Economic Growth in BRICs

Process Book

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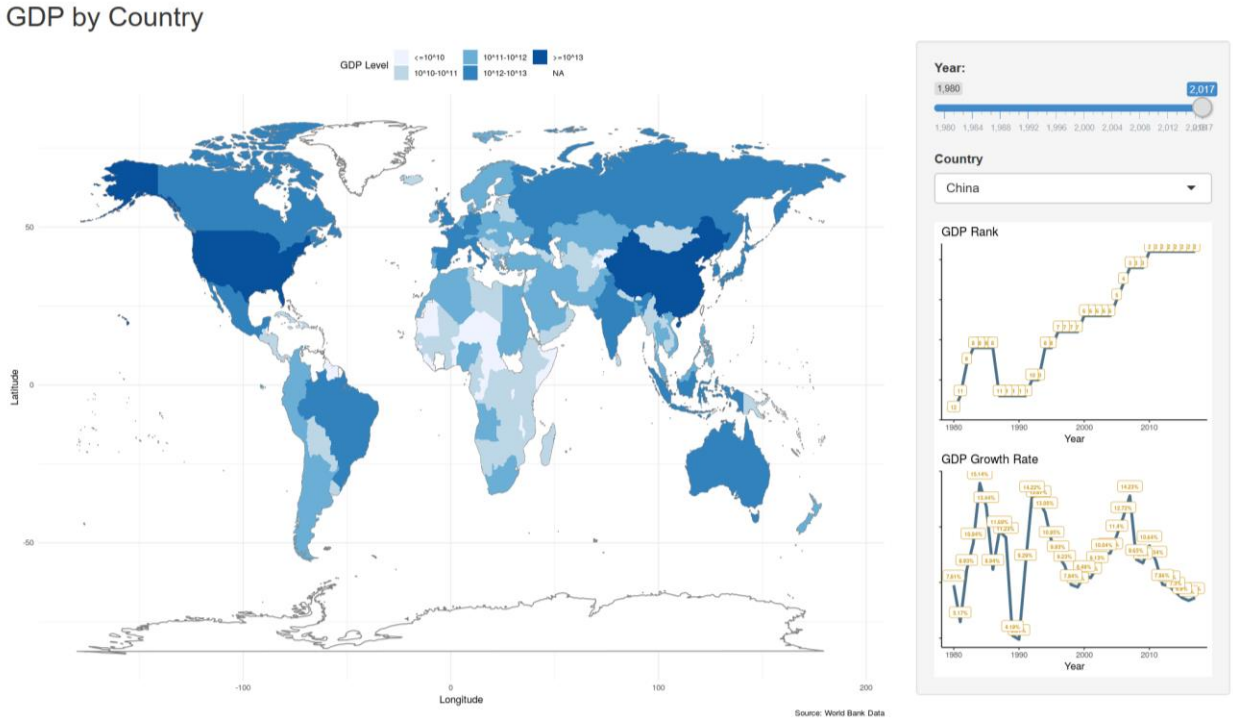


Introduction

Our project explores the global economic conditions measured by nominal GDP and its components from 1980 to 2017 and particularly the economic growth of the emerging market, which are represented by BRICs(Brazil, Russia, India and China). We are concerned about following questions:

- What's the relationship between GDP and other indicators?
- How does GDP differ among countries?
- How does GDP growth rate differ among countries?
- In selected countries, how does their economic structure differ from each other using consumption approach? We divided GDP into final consumption, investments and net export.
- How does the contribution rate of GDP components differ among countries?
- How do consumption and exports differ among selected countries?

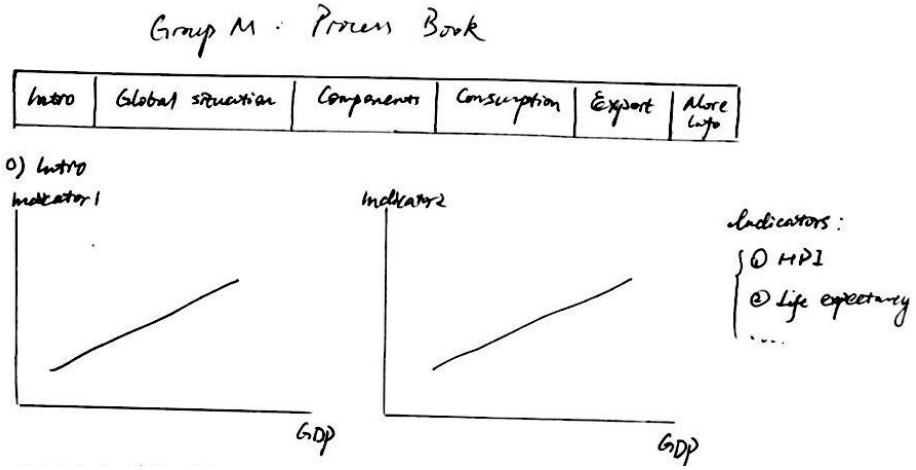
[1] All authors contributed equally to this project.

Initial Plans: Data

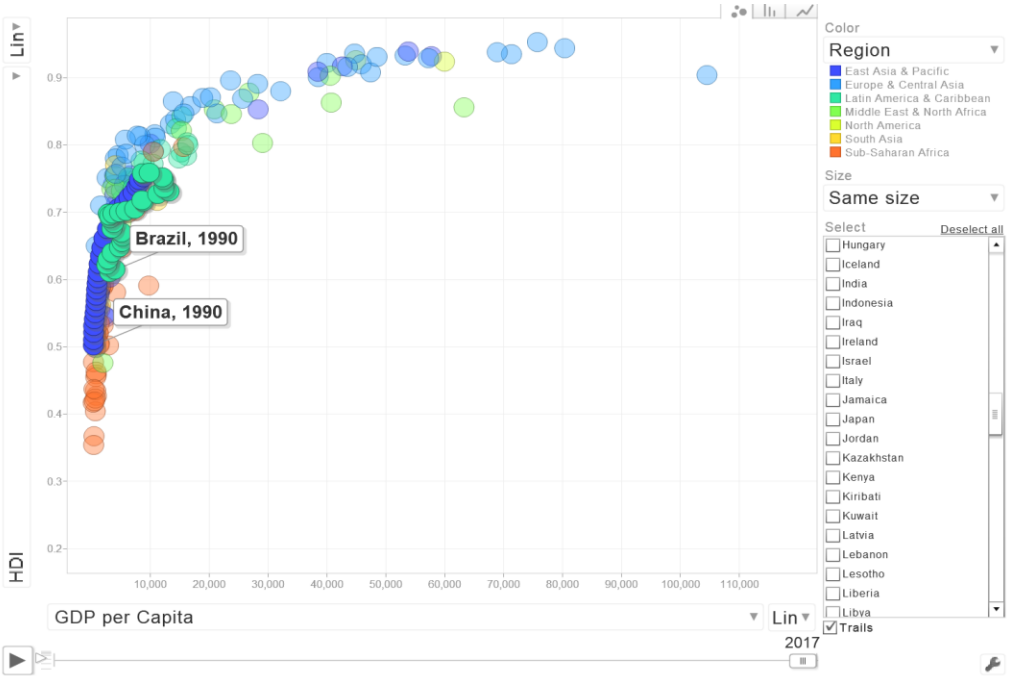
We require the time series data of nominal GDP and indicators like human development index in all countries and the country-level data of consumption, investment and trades. The GDP and other indicators data could be found on World Bank Data(https://data.worldbank.org/) and IMF International Financial Statistics(https://data.imf.org/?sk=4C514D48-B6BA-49ED-8AB9-52B0C1A0179B&sId=1409151240976). The country-level data could be found on the website of statistic department of each country.

Initial Plans: Plots

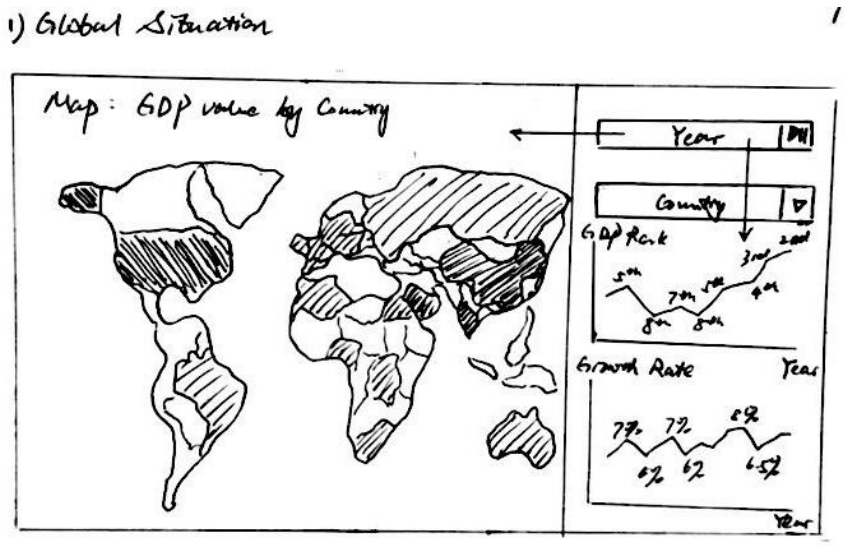
We initially decided to draw scatter plots or line plots to present the relationship between GDP and other indicators such as Human Development Index and Life Expectancy.

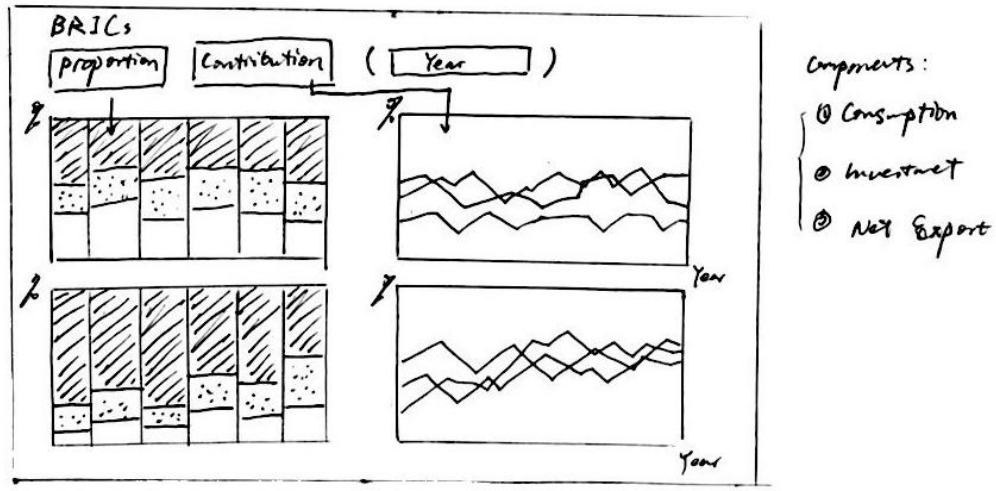


However, we found that the GoogleVis tool provided great interaction for users to track the data of selected countries through time. So we use it to present the relationship between GDP and other indicators.

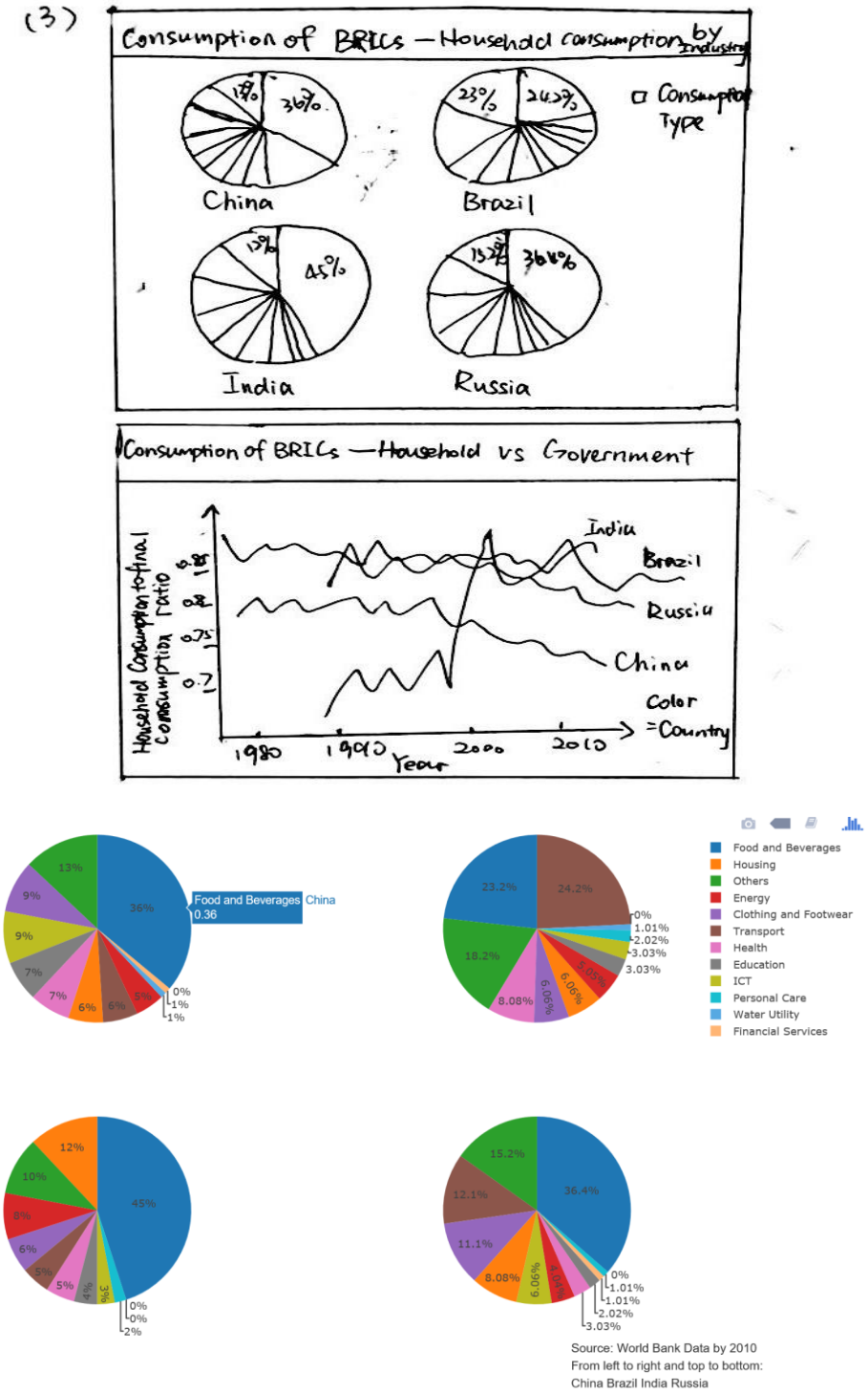


For the global situation of economic growth and the GDP components, we plotted as what we presumed.



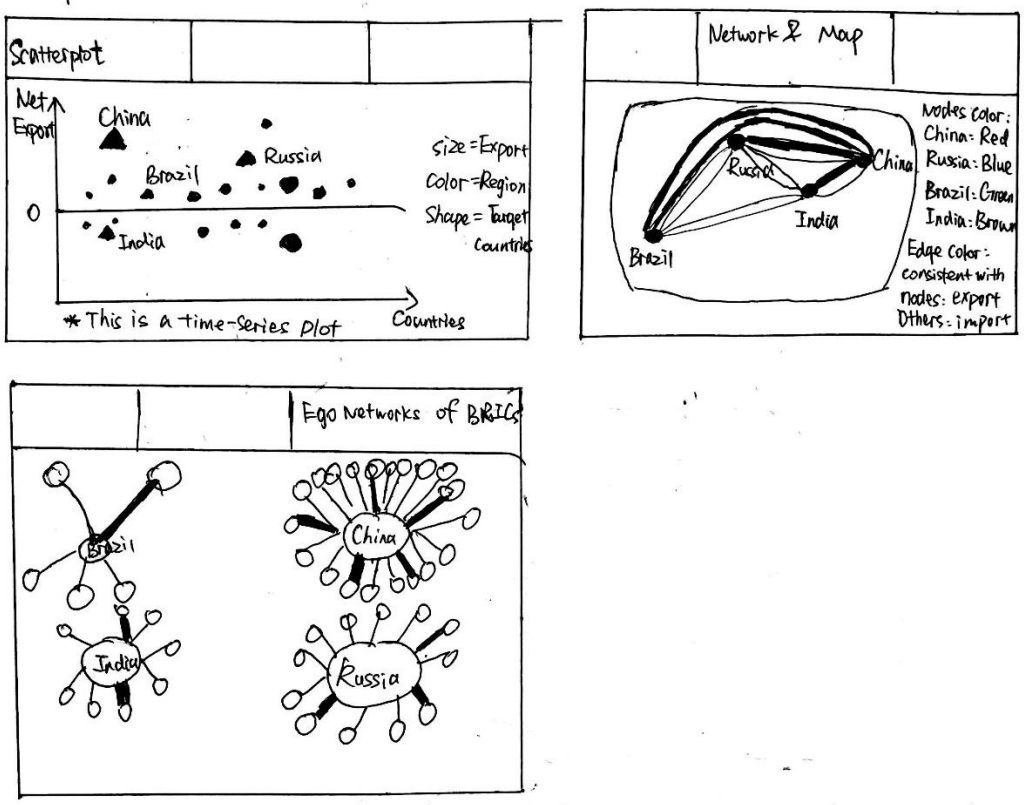


For the consumption details of BRICs, instead of using ggplot, we use plotly to provide more information by interaction, since pie charts sometimes are unprecise.



For the export part, we use gganimation to animate the scatter plot of net exports instead of static plots. We also drew the network graph on the world map to give an intuitive comparison among the BRICs. For the Ego networks, we initially planned to provide some interaction by clicking each nodes, and we drew static ones due to technical difficulties.

(4) Export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Network & Map
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China
India
Brazil
Nodes color:
China: Red
Russia: Blue
Brazil: Green
India: Brown
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Ego networks of BRICS
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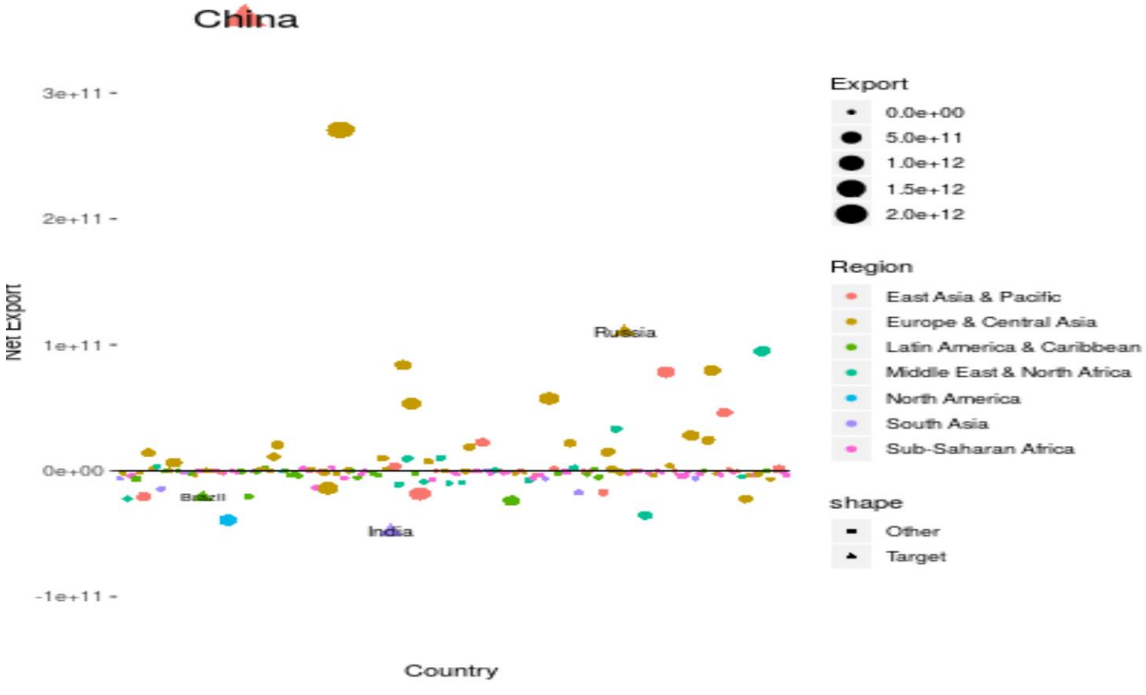
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1.5e+12
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Latin America & Caribbean
Middle East & North Africa
North America
South Asia
Sub-Saharan Africa
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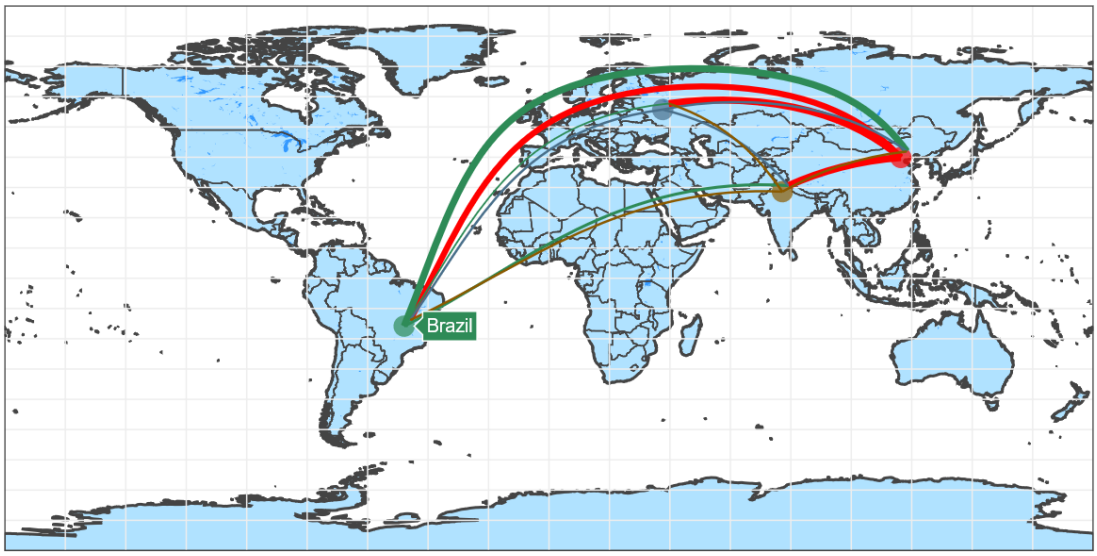
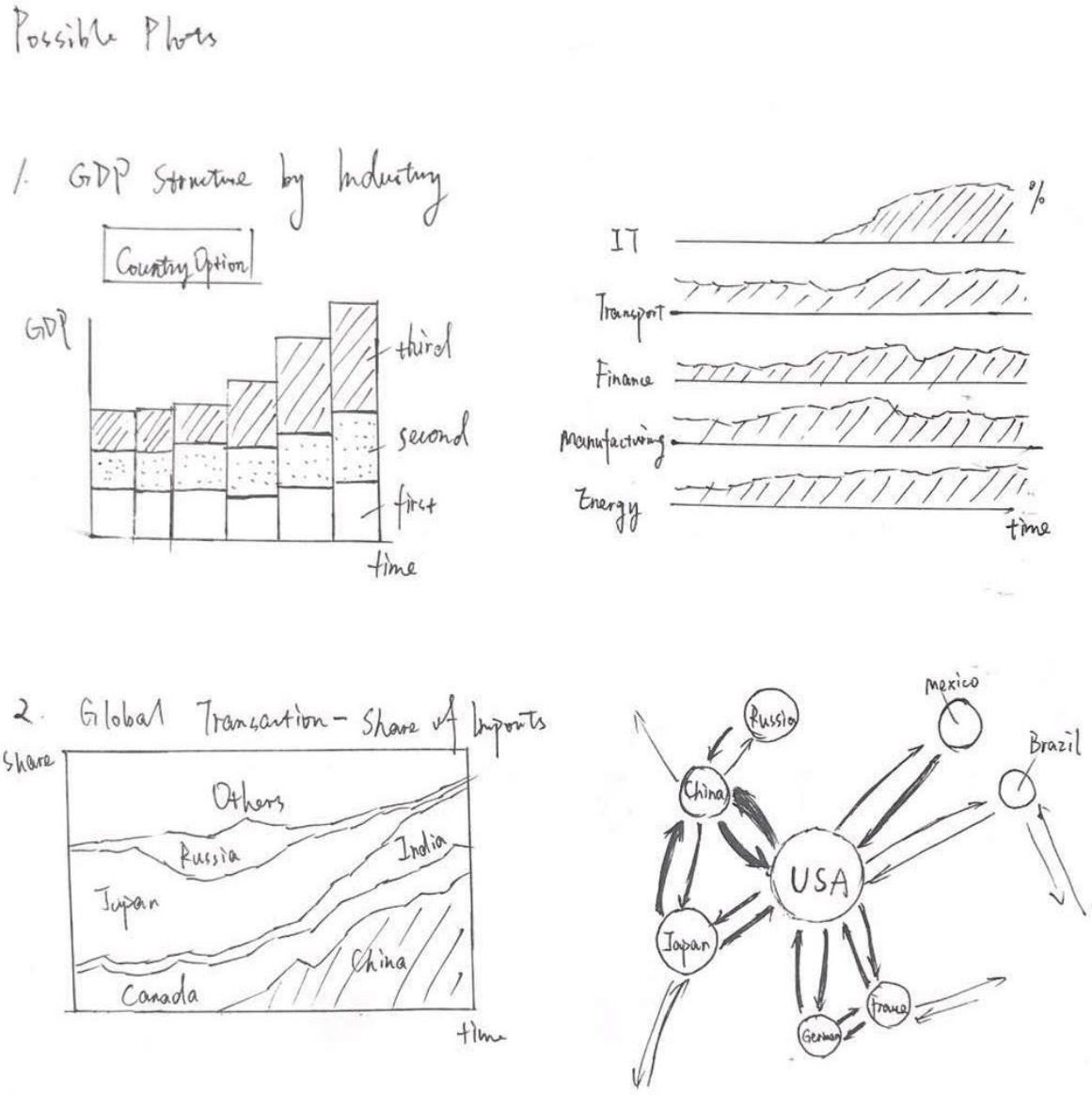


At the beginning we also tried to plot the following plots:

- The GDP structure of selected countries grouped by industry
- The share of exports/imports in the global transaction and the trade network

However, the data of value generated by different industries is hard to collect and the trade network of all countries is too messy, so we gave up these plots and just focused on the comparison among BRICs.



Choosing R Shiny for presentation

We think Shiny is a great way to host our plots as it provides interactive bottoms so that users can click around to see one plot at a time. The website will also be more concise and elegant.

The site is hosted on R server and running at https://haoyu.shinyapps.io/GDP_Comparison/. The googleVis plots only shows in standard browsers such as IE, and some of the interactive or animated plots require some time to load.

Final Data Sources

- World Bank Open Data(https://data.worldbank.org/)
- IMF International Financial Statistics(https://data.imf.org/?sk=4C514D48-B6BA-49ED-8AB9-52B0C1A0179B&sId=1409151240976)
- World Bank Global Consumption Database(http://datatopics.worldbank.org/consumption/)

Conclusion

1. One measurement of GDP: GDP per capita, does have positive correlation with several development indicators. For example, we tried to depict the relationships between GDP per capita and Human Development Index (HDI) and Average Life Expectance (ALE) and found the relations are positive.
2. In the second module of our shiny app, that is: Global GDP Growth Situation, we depicted GDP growth in all economies around the world and found some growth poles, like China and India. In the GDP Rank plot, we can see their ranks just experience a rapid increasement and their growth rates are around 10% in recent 20 years.
3. With respect to GDP components over time, we found that our main objects of study: BRICs (Brazil, Russia, India and China) have different development patterns in terms of investment, consumption and export. For example, it seems like consumption and investment are both main drivers of its economic growth, however, Brazil and Russia are more likely to be consumption-driven economies. Another surprising finding was that net export, as a commonly recognized driven factor for economic growth, has a very low proportion in GDP components comparatively. Contribution rate of GDP components show the same pattern aforementioned.
4. Regarding to consumptions of BRICs, a common of their consumption structures is that the category of food and beverage takes up a large portion of their total consumption. An exception is brazil, where people spend most of their money in transportation. Besides, standard of consumption is negatively correlated with food and beverage spending, that is, higher consumption level indicates a lower food and beverage spending portion. The last but not least, components of consumptions structure are more diversified in urban area than in rural area.
5. In terms of export, China has a remarkable rise in the past 50 years and it plays a leading performance in trade among the BRICs. In addition, it has the highest number of trading partners, and the top-five countries with highest import volume from China are USA, Japan, Vietnam, Germany and India.