**Technique-driven: Dimensionality reduction**

- **Domain situation**
  - multi-target users using existing tools
  - observation: qualitative lab experiment (job-study)
  - theoretical analysis

- **Method mismatches**
  - idiom: how to draw
  - task: how to show it

- **Evaluation**
  - lab studies can't confirm task abstraction

**Dimensionality reduction for documents**

- **Task**
  - Derive low-dimensional target space from high-dimensional measured space

- **Methods**
  - Visual encoding/interaction idiom
  - Evaluation experiments: Dimensionality reduction

- **Threats to validity at each level**
  - **Performance benchmark**
    - traditional user study: many people for short time, few datasets
  - **Mechanisms**
    - impact on research...
Design study methodology: definitions

9-stage framework

Design study methodology: 32 pitfalls

Considerations

Theoretical foundations: Typologies

Curation & Presentation: Timelines

Table 1. Summary of the 32 design study pitfalls that we identified.

Design study methodology: definitions

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Design study methodology: 32 pitfalls

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Theoretical foundations: Typologies

Curation & Presentation: Timelines

Table 1. Summary of the 32 design study pitfalls that we identified.
The importance of being brisk

- sexy use case: eureka moment
  - success enables what was impossible before
    - vis tools for new insights & discoveries
- workhorse use case: workflow speedup
  - success vis tools accelerate your prior workflow
    - sometimes enables the previously infeasible

- TLC use cases
  - started with speedups use case, for presentation
    - make this slide into a timeline now!
  - two other use cases nudge towards exploration
    - comparison between multiple timelines
    - speculative browsing

How to handle complexity: 4 families of strategies

- Derive
  - Derive new data to show within view
  - Change view over time
  - Facet across multiple views
  - Reduce items/attributes within single view

- Merge
  - Change
  - Justuxtapose
  - Filter

- Navigate
  - Select
  - Partition
  - Aggregate

- Embed
  - Navigate
  - Superpose
  - Embed

Visualization entry points

- goals
  - exploratory data analysis
  - presentation
  - curation/authoring

- methods
  - algorithm development
  - system building & software development
  - lab studies with human subjects
  - field studies with human subjects

Presentation: Geometry Center math vis videos

Teaching

Visualization Analysis and Design

- book page
  - https://www.ubc.ca/~vmanulov/book
    - 20% promo code for book+ebook combo: HVN17
  - https://www.cengage.com/products/student/9781464138912
- free to read online within UBC
  - https://lib.ubc.ca/u/effective/1073808
- slide decks as many talk lengths (1, 2, 3, 6, 8+ hrs), some w/videos

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Visualization Teaching at UBC: Me

- Computer Science grad
  - N.G. all students in CS prep, non-programming project options available
  - tooling not taught (most use D3 or R)
- Computer Science grad
  - coming in January 2010, 4th year CS majors
  - tooling D3
- Data Science
  - tooling R
  - Journalism
  - tooling Tableau

- Ed Psych, Forestry, Geography, School Psychology
  - https://flp.ubc.ca/edep/vad/vis-ubc/visualization-courses
Visualization Teaching Across UBC
• many other visualization-focused courses
  – Ed Psych
  – Forestry
  – Geography
  – Global
  – Psychology
• initial list compiled
  https://dfp.ubc.ca/initiatives/viz-ubc/visualization-courses
  – please contact vizatubc-info@cs.ubc.ca with additions/corrections!
• still todo: compile list of courses with significant visualization content

Engaging with visualization teaching
• teach/take a visualization-focused course
• teach/take domain-oriented course where visualization plays a role
  – presentation
  – exploratory data analysis
• offer your domain problem as project topic
  – research or administrative data

Engaging: Possible Next Steps
Pathways to participate
• participate in IEEE VIS 2019 in Vancouver, Oct 20-25
  – http://ieeevis.org
  – big 3 research tracks: VA, InfoVis, SciVis
  – many associated events
  • Vis in Data Science
  • Vis In Practice
  • Large Data Analysis & Visualization
  • Application Spotlights
  • many workshops including bio, security, ...
  • job fair (asynchronous)

Visual Design Process In Depth: Dear Data
• inspiring celebration of data humanism
  • http://www.dear-data.com/by-week/
  • Giorgia Lupi and Stefanie Posavec

Visual Design Process In Depth: Data Sketches
• detailed process notes, from sketching through coding
  • Shirley Wu and Nadieh Brehmer
  • http://www.datasketch.es/

Visual Design Process In Depth: Dear Data
• inspiring celebration of data humanism
  • http://www.dear-data.com/by-week/
  • Giorgia Lupi and Stefanie Posavec

Redesign En Masse: Makeover Mondays
• easy entry point, Tableau focus
  • http://www.makeovermonday.co.uk/blog/

More Information
• this talk
  https://www.cs.ubc.ca/~tmm/talks.html#vizatubc19-entry
• papers, videos, software, talks, courses
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