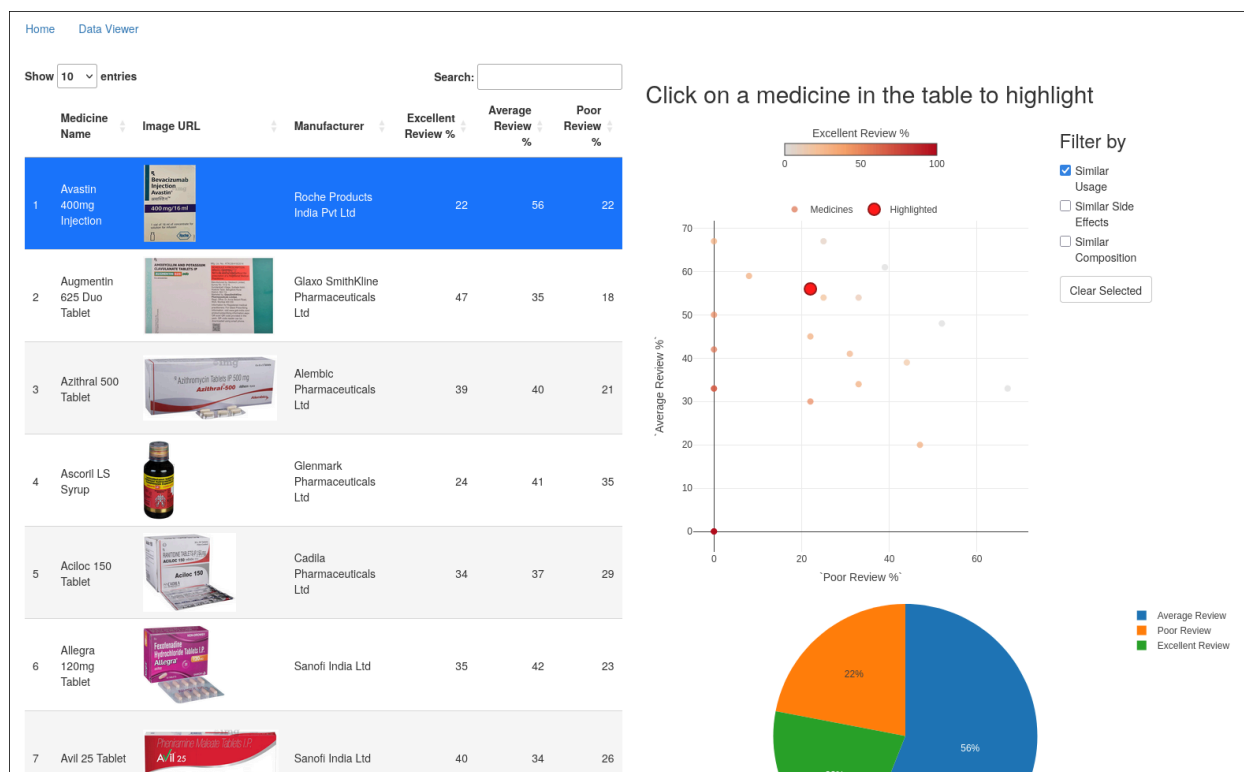


Figure 5: The first section of the data viewer page

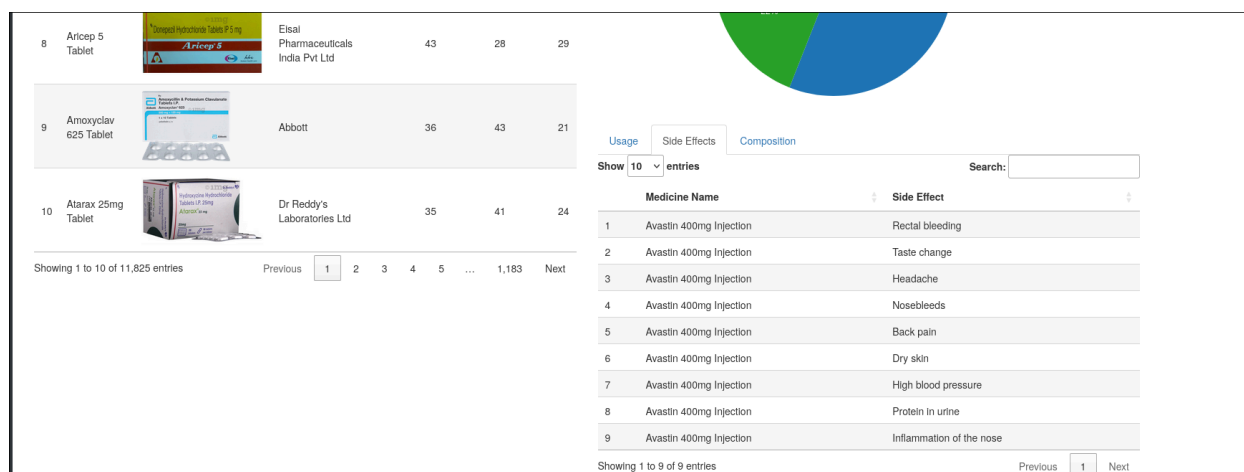


Figure 6: The second section of the data viewer page

4. Response to feedback

“

I recommend removing the medication images, ... you may also add Therapeutic and Pharmaceutical classes as filters ...

”

— Jason

I'm not going to remove the images because one of the class comments actually preferred it with the images, so seems the feedback is split on this point. Additionally, I do not have any data for additional classifications of the medications. All variables are represented in the visualizations/tables.

“... By adding proper sections and heading to each table, visualizations can be made more intuitive. ...”

— unknown classmate

I wasn't exactly sure what to write for each section, though I did add directions to get a user started in the data viewer. The home page already had section labels.

“... could you filter the top X so that it's easier to have and see what's in each bar.”

— unknown classmate

This is already supported by plotly, by dragging over the desired region.

All other feedback was implemented when possible.

5. References

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²<https://doi.org/10.1093/nar/gkad976>

³<https://doi.org/10.5281/zenodo.17229934>