InfoVis Group Research

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CPSC 344 Outro
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http://www.cs.ubc.ca/~tmm/talks.html#344-outro21
Visualization defined & motivated

• computer-based visualization systems
  – provide visual representations of datasets
  – designed to help people carry out tasks more effectively.

• suitable when
  – there is a need to augment human capabilities
  – rather than replace people with computational decision-making methods
Nested model: Four levels of visualization design

- **domain situation**
  - who are the target users?

- **abstraction**
  - translate from specifics of domain to vocabulary of vis
    - **what** is shown? *data* abstraction
    - **why** is the user looking at it? *task* abstraction

- **idiom**
  - **how** is it shown?
    - **visual encoding** idiom: how to draw
    - **interaction** idiom: how to manipulate

- **algorithm**
  - efficient computation


Why is validation difficult?

- different ways to get it wrong at each level

- Domain situation
  You misunderstood their needs

- Data/task abstraction
  You’re showing them the wrong thing

- Visual encoding/interaction idiom
  The way you show it doesn’t work

- Algorithm
  Your code is too slow

Evaluation: broadly interpreted

• methods from many fields, qualitative & quantitative
  – controlled experiments in lab, field studies of deployed systems

anthropology/ethnography

design

computer science

HCI/psychology

anthropology/ethnography

Domain situation
Observe target users using existing tools

Data/task abstraction

Visual encoding/interaction idiom
Justify design with respect to alternatives

Algorithm
Measure system time/memory
Analyze computational complexity

Analyze results qualitatively

Measure human time with lab experiment (lab study)

Observe target users after deployment (field study)

Measure adoption

problem-driven work

technique-driven work

classical foundations

evaluation

quant
qual
mixed
Problem-driven work

- design studies
  - in collaboration with target users
    - real data, real tasks
    - intensive requirements analysis
  - iterative refinement
    - deploy tools/systems
  - typical evaluation: field studies
    - pre-design & post-deployment, often qualitative
- opportunistic collaboration
  - many domains, industry & academia
Design studies: domains

• many domains
  – fisheries, in-car networks, journalism, ...

• genomics
  – Harvard Med School, BC Cancer, UBC Biodiversity, Agilent, ...

• log analysis
  – Google web search, AT&T web hosting, Mobify e-commerce
  – building & energy usage
Ocupado design study

Ocupado: Visualizing Location-Based Counts Over Time Across Buildings

Michael Oppermann
Tamara Munzner

https://youtu.be/KcwjVK8eUdw
Technique-driven work

• scalable algorithms & systems
  – typical evaluation: computational benchmarks

• new visual encoding & interaction techniques
  – typical evaluation: controlled experiments with people (quant)
  – typical evaluation: qualitative assessment

• areas
  – graph drawing, dimensionality reduction
  – human-in-the-loop curation/assessment of ML results
Grad course: CPSC 547

• teaching now, final presentations Wed Dec 10
  – 2-5:30pm, FSC 2330, you're invited!
  – topics https://www.cs.ubc.ca/~tmm/courses/547-21/projects.html
    • Hood Hunter:A House Hunter’s Guide to Narrowing Neighbourhoods
    • Drinking Behavior Patterns in Dairy Cattle
    • Multiscale Visualization of Pathogenic Structural Variants
    • A New City Map
    • What Can We Learn From User-Movie Ratings?
    • SoundMap:A Visualization Tool to Explore Multi-Attribute Sound Data
    • MultiModalTopicExplorer:Topic modeling for exploring multi-modal data from asynchronous online conversations
    • PartViz:Visualizing Graph Partitioners
    • Explorify:A Personalized Interactive Visualization Tool for Spotify Listening History
    • Necklace Maps for COVID-19 Visualization
    • Definitions and Aspects of Visualization Literacy: A Survey
    • Course Friction Explorer:Visualizing and Validating Indicators of Student Struggle
    • Visualizing Android Features Through Time
    • Visualizing the Run Time Execution of Command Patterns
Ugrad course: CSPC 436V

- new-ish, third offering is Jan 2022
  - previous offering
    https://www.students.cs.ubc.ca/~cs-436v/21Jan/

- 4th year majors course
  - theory: visualization foundations
  - tooling: D3.js
  - prereq: CPSC 310
  - HCI not required, but very helpful
  - just 5 spots left!
More info

• book (free through UBC library)
  http://www.cs.ubc.ca/~tmm/vadbook

• papers, videos, software, talks, courses
  http://www.cs.ubc.ca/group/infovis
  http://www.cs.ubc.ca/~tmm

www.cs.ubc.ca/~tmm/talks.html#344-outro21