

Basic Info

The project title: Global population from 1960 to 2016

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The project repository is [here](#).

Background and Motivation

World population has changed over years in many respects such as "Age dependency ratio (% of working-age population)", "Age dependency ratio, young", "Fertility rate, total (births per woman)", "Life expectancy at birth, female (years)" and "Female population 00-04". There were also interesting changes in values of some attributes throughout years. For example, in the US "Age dependency ratio, young" changed from ~51% in 1960 to <29% in 2016, and "Fertility rate, total (births per woman)" dropped from ~3.6 to ~1.8. In China "Life expectancy at birth, female (years)" increased from ~45 in 1960 to ~78 in 2016. We are interested in visualizing all these changes across countries and years. We also would like to find out explanations (e.g. from economical and political points of view) for these changes if possible. Studying the potential explanation that causes these trends could help users predict the global population in the future and make plans that could meet the current or future needs of people according to different distribution of population.

Project Objectives

Data

The dataset was downloaded from a [Kaggle link](#).

Data Processing

No substantial data cleanup is expected. But there might be missing data. We plan to either interpolate data to fill up small holes in data or drop a small amount of lines with too many missing attribute values.

Visualization Design

All attributes we are interested in are options in a selection bar. For different attributes, we show data in a world map with each country colored accordingly. A color bar is displayed beside the world map. There is also a year chart in which users can select a specific year, and a year slide bar with which users can see transition throughout years.

Users can select one country by clicking it on the map. A line chart of year vs. the selected attribute for the selected country will show up next to the world map. Clicking another country will add another line to the line chart, and so on. This line chart shows comparison among selected countries. If users would like to show comparison in another attribute among the same countries, they can keep the selections of countries and select another attribute in the selection bar. By hovering over a line, a tooltip of more details will pop up. Lines of different countries have different colors. Users can remove the line charts they are not interested in any longer by simply clicking the Remove buttons beside those line charts.

To show multiple attributes in one graph, we use parallel coordinates. For a selected year (or a selected country), we plot countries (or years) and attributes as parallel coordinates. By this chart, we can observe correlation between attributes. Each coordinate can be sorted and be moved to be reordered. Use brush to select part of a coordinate and to highlight paths that go through the selected part of the coordinate.

We can also use table to show data for a selected year. The columns of the table are countries and attributes. The table can be sorted by each column. Countries from each continental can collapse to one group.

See the last 5 pages for sketches of the designs.

Must-Have Features

The world map for a selected year and attribute.

Line charts for comparison among countries.

The parallel coordinates for a selected year or country.

Brush, sorting and reordering of parallel coordinates.

Link the world map, the line charts and the parallel coordinates.

Optional Features

The table.

Project Schedule*

10/29 ~ 11/4 Create the world map with the current data. For missing data, either fill up the holes by interpolation or remove the rows or columns.

Map and the legend bar -- Yanyan

The selection bar and the slide bar -- Lin

Data processing -- Lin and Yanyan

11/5 ~ 11/11 Finish the world map and the line charts.

Link between the world map and line charts -- Lin

Line charts -- Yanyan

11/12 ~ 11/18 Finish the parallel coordinate chart.

Creating parallel coordinates and brush -- Yanyan

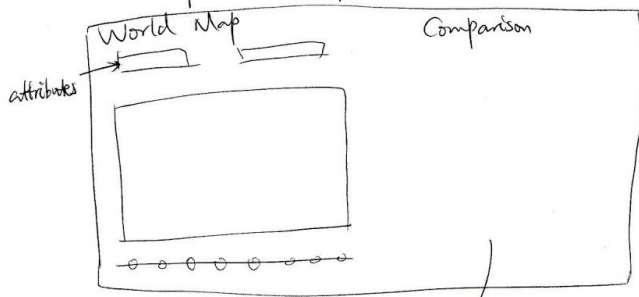
Sorting and reordering -- Lin

11/19 ~ 11/25 Link everything.

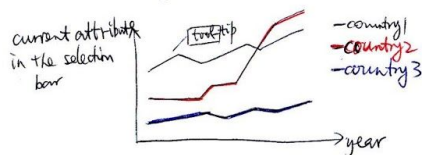
11/26 ~ 11/30 Fix possible bugs in the code. Refine the features. Take a break!

* Work distribution is subject to change.

World Map — Comparison



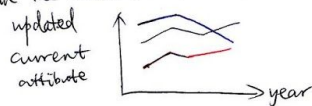
Selecting multiple countries by clicking them on the world map will trigger the comparison line chart generation.



By hovering over a line, a tool-tip will pop up.

The name of the country corresponding to this line is shown in the tool-tip, as well as the year and the attribute value at this point.

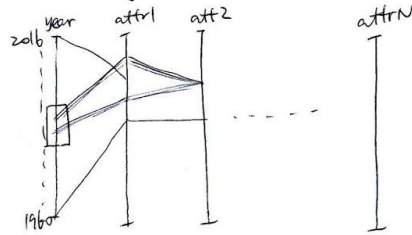
If we keep the selection of countries (highlighted) on the world map and change the attribute in the selection bar, another comparison chart will be added too.



But we don't want to accumulate too many line charts, we can click anywhere blank on the map to unselect countries, or remove the line charts in the comparison panel that we are not interested any more by clicking the **Remove** button beside each line chart.

Parallel coordinates

For a fixed country, we can see changes in attributes in different years. Any trend of changes can be observed easily.



Features:

- Brush. Can use brush to select a segment of one coordinate. The paths going through the selected segment will be highlighted. Similarly, if multiple segments of coordinates are selected, only paths going through all segments will be highlighted.
- Sorting. Each coordinate can be sorted in decreasing/increasing order.
- Reordering. Coordinates can be moved around to be reordered so that specific attributes users are interested in can be adjacent and their correlation can be visualized effectively.

Similarly, we can make parallel coordinates for a particular year one would like to study. In this case, we can simply replace the year coordinate in the above chart by the country coordinate.

Table

← can switch the group attribute in the first column between year and country.

YEAR ▴ ▾	Attr1 ▴ ▾	Attr2 ▴ ▾	Attr3 ▴ ▾	...
▲ 1960 ▾				
▲ 1961 ▾				
...				
1980				
country				
...				
1981				
...				
2016				

Features:

- sorting. Each column can be sorted
- Grouping/Ungrouping. By clicking ▾ on a year, all countries show up below this year and all attribute values in other columns are populated. Note that attribute values in the year row are median or mean values of those from all countries. By clicking ▲, the details of countries will disappear. Keep clicking ▲, 5 or 10 years can be grouped into one group and the aggregate values of attributes are populated.

Similarly, when the first column of the table is COUNTRY, we can group/ungroup years.
This table can be combined with line charts for comparing selected countries.