MONASH University

MONASH
INFORMATION
TECHNOLOGY

FIT3179 Data Visualisation

Week 10: Interactive Data Visualisation

GROUP OF EIGHT AUSTRALIA

MONASH University

Lecture Overview

- Why add Interactivity in visualisation?
- Manipulation and change: Munzner textbook chapter 11

Readings

MONASH University

- Mandatory reading:
  - Textbook *Visualization Analysis and Design*: **Chapter 11: *Manipulate View***

- Optional readings:
  - Heer and Robertson, 2007, Animated Transitions in Statistical Data Graphics
  - Claessen and van Wijk, 2011, Flexible Linked Axes for Multivariate Data Visualization
  - Cordeil et al. 2017, ImAxes

Too much Data!

MONASH University

With big datasets, there is too much data to present easily

- Sometimes there is just too much data for the user to understand

Visualisation experts noted this and considered different ways to address the problem. *Ben Shneiderman (1996)* suggested that data should be visualised with:

"*Overview first, zoom and filter, then details-on-demand*"

This is Shneiderman's mantra. Read VAD, section 6.7.

Why add interactivity?

MONASH University

We add interactivity to make data easier to understand. We can also use interactivity to improve the *story* of the data.

- Generally we want to add interactivity because:
  - There is too much data to present easily: need to reduce the cognitive load of the user
  - To cater for extra dimensions in the data
  - To more easily facilitate macro/micro readings
  - To add extra meaning
    - Narrative for the user
    - Information discovery

Reducing Cognitive Load

MONASH University

- Cognitive load is when we have to process more than our brain can really handle (VAD 6.5.1)
  - Our long-term memory is very good and unlimited, but out working-memory (or short-term memory) is very limited.
  - Once the cognitive load is exceeded, the user loses ability in decision making and knowledge acquisition.
- Focus and context principles can help us to deal with this
  - Reducing the number of unique elements and allow the user to group items helps.
- Visualisations in general allow us to tap into visual thinking (VAD 6.5)
  - Munzner describes this as ‘eyes beat memory’
  - Change blindness (VAD 6.5.3)

Why add interactivity: *Extra dimensions*

MONASH University

- To cater for extra dimensions in the data
  - Sometimes there are too many dimensions to a data set to display nicely
  - For example, you may have values for things, but also have a time dimension
  - Interactivity may allow you to scroll through time to see changes

Why add interactivity: *Better Macro/Micro reading*

MONASH University

- To more easily facilitate macro/micro readings
  - Macro readings should always be evident
  - However micro readings may be difficult
  - Interactivity can allow exploration of data of the viewers interest
  - They can create their own secondary narratives and draw their own meanings

Why add interactivity: *Add extra meaning*

MONASH University

- To add extra meaning
  - Interactivity may also draw out extra meaning to data
  - It might allow data difficult to make meaning be more easily accessible
  - It may also juxtapose data in a different way
  - Moving things around on a visualisation for example may allow different comparison to happen

Interactive Visualisation Examples

MONASH University

- Google Maps
- http://www.gapminder.org/tools/
- http://caleydo.org/tools/lineup/
- http://usmigrationflowmapper.com
- http://www.poppyfield.org/
- http://co2.digitalcartography.org/
- http://britains-diet.labs.theodi.org
- http://www.nytimes.com/interactive/2014/06/05/upshot/how-the-recession-reshaped-the-economy-in-255-charts.html?_r=0&abt=0002&abg=0

Interactivity: *Change*

MONASH University

- What can be changed with interactivity?
- Can these changes be grouped?

Interactivity: *Select and navigate*

MONASH University

- How can a selection be
  - created?
  - manipulated?
  - visualised?
- What types of navigation exist?