Mini Project 3 – Graph Design (Networks)

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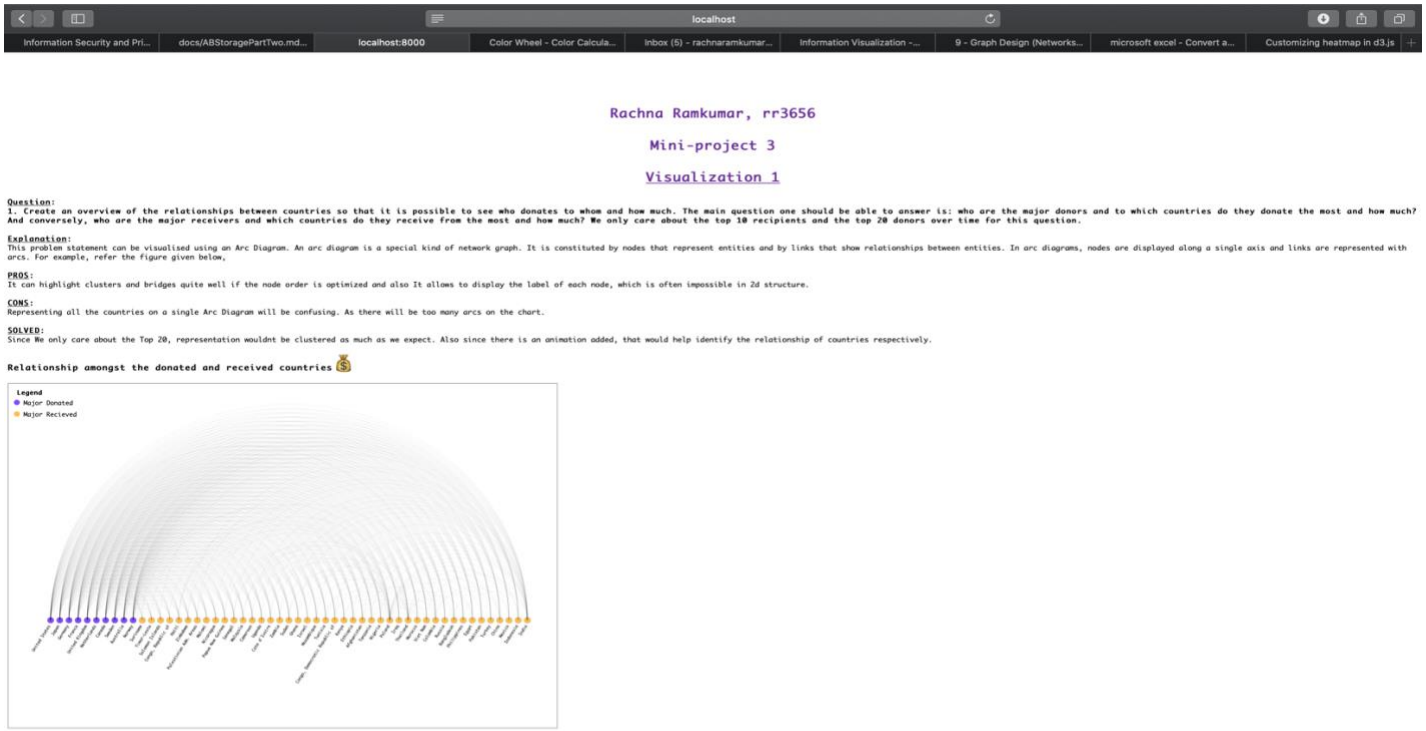
1. **Create an overview of the relationships between countries so that it is possible to see who donates to whom and how much. The main question one should be able to answer is: who are the major donors and to which countries do they donate the most and how much? And conversely, who are the major receivers and which countries do they receive from the most and how much? We only care about the top 10 recipients and the top 20 donors over time for this question.**

SOLUTIONS :

A.

This problem statement can be visualised using an Arc Diagram. An arc diagram is a special kind of network graph. It is constituted by nodes that represent entities and by links that show relationships between entities. In arc diagrams, nodes are displayed along a single axis and links are represented with arcs. For example, refer the figure given below.



PROS : It can highlight clusters and bridges quite well if the node order is optimized and also It allows to display the label of each node, which is often impossible in 2d structure.

CONS : Representing all the countries on a single Arc Diagram will be confusing. As there will be too many arcs on the chart.

SOLVED : An Animation is added such that, when the mouse moves over a specific county it will be highlighted and so will its arcs.

2. **Considering only the top 5 purposes of donation, how does the relationship between countries look like in terms of purposes? What composition of purposes do the donations between each pair of countries have? Are there countries that donate to a given country using multiple purposes? Or do counties always donate using one single purpose when donating to another country? The same as the previous question, we only care about the top 10 recipients and the top 20 donors here.**

SOLUTIONS :

For this visualisation we can use a Sankey Diagram. A Sankey Diagram is a visualisation technique that allows to display flows. Several entities (nodes) are represented by rectangles or text. Their links are represented with arrow or arcs that have a width proportional to the importance of the flow. For Example refer a sample chart below,

PROS : We can analyse the dataset based on specific composition of purposes and determine see what kind of donations between each pair of countries have.

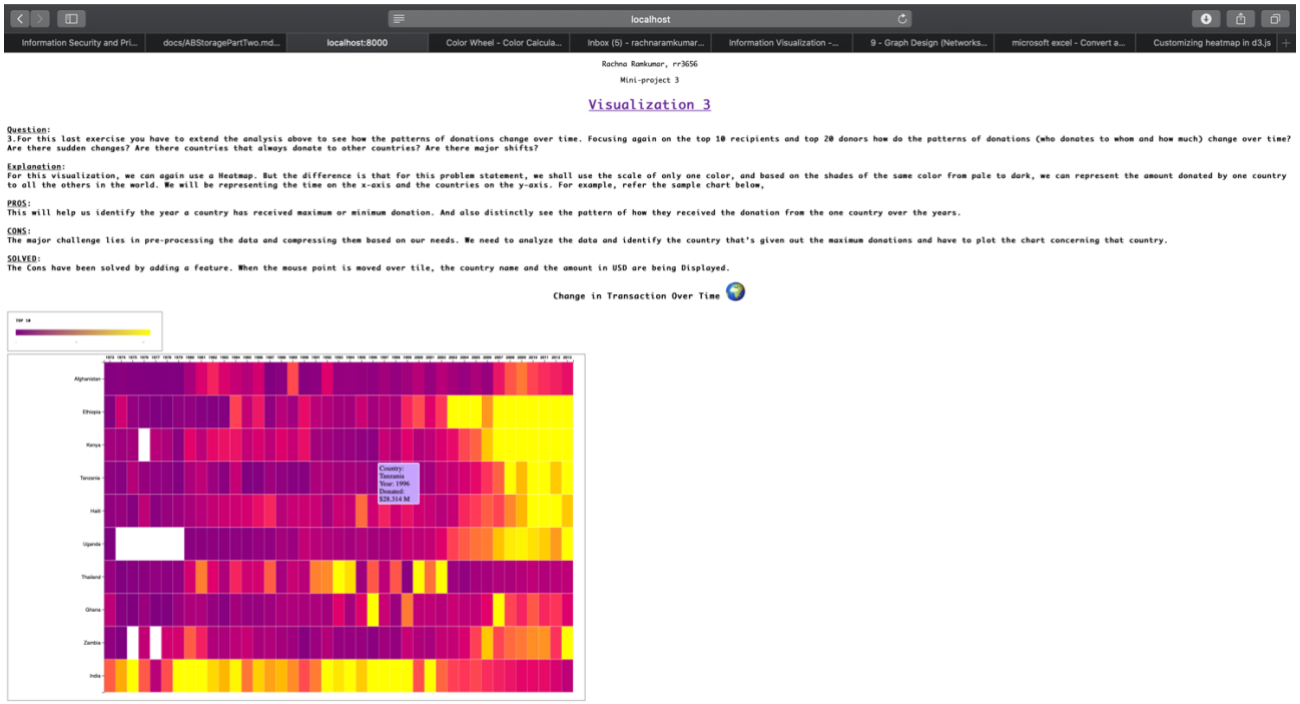
CONS : Analysing the dataset and pre-processing it to scale it to visualise into this chart is tricky and challenging.

SOLVED : An Animation is added such that, when the mouse moves over a specific bridge all the lines flowing through that bridge will be highlighted.

3. **For this last exercise you have to extend the analysis above to see how the patterns of donations change over time. Focusing again on the top 10 recipients and top 20 donors how do the patterns of donations (who donates to whom and how much) change over time? Are there sudden changes? Are there countries that always donate to other countries? Are there major shifts?**

SOLUTIONS :

For this visualization, we can again use a Heatmap. But the difference is that for this problem statement, we shall use the scale of only one color, and based on the shades of the same color from pale to dark, we can represent the amount donated by one country to all the others in the world. We will be representing the time on the x-axis and the countries on the y-axis. For example,



PROS : This will help us identify the year a country has received maximum or minimum donation. And also distinctly see the pattern of how they received the donation from the one country over the years.

CONS : The major challenge lies in pre-processing the data and compressing them based on our needs. We need to analyze the data and identify the country that's given out the maximum donations and have to plot the chart concerning that country.

SOLVED : An Animation is added such that, when the mouse moves over a specific tile, it will display all the necessary details.

References :

1. www.stackoverflow.com
2. https://www.d3-graph-gallery.com/all.html
3. Observable Notebooks

NOTE : THE SCREENSHOTS ARE ATTACHED IN THE INDIVIDUAL FILES AS WELL.