Marriage in Changing Society: Analysis of 10yrs Divorce in Chinese Provinces
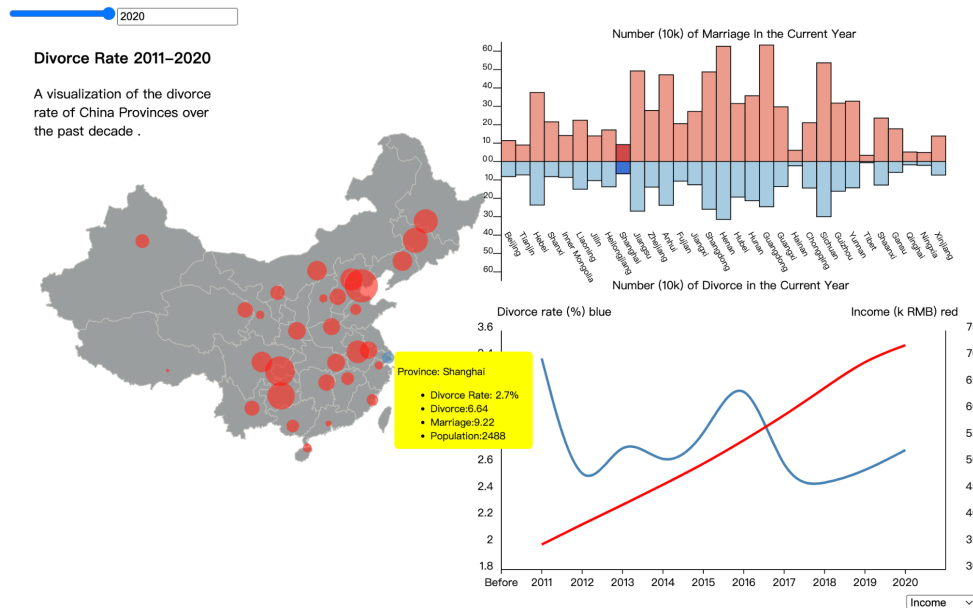
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Overview

In this project, we use Javascript, HTML, D3, and React to build three highly interactive linked views whose aim is to visualize marital instability in China's province from 2011 to 2020. The red points on the map show the divorce rate of each province, with the size meaning the scale. Contrasting the colors blue and red, the up and downside of the symmetric bar chart in the top right corner compare the number of divorces and marriages in each province in the selected year. In the lower right corner, a line chart provides a possibility to explore the province-wise relationship between changes in divorce rate and changes in *College Enrollment Rate, Average Income, and Population* by selecting an indicator from the dropdown box. Finally, the slider in the up left corner can be used to choose a specific year for investigation.

In short, our program is robust with the three charts being connected with each other tightly and nested.

Data

The raw data is downloaded from the website of the National Bureau of Statistics of China. It has 7 excel files each containing one attribute we are interested in (the one about position has two attributes latitude and longitude). The final dataset we used in the project is a table containing 311 rows and 10 columns. The columns include basic indexing information like *Province,* its *latitude* and *longitude,* and *Year.* For each province per year, we use three attributes, *Marriage Registration (Ten Thousand Pairs), Divorce Registration (Ten Thousand Pairs), and Divorce Rate,* to plot the changes in the marital-related situation. Meanwhile, we provide *Per capita Disposable Income of All Residents, College Enrollment Rate,* and *Population* for discovery purposes. Our dataset can be accessed here. The Processing steps include table conversion, Unit Conversion, and language translation. Most steps are done through Excel.

Goals and tasks

Goal

Our goal is to visualize the crude divorce rate in China's 30 provinces in the past decade. Viewers can compare not only the divorce and marriage situation across districts, and years, but also the relationship between divorce rates and multiple society development indexes such as Income level, Higher Education Level, and population.

Using specific scenarios to show our task, let's imagine an international student named Elizabeth who has just learned about China's three-child and cooling-off period for divorce policy. She hopes to explore the background of these policies. These are some of her sample questions that our webpage can answer.

- Do coastal districts have a higher divorce rate compared to the in-land ones?
- Which provinces have seen the largest rise in divorce rates in the last decade?
- Does this change in divorce rate correlate with other factors (such as disposable income per capita and college rate)?
- Do regions with a high volume of marriage also have a high volume of divorce or are there counterexamples?

Task

- ☐ Create Static Map (find and read data)
- ☐ Years Slider (filter data)
- ☐ Tooltip (read data, design position)
- ☐ Bar Charts (bars, scales)
- ☐ Static Line Charts (read data, scales, axes)
- ☐ Line Charts and Dropdown(dropdown box design, scales, lines)
- ☐ Connect with Symbol Map (interactions)

Visualization

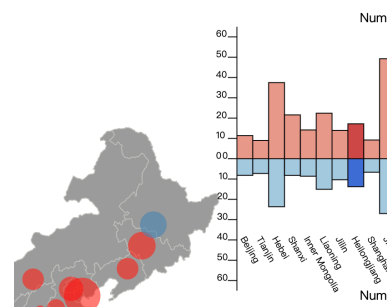## Our interface's Basic Display:

A **geo-map** of the country with accurately depicted dots representing the divorce rate of the corresponding year of the province. The default year and province are set to be 2020 and Beijing respectively. A **bar chart** of each province's number of marriages and divorces in the corresponding year; A **line chart** of each province's divorce rate with another external factor.

Interaction:

For a selected year, hovering the mouse over a specific province will highlight the corresponding bar on the right. A tooltip element will be shown beside the mouse. We explicitly give out the numerical data about the hovered point on the tooltip so that viewers will gain more accurate information about the province, rather than solely depending on the relative size of the point. And if the user hovers over the bar chart, the according province on the map will also highlight itself. Meanwhile, the line chart will appear in its default form (Changes of Divorce Rate & Income over the 10 years).
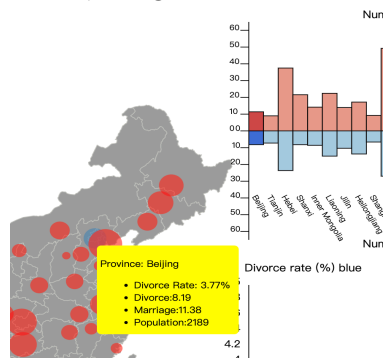

Hovering over the point and the bar highlights.   Hovering over the bar and the point highlights.

Discovery: If the user clicks on one province dot or one bar, the line chart will update the selected province's data and the user can play with different factors and discover the trends between them using the line chart and the dropdown box. The dropdown box for the line chart is designed to attract users to explore the graph themselves while making the total graph concise and clean.
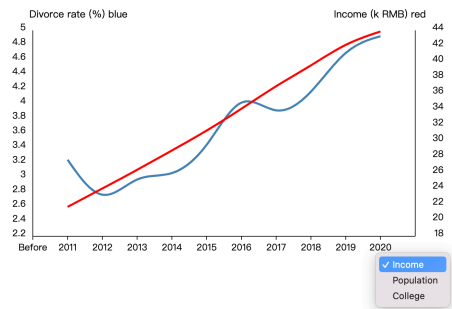
Rationale: The reason we do such a design is that we want our graphs to be **multi-dimensional, nested, interactive, and non-conflicting**. On the one hand, we design two graphs based on the geographical position (map and bar chart) and change them using the year slider, on the other hand, we design one multiple line chart based on time and change it using the mouse clicking. In this way, the user can choose the most specific information she wants to know:

What is the marriage/divorce comparison for Beijing in 2018?
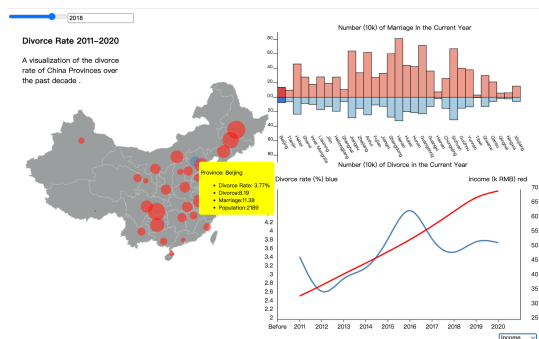
Is there a negative relationship between the divorce rate and the college enrollment rate in Shanghai in the last ten years?
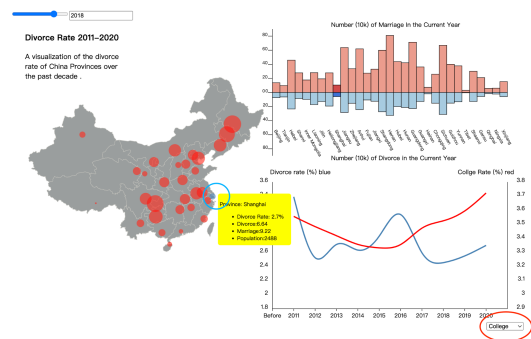
Reflection

We have managed to achieve all of the goals we set in the proposal, and we have also done improvements. All of the changes are improvements without the reduction of workload. Below is the detailed improvement we made to the project compared to the proposal.

Improvements:
[Bar Chart] To facilitate easier comparison. we make the bars below and above align with each other instead of staggering. We also further diverge the colors of the marriage bar and divorce bar.
[Connectivity and Interaction] At first, we didn't think about adding the clicking function to the bar chart. But we believe that since the map and the bar chart can connect with each other through hovering, there must be users hoping to use the bar chart to choose the province, instead of the map. So, we add the clicking function to the bar chart. Meanwhile, we add the topic and a brief introduction in the blank to make the graph more balanced and complete.

Challenges:
[Mouse Event] As mentioned in our goal, we not only hope to visualize the demographic marital condition in China but more importantly, make further investigation into the line chart. Therefore, we must apply **clicking** events on the map points on the layer of the tooltip **hovering**. However, the two

setSelectedProvince functions lead to some collision. We solve this problem by adding another set of selection objects.

[Default Setting] The nested structure requires us to set a default value for the province, year, and dropdown box factors to avoid changes when change is not needed.

[Bar chart click & Map click] Adding setSelected Statement to the bar chart enables a merging of the two different clicking actions.

Expansion Possibilities:

[Multiple Dropdown Selection] Support selecting one or more factors(lines) to be shown on the line chart (only to visualize the changing trend of different factors, not to compare the absolute value of each of them)