Data Visualization

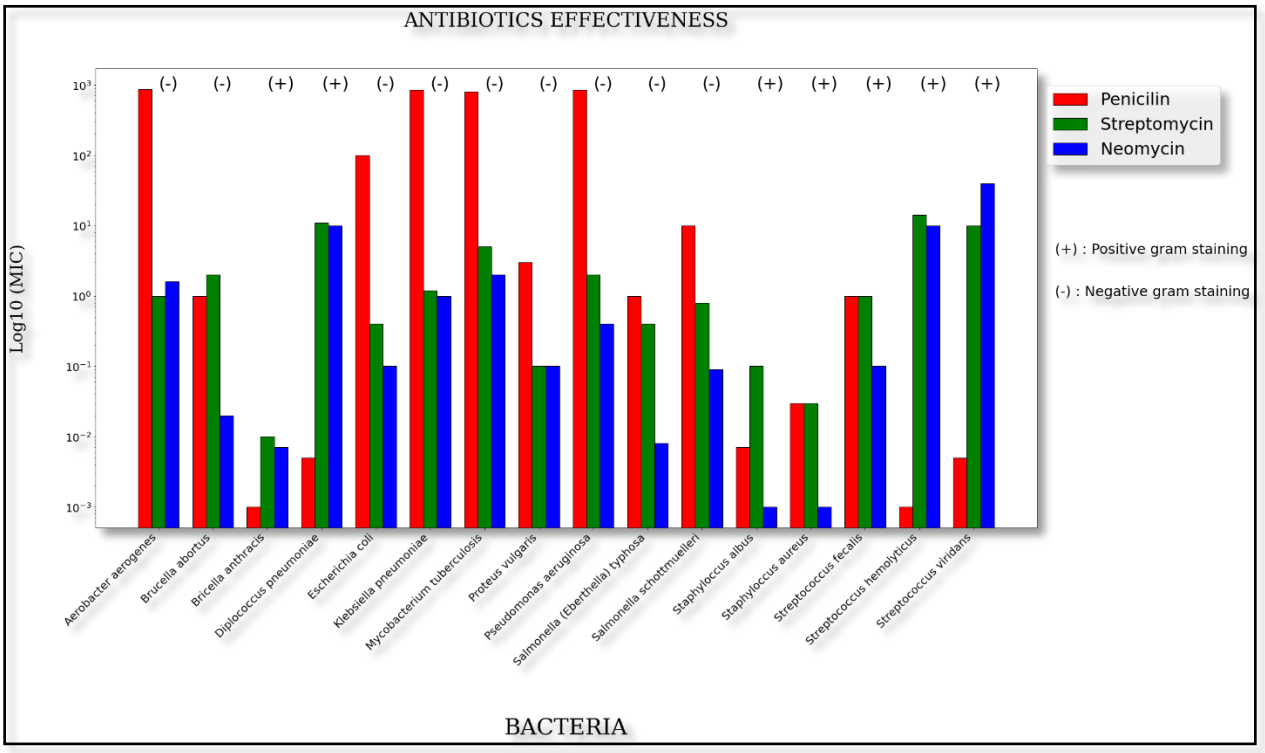
For this project, we have used bar chart, scatter, and heat map to show the effectiveness of 3 antibiotics on 16 types of bacteria. As indicated in the graphs, we have used the logarithm for MIC values. Considering the information that needs to be obtained from the chart and its comprehensibility for the end user, the heatmap chart is the best chart to illustrate its data.

	Bacteria	Penicilin	Streptomycin	Neomycin	Gram_Stain
0	Aerobacter aerogenes	870.000	1.00	1.600	negative
1	Brucella abortus	1.000	2.00	0.020	negative
2	Bricella anthracis	0.001	0.01	0.007	positive
3	Diplococcus pneumoniae	0.005	11.00	10.000	positive
4	Escherichia coli	100.000	0.40	0.100	negative

The important thing in implementing diagrams is that the end user can get a general understanding at first glance. For better understanding and conveying more information, it is better to use non-data elements such as descriptive and reference data in our charts. As shown in all 4 charts, we have created Title, Labels, Legend to better understand the chart and in some cases, we have used Gridlines to make the data more readable. We used the logarithm to transform the data in all three graphs because the difference between its values is large and it can have little efficiency in showing elements with small values.

1. Bar chart

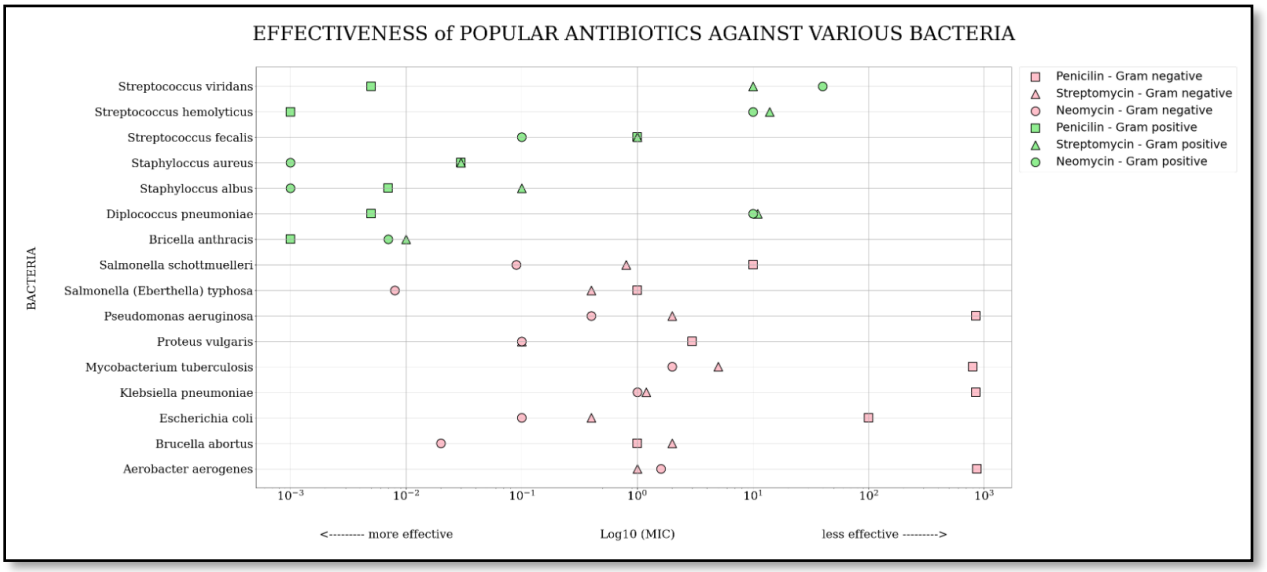
In displaying the data in a bar graph, by assigning 3 colors to the antibiotics, we created a distinction between them and for each bacterium, we have specified the positive or negative gram staining above the antibiotic. But the bar graph may make it difficult to choose and identify the best drug for each case due to its high density.



The y axis shows logarithm on based 10 of MIC values for each antibiotic and the x axis shows the name of bacteria. As it is shown in the legend, we use red, green, and blue color for the antibiotics, respectively for penicillin, streptomycin, and neomycin.

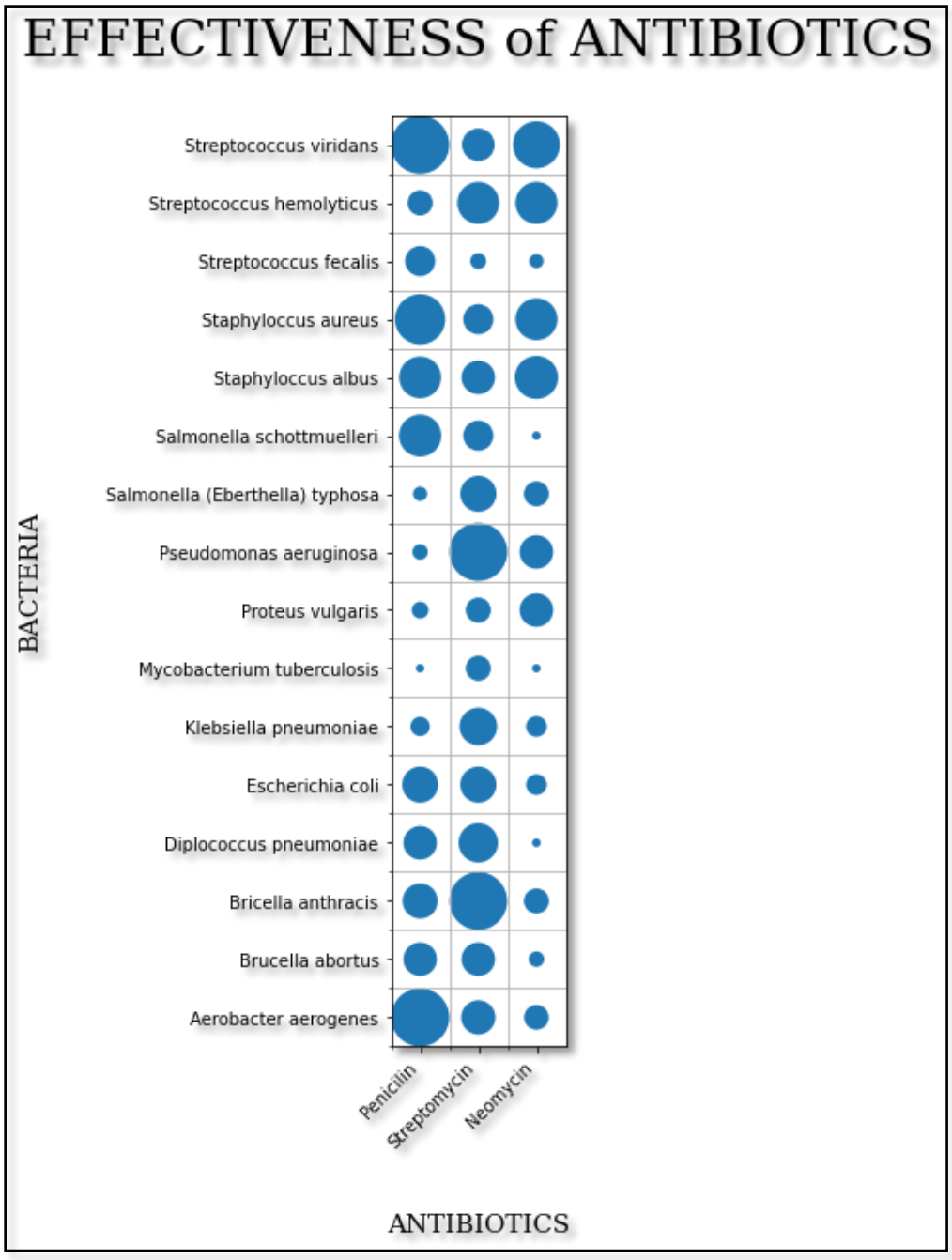
2. Scattered Plot

In the scatter diagram, the x axis corresponds to the logarithm on based 10 of MIC values for each antibiotic and the y axis corresponds to the name of bacteria. We have determined the positive and negative gram staining by color separation. Also, by assigning different shapes to each antibiotic and using grid lines, we were able to create a better understanding of the data. But in this graph, due to the lack of correlation and in some cases overlapping, the possibility of comparing antibiotics with each other is difficult.



3. Heatmap (with circle)

What's more, we can display our data as a circular heatmap. In this way, the amount of MIC is directly related to the radius of the circles, the bigger circle means the higher amount of MIC. In this type of chart, due to the lack of precise numbers, it may be difficult to determine the most effective antibiotic in cases such as Streptococcus hemolyticus and Staphyloccus albus. In this figure, the rows and columns correspond to the name of bacteria and the name of antibiotics, respectively.



4. Heatmap (Table form)

The heatmap diagram was the best option for displaying our data because we have used the color spectrum to better compare each antibiotic for each bacterium, which makes the end user able to have a good understanding even at first glance. Also, by showing the exact value of MIC in the plot, it can be effective in decision making. As we have observed, in cases like Vulgaris Proteus, the effective concentration of Neomycin and Streptomycin is the same, but there is no overlap.

In the following diagram, rows correspond to the name of bacteria and the columns correspond to the antibiotics. It uses the gradient color to show the amount of MIC works for the specific bacterium, the darkest color corresponds to smallest amount and the lightest color means that you need more antibiotic to be effective.