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CSE 5544
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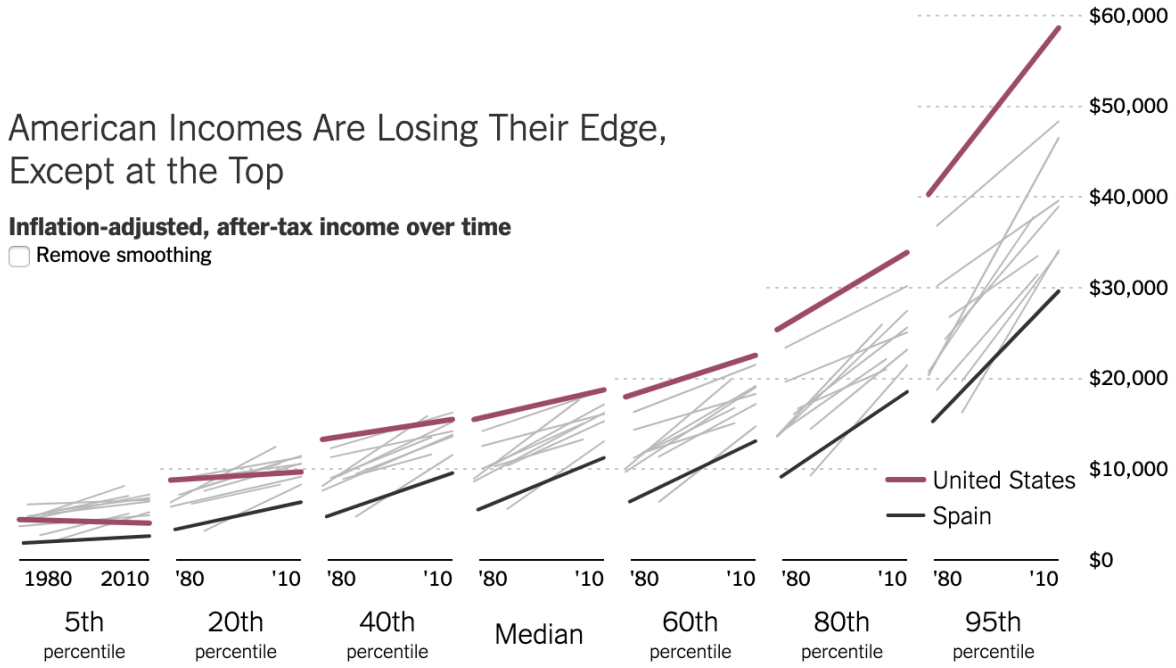
Midterm Part 2




Q1: Part 1: (https://www.nytimes.com/2014/04/23/upshot/the-american-middle-class-is-no-longer-the-worlds-richest.html)

A. Tasks
   A. The visualization is trying to demonstrate how typical American incomes have increased (or decreased) over time in different percentile buckets across the inflation adjusted income spectrum.
   B. It is also trying to show how the income of American's changed relative to other countries. The grayed out lines represent other, similar, countries and their growth rates in each percentile bucket.

B.

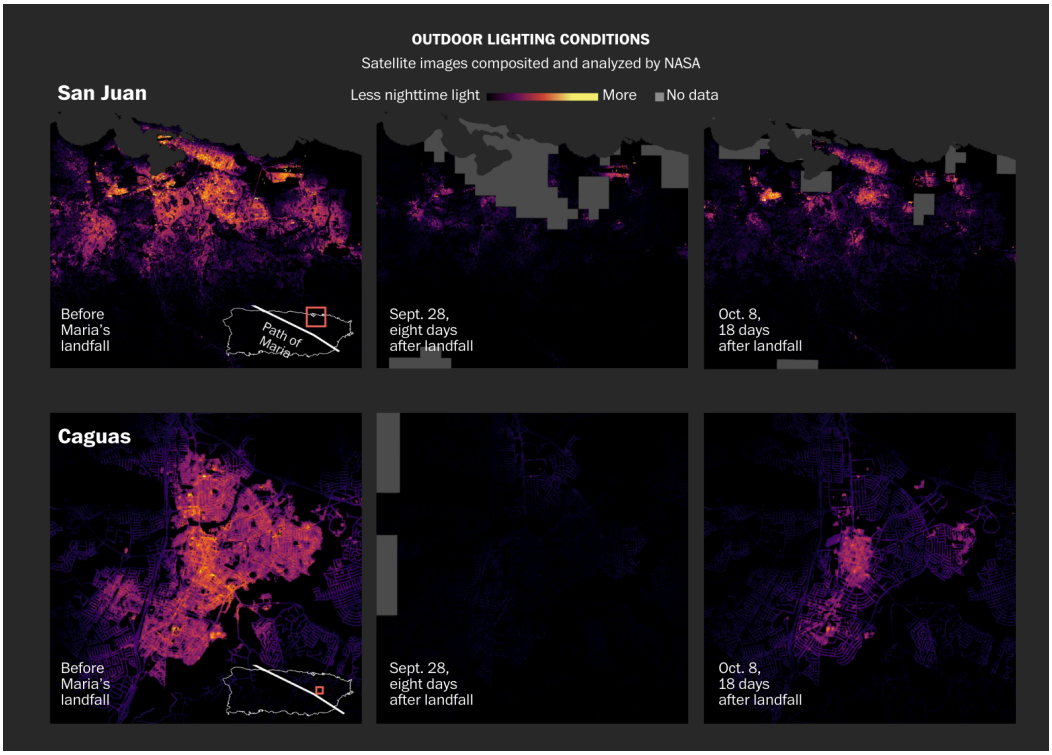
| Variable | Data Type | Mark Type | Mark Properties | Position in Space Time | View Transformation |
|---|---|---|---|---|---|
| **Percentile** | Ordinal | Separate Graph | | X (Bucket) | |
| **Year** | Quantitative | | | X | |
| **Income** | Quantitative | Line | | Y | |
| **Country** | Nominal | Line | Color | | On hover, highlight the line and display the name |

C. **Good Design Element:**

The design uses the "Overview first, then zoom and detail" method described by Schniederman as evidenced by its interactivity. Specifically, at first only the US income lines are highlighted with color as the overview. As the user mouses over the different lines in each graph the country names appears and the lines are highlighted in each separate percentile graph provided the detail view. In terms of helping the task at hand, it allows for individual comparison between the US and other countries which directly impacts the suitability of the visualization for the task. The interactivity is also very effective because it allows for quick comparisons.

D. **Bad Design Element:**

The overlaid lines for each countries income results in a cluttered visualization. This reduces the designs effectiveness as it becomes difficult to distinguish between the different countries, and also effects the success of the task as it complicates comparisons at the overview level. To address this, I would allow for users to turn countries on and off. So at any point in time there would only be 2-4 countries displayed thereby reducing the visual clutter. The design would still effectively address the task becuase it would allow for comparisons between the US and other countries income growth, just on a more microscopic level.




Part 2: (https://www.washingtonpost.com/graphics/2017/national/puerto-rico-hurricane-recovery/?utm_term=.1b95e9430183)

A. Tasks:
   A. Show the effect on Hurricane Maria on the power infrastructure of the Caribbean Islands.
   B. Demonstrate the different rates of power grids recovery for different areas affected by Hurricane Maria.

B.

| Variable | Data Type | Mark Type | Mark Properties | Position in Space Time |
|---|---|---|---|---|
| **Nighttime Light** | Ordinal | Point | Color | |
| **Lat** | Quantitative | | | X |
| **Lon** | Quantitative | | | Y |
| **City** | Nominal | Separate Graph | | Graph Position ( Y) |
| **Days After Landfall** | Categorical | Separate Graph | | Graph Position (X) |

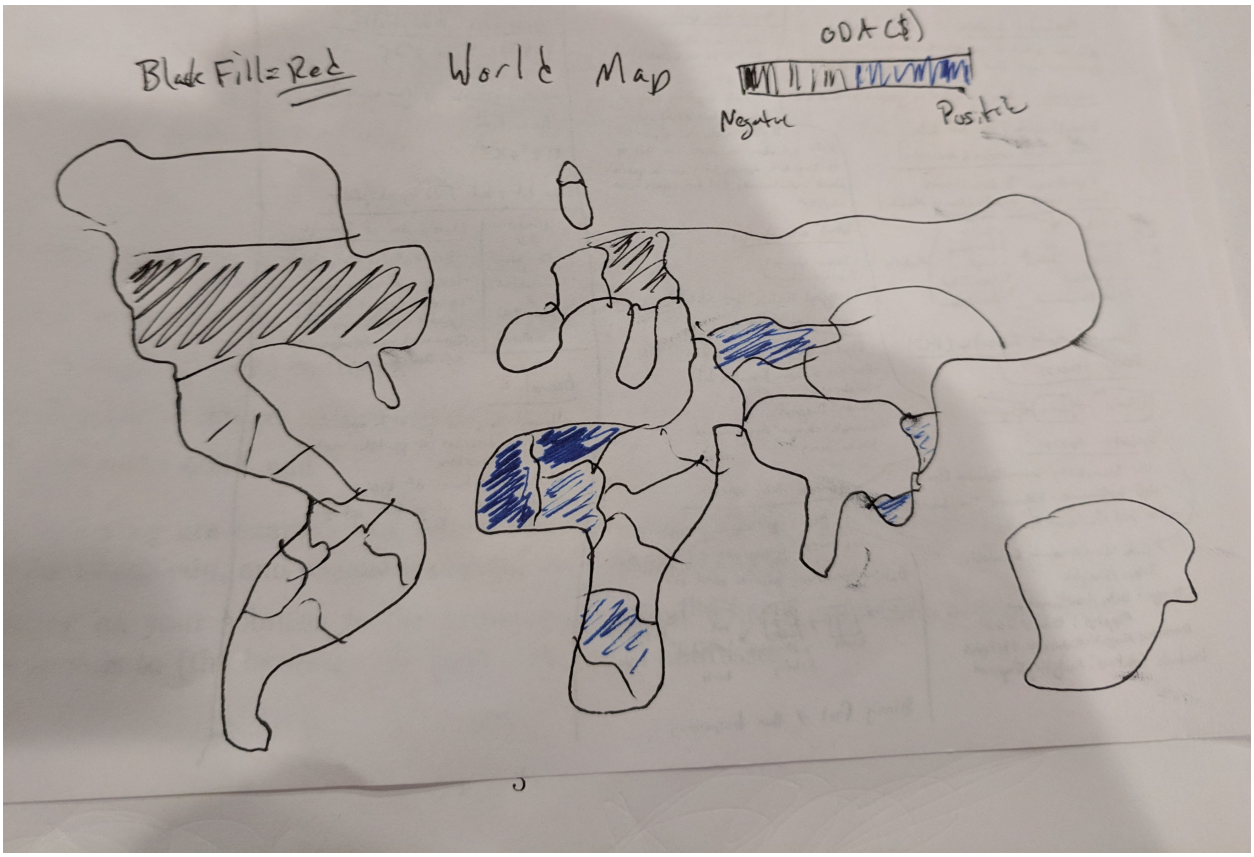
C. **Good Design Element:**

They made very good use of color in the visualization. By employing the principles discussed on the color slides, specifically the lightness scale with hue and chroma variation, the creator effectively uses color to demonstrate the differing light (representative of the power grid) intensities. This increased the effectiveness of the visualization as it makes it easy to quickly glance at the visualization and understand the different levels of power grid functionality. Furthermore, it helps address the task by showing the strength of the power grid as measured by the more yellow part of the color scale. It also clearly highlights the lack of power infrastructure after the hurricane.

D. **Bad Design Element:**

The lack of interactivity makes it difficult to address the recovery task. If one were to make a time slider and with stops at each day instead of having three, almost cherrypicked, recovery points the user would be able to explore over time how the individual city recovered. This would increase the effectiveness of the visualization because it would further enable exploration of the aforementioned tasks. Furthermore, it would allow for day by day comparisons of the recovery efforts at each location.

**Part 2:**




My design makes use of the "Overview first, zoom and filter, then details on demand" mantra. Its overview mode is at the global level where each country will be colored based on their normalized ODA outflow. The color scale will flow from red to blue using the color principle, lightness scale with hue and chrome variation, in order to avoid misleading the viewer with a rainbow scale or similar. Countries with a negative ODA flow will be colored red and countries with positive outflow will be colored varying shades of blue. Furthermore, a timescale could be added so the viewer can scrub through time and view how the countries ODA flow changes each year.

In terms of visual encodings, in the initial rendering there are two main variables: country and ODA flow. ODA flow is quantitative and is encoded with a color scale over its normalized set of values. This is appropriate for the data becuase it creates in essence a heat map where countries with a high positive or negative ODA flow can be quickly identified. Countries will be encoded as an area placed on a world map with the fill corresponding to the aforementioned ODA flow. This encoding is effective becuase it allows viewers to easily compare flow for geographic neighbors. Furthermore, due to the nature of using color for the scale it only allows

for inferring relative value; it is nearly impossible to internally interpolate and accurately estimate the true value of each country. To resolve this issue, a pop up for each country could be used so that when you click within the countries boundary it shows the numeric value. If trends over time wanted to be examined further, the popup could also display a line chart that depicted the ODA over time.

This visualization enables a variety of different stories to be told. First and foremost, it creates a platform to examine where most of the ODA dollars are going geographically. Since the dataset is provided in terms of countries it logically makes sense to compare them on a world map. This could help identify which countries are sending the most support abroad and also which countries are receiving the most support. Furthermore, it can identify which countries are disproportionally receiving support. For example, if a country was very red and all the surrounding countries were significantly lighter shades, assuming they face similar economic/social headwinds, this visualization would make it easy to recognize the disproportionality of that countries ODA receipts.

The biggest flaw in this visualization is removing the temporal component from the data. It becomes difficult to simultaneously display the temporal nature of the ODA flow while also displaying enough countries in a manner that provides useful insights. If I were to place all of the countries on a line chart and plot the ODA over time, there would be significant visual clutter and the expressiveness & effectiveness would decrease accordingly. As such, a conscious decision was to make the temporal component a part of the "detail on demand" idea where a user could click on a country to view its trend over time. Furthermore, this design may make it difficult to order countries based on ODA as distinguish colors close in hue is difficult for humans. This again was a result of a decision to focus on trend discovery at the overview level.