Visualization Basics

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What is Visualization? Why it is important?

"Visualization is the communication of information through graphical representations"

- A single image can contain a large amount of information and it can be interpreted faster than textual information
  - Image interpretation is performed in parallel on the perceptual system while text is sequential (reading)
  - Image also does not depend on the language

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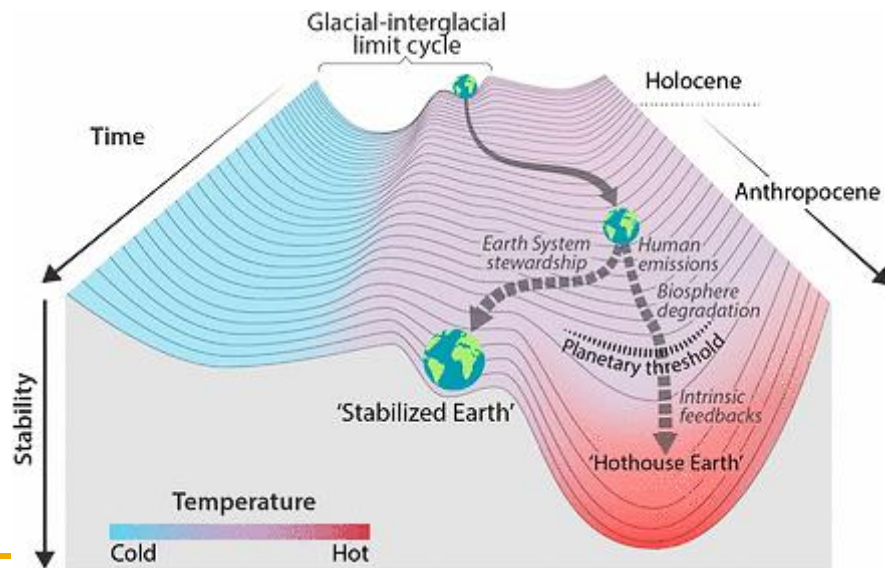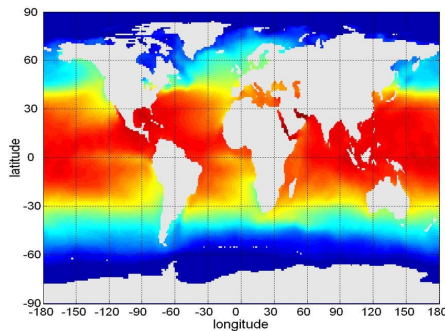## What is Visualization? Why it is important?
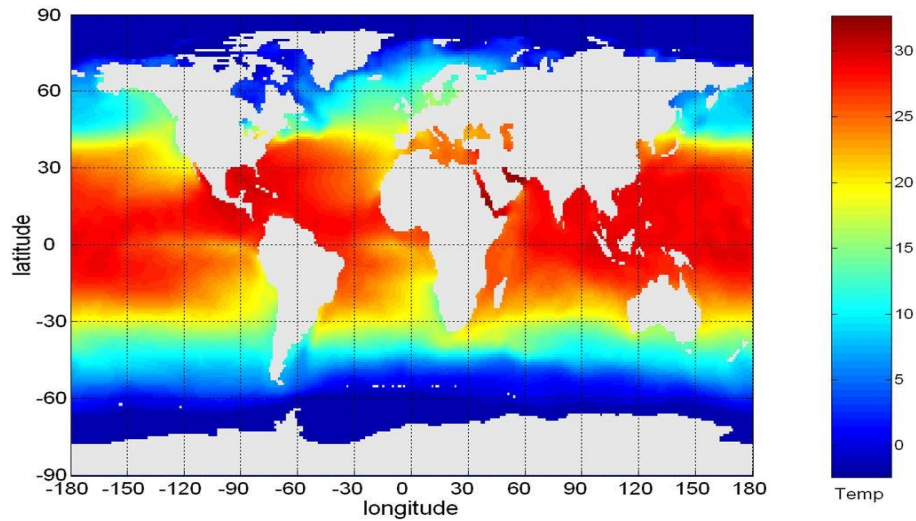
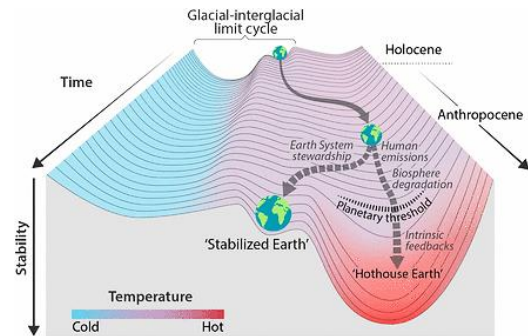15

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What is Visualization? Why it is important?

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What is Visualization? Why it is important?

Graph

Illustration

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User Roles

- A visualization can be used for different reasons

  - **Exploration**: user has some data and wants to verify certain specific properties

  - **Confirmation**: there is a hypothesis about something, and the user wants to confirm or refuse it

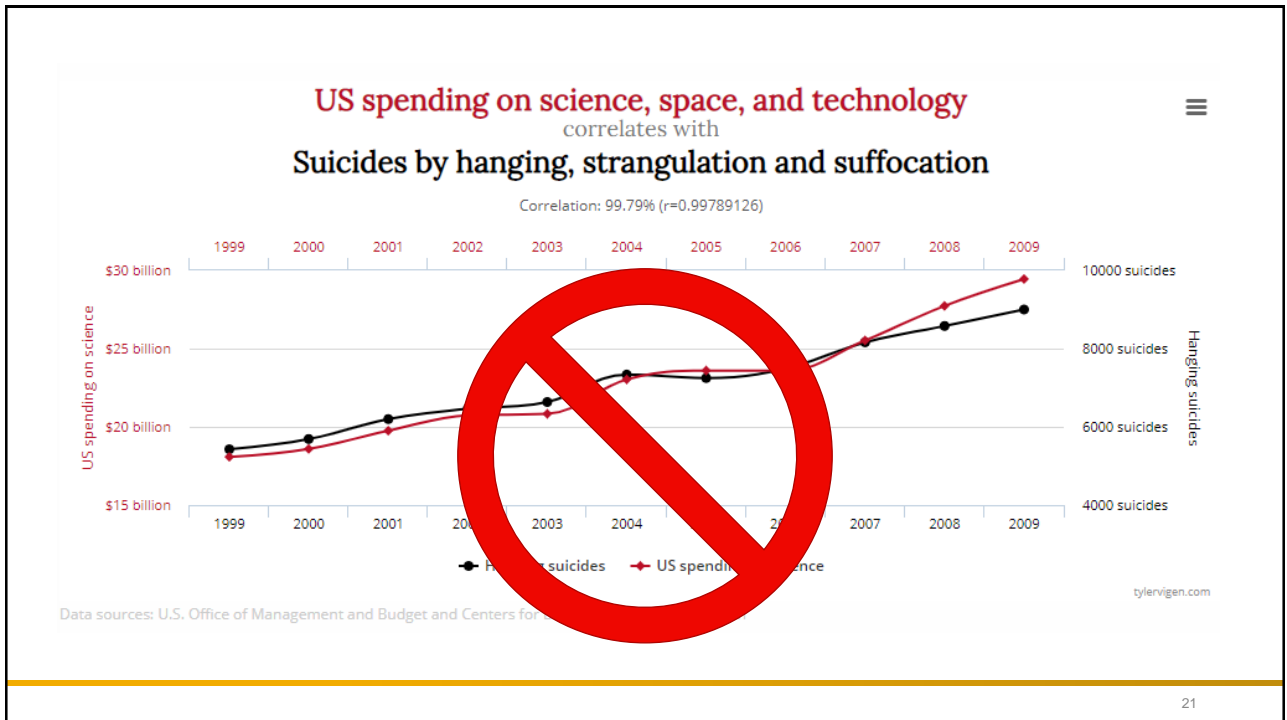 - **Presentation**: present concepts or facts/results to an audience

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But, be careful in what you are showing
to audiences!
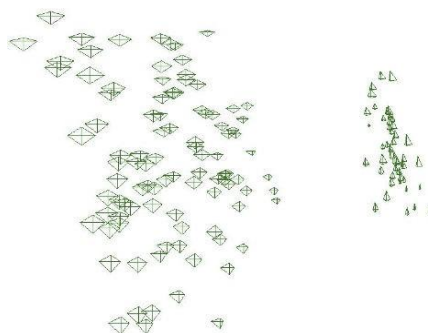
Do not transform
apparent correlation into causality!

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Graph Analysis

• When analyzing a graph
   • First, we detect groups of objects (pre-attentive)
   • Then we categorize such groups (cognitive)
   • Finally, we analyze special cases that were not grouped
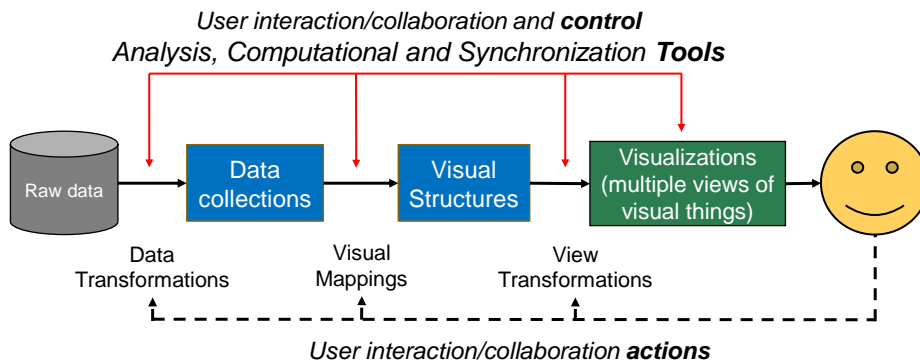

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Study Case (Scatterplots)

- Gapminder (https://www.gapminder.org/)
- Example video.

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Visualization Process

- The visualization process defines a mapping between data and graphical elements, which are then displayed into the screen
- Interaction is also an important aspect of the visualization process and can be part of a larger process (of "knowledge discovery")


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Data Processing and Transformation

- •The first step is to convert the data in some format that can be processed
  - • Handle missing values (e.g. interpolation)
  - • Identify wrong values
  - • Reduce the data size (sampling, filtering or aggregation)
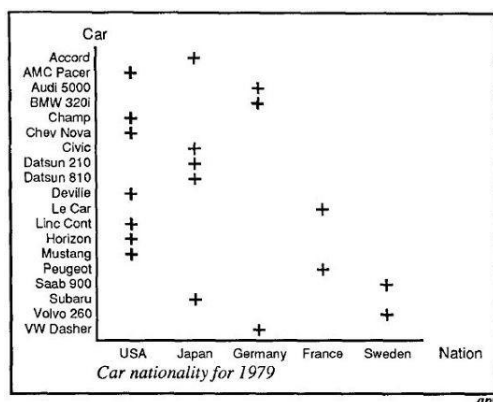 - • Data normalization

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Visual Mappings

- • Data elements are mapped to specific visual representations
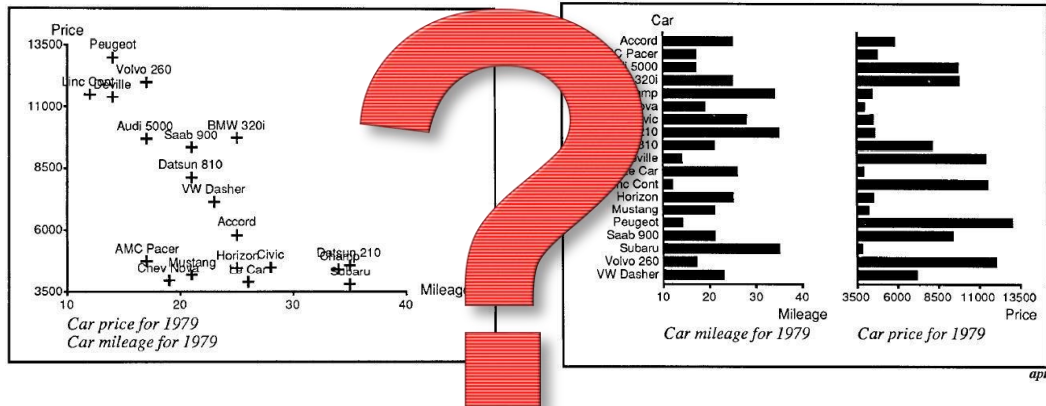 - • Geometry, color, texture, etc.
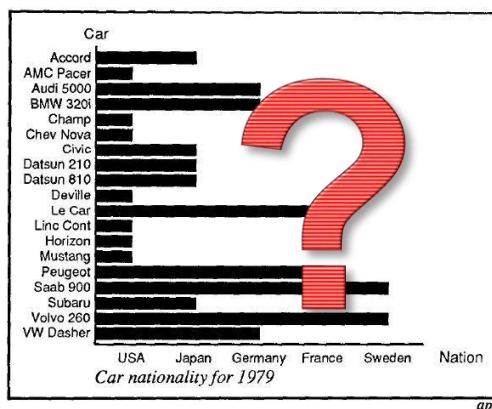
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Visual Mappings

• Different choices of mapping can affect the visualization effectiveness

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