

1. Sketches of the visualization

1. World map with a color-coded heatmap representing the cost of living index for each country. Users can interact with the map by hovering over countries to reveal detailed information.
2. Time-series line chart displaying the evolution of living costs across different regions and countries over the years (2009-2023).
3. A bar chart ranking the top 10 most expensive and least expensive cities based on the overall cost of living index.
4. A set of small multiple bar charts illustrating the cost breakdown of different categories (rent, groceries, restaurant prices, local purchasing power) for selected cities or countries.
5. A scatter plot comparing the local purchasing power index with the cost of living index, revealing potential outliers and correlations.

2. Tools and related lectures

2.1 Tools

- (1) Website inspiration: Next.js, Remix
- (2) Programming software and packages: D3.js, Electron Fiddle, npm, React, Babel
- (3) Visualization inspiration: D3 gallery, [Happiness around the world](#)

2.2 Related lectures

- (1) Programming basics: 1.2 - Basic web development; 2/3 - Javascript par 1/2;
First and most important, we would refer to the basic HTML and CSS elements to construct our website structure and organize different visualization content. Besides the samples provided in the slides, we learn from the stunning viz websites as well, to obtain more related and applicable ideas.
- (2) Data import and pre-processing: 4.1 - Data; 4.2 - D3
We have scrapped the complete dataset from the Numero website in Milestone 1 (as CSV files). In this step, we need to learn how to import CSV files, then pre-process and filter the data we would like to show using JavaScript.
- (3) User interaction function design: 5.1 Interaction;
Furthermore, the more challenging goal is to design data filtering functions for users to explore the dataset by narrowing down the range of values or by searching the text of country/city. (e.g., Filtering and Brushing, faceted/navigational search, and linked views show both overview and details).
- (4) Map visualization: Map
We could apply the most common navigation function in our map visualization, which allows users to move around in the plane and zoom in/out. It's the natural way how we use Google Map every day and will provide a more smooth user experience.

3. Break down our goal

3.1 Core visualization (minimal viable product)

Our website is composed by three main core visualization ideas: bubble chart, map chart, and bump chart, to present the quality of living data from general to specific scope.

(1) *Bubble chart*

The purpose of this plot is to help users identify patterns and relationships between purchasing power and cost of living across different locations while also taking into account the population size. By analyzing this

plot, users can gain insights into which locations offer a better balance between purchasing power and cost of living, which may be useful for making decisions about relocation, investments, or policy changes.

- **X-axis (Local Purchasing Power Index):** This index represents the relative purchasing power of citizens in different locations. A higher value means the local population has more purchasing power, which may indicate higher salaries, a stronger economy, or a lower cost of living.
- **Y-axis (Different Cost of Living Indexes):** The user can select different types of cost of living indexes for the y-axis, such as Rent Index, Groceries Index, or Restaurant Price Index. These indexes represent the relative costs of various aspects of living in different locations. A higher value means a higher cost of living in that particular aspect.
- **Bubble size (Population):** The size of the bubbles represents the population of the locations being plotted. Larger bubbles indicate a larger population, while smaller bubbles indicate a smaller population.

(2) *Bump chart*

Tools used: the Nivo and React library, and Visual Studio Code as compiler IDE.

Goal: The bump chart is used to explore the changes in ranking over time. Since we have data from several hundreds of cities over more than ten years, it is difficult for users to understand the continuous fluctuation without such a chart. The difference between the area bump chart and a simple line plot is that it shows the ranking and the value of a data point at the same time. The thicker the flow is, the larger value it has compared to other cities.

Enhancements: Based on these preliminary results, we found the flows fluctuate dramatically in the first several years, which is probably due to limited investigated cities and collected user data in an early stage. Thus, we decided to visualize the data from 2014 (within ten years) in the following updated version, to decrease the effect of noise and misleading. Additionally, a filtering function should be applied to this chart to provide users with better flexibility while exploring the data.

3.2 Extra ideas (more creative or challenging): Map chart

Tools used: will use the GeoJson format on a with the template available a this address : [Bubble map template](#).

Sketch: ([source](#))

Goal: With this visualization we aim to highlight the differences between regions in the world according to, for example, the cost of oil.

We'll give the ability to switch between these values.

Radius of the bubble will scale according to the size of the value. Colors may be used to separate values according to some threshold like the median or the mean. Transparency will be necessary if the biggest bubbles hide some of their counterparts.

Enhancements: We could implement the ability for the user to move the cursor to a bubble to get the value associated with it. Statistics per region may be displayed to give more insight between regions and for cities inside a region.

