Week 4: Facet

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JRNL 520M, Special Topics in Contemporary Journalism: Visualization for Journalists
Week 4: 6 October 2015

http://www.cs.ubc.ca/~tmm/courses/journ15
Now

• Finish up color theory + demos (30-45 min)
• break (15 min)
• Recreating News in Tableau (60+ min)
  – working through together in lab mode, not fast in demo mode
• Facet lecture, if there’s enough time
Lab/Assignment 4

• Work through Recreating News Visualizations in Tableau
• Create Drought Footprints yearly and monthly versions
• Fix two previous obstacles from previous labs (but not a duplicate of color for this week)
• submit next week
  – by 9am Tue, email tmm@cs.ubc.ca with subject JOURN Week 4
VAD Chap 11: Facet Into Multiple Views

- **Juxtapose**

  ![Juxtapose Diagram]

- **Partition**

  ![Partition Diagram]

- **Superimpose**

  ![Superimpose Diagram]
How?

Encode

Arrange
- Express
- Separate

Order
- Align

Use

Map from categorical and ordered attributes
- Color
  - Hue
  - Saturation
  - Luminance
- Size, Angle, Curvature, ...

Shape
-+
- ●
- □
- ▲

Motion
Direction, Rate, Frequency, ...

Manipulate
- Change
- Select
- Navigate

Facet
- Juxtapose
- Partition
- Superimpose

Reduce
- Filter
- Aggregate
- Embed

What?

Why?

How?
How to handle complexity: 3 more strategies

- **Manipulate**
  - Change
  - Select
  - Navigate

- **Facet**
  - Juxtapose
  - Partition
  - Superimpose

- **Reduce**
  - Filter
  - Aggregate
  - Embed

**Derive**

- change view over time
- facet across multiple views
- reduce items/attributes within single view
- derive new data to show within view
How to handle complexity: 3 more strategies

**Manipulate**

- **Change**

**Facet**

- **Juxtapose**

**Reduce**

- **Filter**

**Derive**

- **Embed**

- **Aggregate**

- **Partition**

- **Superimpose**

• change over time
  - most obvious & flexible of the 4 strategies

+ 1 previous
Idiom: **Animated transitions**

- smooth transition from one state to another
  - alternative to jump cuts
  - support for item tracking when amount of change is limited

- example: multilevel matrix views
  - scope of what is shown narrows down
    - middle block stretches to fill space, additional structure appears within
    - other blocks squish down to increasingly aggregated representations

How to handle complexity: 3 more strategies

- **Manipulate**
  - Change
  - Select
  - Navigate

- **Facet**
  - Juxtapose
  - Partition
  - Superimpose

- **Reduce**
  - Filter
  - Aggregate
  - Embed

- **Derive**

- facet data across multiple views
Facet

- **Juxtapose**

- **Partition**

- **Superimpose**

- **Coordinate Multiple Side By Side Views**
  - Share Encoding: Same/Different
  - Linked Highlighting
  - Share Data: All/Subset/None
  - Share Navigation
Idiom: **Linked highlighting**

- see how regions contiguous in one view are distributed within another
  - powerful and pervasive interaction idiom

- encoding: different
  - **multiform**

- data: all shared

Idiom: **bird’s-eye maps**

- **encoding**: same
- **data**: subset shared
- **navigation**: shared
  - bidirectional linking

**differences**
- viewpoint
- (size)

**overview-detail**

Idiom: **Small multiples**

- **encoding:** same
- **data:** none shared
  - different attributes for node colors
  - (same network layout)
- **navigation:** shared

[Systems: Cerebral]

## Coordinate views: Design choice interaction

<table>
<thead>
<tr>
<th>Encoding</th>
<th>Data</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>Subset</td>
<td>None</td>
</tr>
<tr>
<td>Same</td>
<td>Redundant</td>
<td>Overview/Detail</td>
<td>Small Multiples</td>
</tr>
<tr>
<td>Different</td>
<td>Multiform</td>
<td>Multiform, Overview/Detail</td>
<td>No Linkage</td>
</tr>
</tbody>
</table>

### why juxtapose views?

- **benefits: eyes vs memory**
  - lower cognitive load to move eyes between 2 views than remembering previous state with single changing view

- **costs: display area, 2 views side by side each have only half the area of one view**
Partition into views

• how to divide data between views
  – encodes association between items using spatial proximity
  – major implications for what patterns are visible
  – split according to attributes

• design choices
  – how many splits
    • all the way down: one mark per region?
    • stop earlier, for more complex structure within region?
  – order in which attribs used to split
  – how many views
Partitioning: List alignment

• single bar chart with grouped bars
  – split by state into regions
    • complex glyph within each region showing all ages
  – compare: easy within state, hard across ages

• small-multiple bar charts
  – split by age into regions
    • one chart per region
  – compare: easy within age, harder across states
Partitioning: Recursive subdivision

- split by neighborhood
- then by type
- then time
  - years as rows
  - months as columns
- color by price

- neighborhood patterns
  - where it’s expensive
  - where you pay much more for detached type

System: HIVE

Partitioning: Recursive subdivision

- switch order of splits
  - type then neighborhood

- switch color
  - by price variation

- type patterns
  - within specific type, which neighborhoods inconsistent

System: HIVE

Partitioning: Recursive subdivision

- different encoding for second-level regions
  - choropleth maps

System: HIVE

Superimpose layers

- **layer**: set of objects spread out over region
  - each set is visually distinguishable group
  - extent: whole view

- **design choices**
  - how many layers?
  - how are layers distinguished?
  - small static set or dynamic from many possible?
  - how partitioned?
    - heavyweight with attribs vs lightweight with selection

- **distinguishable layers**
  - encode with different, nonoverlapping channels
    - two layers achievable, three with careful design
Static visual layering

• foreground layer: roads
  – hue, size distinguishing main from minor
  – high luminance contrast from background

• background layer: regions
  – desaturated colors for water, parks, land areas

• user can selectively focus attention

• “get it right in black and white”
  – check luminance contrast with greyscale view

Superimposing limits

• few layers, but many lines
  – up to a few dozen
  – but not hundreds

• superimpose vs juxtapose: empirical study
  – superimposed for local visual, multiple for global
  – same screen space for all multiples, single superimposed
  – tasks
    • local: maximum, global: slope, discrimination

Dynamic visual layering

- interactive, from selection
  - lightweight: click
  - very lightweight: hover

- ex: 1-hop neighbors

Further reading

  – Chap 11: Facet Into Multiple Views