InfoVis Group Research

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Technique-driven work
• scalable algorithms & systems
– typical evaluation: computational benchmarks
• new layout & interaction techniques
– typical evaluation: controlled experiments on human subjects

Evaluation: broadly interpreted
– methods from many fields, qualitative & quantitative
  – controlled experiments in lab, field studies of deployed systems

Domain situation
You misunderstood their needs
You’re showing them the wrong thing

Problem-driven work
• design studies
  – in collaboration with target users
  – real data, real tasks
  – intensive requirements analysis
  – iterative refinement
  – deploy toolkitsystems
  – typical evaluation: field studies

My strategy: opportunistic collaboration
– many domains
  – both industrial and academic partners

Evaluation experiments: Graph drawing
– typical evaluation: controlled experiments on human subjects

Technique-driven: Graph drawing
– scalable algorithms & systems
  – typical evaluation: computational benchmarks
  – new layout & interaction techniques
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Problem-driven: Genomics
– in collaboration with target users
– real data, real tasks
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– typical evaluation: field studies

Visualization (vis) defined & motivated
Computer-based visualization systems provide visual representations of datasets designed to help people carry out tasks more effectively.

Visualisation is 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

Problem-driven: Tech industry

Technique-driven: Dimensionality reduction

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Problem-driven: Genomics, journalism

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Problem-driven: Energy, sustainability

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Problem-driven: Genomics, journalism

Problem-driven: Energy, sustainability

Problem-driven: Autos, e-commerce

Problem-driven: Genomics

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Evaluation experiments: Dim. reduction

Michael Sedlmair
Melanie Tory

Points vs landscapes for dimensionally reduced data

Taxonomy of cluster separation factors

Guidance on DR & scatterplot choices

Evaluation in the field: Dim. reduction

Michael Sedlmair
Melanie Tory
Stephen Ingram
Matt Brehmer

DR in the Wild

Curation & Presentation: Timelines

Johanna Fulda
Melanie Tory
Stephen Ingram
Matt Brehmer

Timelines Revisited
timelinesrevisited.github.io/

Theoretical foundations

Michael Sedlmair
Miriah Meyer
Matt Brehmer

Visualization Analysis & Design

• book 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
• grad course: CPSC 547
  • teaching now
  • final presentations Tue Dec 15
    • 1-5pm FSC 2330A
  • you’re invited!
    http://www.cs.ubc.ca/~tmm/CPSC547/17/
• on sabbatical next year
• undergrad course planned for Sep 2019
  www.cs.ubc.ca/~tmm/talks.html#344-outro17