Lecture 16: Writing InfoVis Papers

Information Visualization
CPSC 533C, Fall 2007

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Overview

- Initial Stage: Paper Types
- Middle Pitfalls: Visual Encoding
- Late Pitfalls: Paper Strategy, Tactics, Results
- Final Pitfalls: Style and Submission
- Generality

InfoVis Validation Approaches

- algorithm complexity analysis
- implementation performance (speed, memory)
- quantitative metrics
- qualitative discussion of result pictures
- user anecdotes (insights found)
- user community size (adoption)
- informal usability study
- laboratory user study
- field study with target user population
- design justification from task analysis
- visual encoding justification from theoretical principles

Paper Types: Technique

- paper types as guide through validation choices
- technique/algorithm
  - most common: here's new algorithm to do X
  - do first, or do better
- validation
  - complexity, performance
  - quant metrics, qual discussion of pix

Paper Types: Design Study

- design study
  - justify visual encoding choices
    - what is mapping from domain problem to visual encoding
    - why does it solve problem
    - abstraction and justification is critical
  - not just apply technique X to domain Y
  - formative evaluation: ethnographic analysis, iterative design
- validation
  - anecdotes, adoption
  - design justification from task analysis
  - visual encoding justification from theoretical principles
  - secondary: user studies

Paper Types

- systems
  - design study for library/toolkit architectural choices
    - not for application-level visual encoding
  - lessons learned: why does anybody else care?
- summative evaluation / user studies
  - lab studies of abstracted tasks
  - field studies with target users
- model
  - taxonomies: aid to thinking, finding gaps
  - formalism: new models/definitions (ex: space-scale)
  - commentary: advocate (ex: fisheye followup)

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- Neither Fish Nor Fowl
  - hard to straddle boundaries
  - pick one primary contrib, vs. others as secondary

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- 2D Good, 3D Better
  - must justify when benefits 3D outweigh cost of occlusion
  - abstract visual encoding allows choice over mapping variables to spatial position

Middle Stage: Visual Encoding 2

- Color Cacophony
  - blatant disregard for basic color perception facts
  - huge areas of highly saturated color
  - color coding intended for regions too small for distinguishability
  - nominal color coding for too many (15+) categories
  - red/green with no luminance difference
  - encode 3 separate variables with RGB

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- Rainbows Just Like In The Sky
  - unjustified use of continuous rainbow colormap
  - hue does not have implicit perceptual ordering
  - standard rainbow colormap is perceptually nonlinear
  - for many nameable regions, quantize into segmented colormap

Later Stage

- after bulk of work done
- before begin writing draft

- strategy: paper-level structure
- tactics: section-level problems
- results: results section in specific

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- Bad Slice and Dice
  - two papers split up wrong
  - neither is standalone, yet both repeat

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Paper Writing: Contributions

- what are your research contributions?
  - what can we do that wasn't possible before?
  - how can we do something better than before?
  - what do we know that was unknown or unclear before?
- determines everything
  - from high-level message to which details
- often not obvious
  - diverged from original goals, in retrospect
- state them explicitly and clearly in introduction
  - don't hope that reviewer or reader will fill in for you
  - don't leave unsaid what should be obvious after close reading of previous work
    - pw very important - but many readers skip
  - goal is clarity, not overselling
    - do include limitations: often later, in discussion subsection

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- I Am Utterly Perfect
  - discussion of limitations makes paper stronger

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- Unjustified Tasks
  - user study tasks should be ecologically valid
  - convincing abstraction of real-world tasks of target users

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- Nonspecific Use Of Large
  - hundreds, 10K, 100K, millions, billions?

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- Resubmit Unchanged

Generality

- type: infovis
- encoding: color is general vis, others more infovis
- strategy: all research
- tactics: all research
- results: general vis
- style: all research, except
  - Story-Free Captions: general vis and graphics
  - My Picture Speaks For Itself: more infovis