Today
• Writing infovis papers: pitfalls to avoid
  – other research pitfalls and process
    • review reading, review writing, conference talks
    • final papers and final presentations
      – course paper vs research paper expectations
      – reproducible and replicable research
      – other course pitch: Rensink

Later pitfalls: Strategy
• What I Did Over My Summer Vacation
  – don’t focus on effort rather than contribution
  – don’t be too low level, it’s not a manual
• Least Publishable Unit
  – don’t aim too high beyond (your own) previous work
• Dense As Plutonium
  – don’t cram in so much content that can’t explain why/what/how
• Bad Slice and Dice
  – two papers split up wrong
  – neither is standalone, yet both repeat

Later pitfalls: Tactics
• Stealth Contributions
  – don’t leave them implicit, it’s your job to sell reader explicitly!
  – consider carefully, often different from original project goals
• Story-Free Captions
  – don’t use passive voice, leaves ambiguity about actor
  – must say why previous work doesn’t solve your problem
• Reproducible and Replicable Research
  – don’t leave unsaid should be obvious after close reading of previous work
  – don’t present tricks, do it

Later pitfalls: Results
• Unfinished By Time
  – choose level of detail for performance numbers
    • detailed graphs for technique papers, high-level for design & eval papers
• Gnarly Man Comparison
  – compare appropriately against state-of-the-art algorithms
    • head-to-head hardware is best (re-run benchmarks yourself, all on same machine)
• Tiny Toy Datasets
  – compare against state-of-the-art datasets sizes for technique (small ok for eval)
• But My Friends Liked It
  – asking labmates not convincing if target audience is domain experts
• Unjustified Tasks
  – use ecologically valid user study tasks; convincing abstraction of real-world use

Later pitfalls: Style
• Deadly Detail Dump
  – explain how only after what and why: provide high-level framing before low-level detail
• Story-Free Captions
  – don’t get fixated, try not to take it personally
• My Picture Speaks For Itself
  – explicitly walk them through images with discussion
• Grammar Is Optional
  – good low-level flow is necessary (but not sufficient), native speaker check good if ESL
• Mistakes Were Made
  – don’t use passive voice, leaves ambiguity about actor
  – your research contribution or done by others?

Final pitfalls: Style 2
• Jargon Attack
  – avoid where you can, defines on first use
  – all acronyms should be defined
• Nonspecific Use Of Large Numbers
• From High-Level Message to Which Details Worth Including
  – bonus points: new name for old technique

Final pitfalls: Submission
• Slimy Simultaneous Submission
  – often detected when same reviewer for both
  – instant dual submission, almost always detection via updated bib!
• Resubmit Unchanged
  – respond to previous reviews: often get reviewer overlap, irritated if ignored

Idiom pitfalls
• Unjustified Visual Encoding
  – should justify why visual encoding design choices appropriate for problem
• Unnecessary Clear Statement of Problem and Encoding
  – should characterize capabilities of new technique if proposed in paper
• Color Cacophony
  – avoid blatant disregard for basic color perception issues
  – huge areas of highly saturated color
  – categorical color coding for 15+ category levels
  – midrange without luminance differences
  – encoding 3 surpasses attributes with RGB
• Rainbows Just Like In The Sky
  – would have for ordered attribs, perceptual nonlinearity along rainbow gradient

Review reading pitfalls
• Reviewers Were Idiots
  – remember you’re only read the best of the best!
  – most new reviewers are overly harsh
• Reviewers Were Threatened By My Brilliance
  – seldom: unduly harsh since intimately familiar with area
• I Just Know Person X Wrote This Review
  – sometimes true, sometimes false
• You Didn’t Cite Me
  – stop and think whether it’s appropriate
  – be calm, not petulant
• You Didn’t Channel Me
  – don’t compare against paper you would have written
  – review the paper they submitted

Research Process & Pitfalls

Generalities
• encoding: visualization specific
• strategy: all research
• tactics: all research
• results: visualization specific
• style: all research, except
  – Story-Free Captions, My Picture Speaks For Itself

Contributions in research papers
• 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 bonus points: new name for old technique
• often not obvious
  – diverged from original goals, in retrospect
  – state them explicitly and clearly in the introduction
  – don’t hope reviewer or reader will fill them in for you
  – don’t leave unsaid should be obvious after close reading of previous work
  – goal is clarity, not overwhelming (limitations typically later; in discussion section)

Thoughts on writing infovis papers
• Embrace feedback
• +1 and +2 reviews are often stronger as feedback
• +2 papers split up wrong
• don’t get fixated, try not to take it personally
• don’t get fixated, try not to take it personally
• don’t leave unsaid should be obvious after close reading of previous work
• don’t like it
• don’t get fixated, try not to take it personally
• don’t leave unsaid should be obvious after close reading of previous work
• don’t ignore previous work

Review writing pitfalls
• Uncalibrated Dismay
  – remember you’ve only read the best of the best!
  – most new reviewers are overly harsh
• It’s Been Done, Full Stop
  – you must say why did it in which paper, full citation is best
• You Didn’t Cite Me
  – stop and think whether it’s appropriate
  – be calm, not petulant
• You Didn’t Channel Me
  – don’t compare against paper you would have written
  – review the paper they submitted
Conference talk pitfalls

- Results As Dessert
  - don’t save until the end as a reward for the stalwart!
  - showcase early to motivate
- A Thousand Words, No Pictures
  - aggressively replace words with illustrations
- Full Coverage Or Bust
  - cover all details from paper
  - communicate big picture
  - ...as advertising convince them it’s worth their time to read paper!

Paper writing process suggestions

- **pre-paper talk**
  - write and give talk first, as if presenting at conference
  - iterate on talk slides to get structure, ordering, arguments right
- **post-paper talk**
  - then use paper outline from pre-talk draft of slides
  - encourages concise explanation of critical ideas, creation of key diagrams
  - provides stepping stones to visualize as a whole
  - easier to cut slides than you praised it over
- **pre-paper/practice talk feedback session**
  - global comments, then slide by slide detailed discussion
  - nurture culture of internal critique (build your own critical group if necessary)
  - have non-authors read paper before submitting
  - internal review can catch many problems
  - ideally group feedback session as above

Course requirements vs research paper standards

- **Research novelty not required**
- **Mid-level discussion of implementation is required**
  - part of my judgement is about how much work you did
  - high-level what tools etc did you use
  - medium level what pre-existing features did you adapt
- **Design justification is required**
  - (unless analysis/survey project)
  - different in flavour between design study projects and technique projects
  - technique exploration alone is not enough
- **Publication-level validation not required**
  - user studies, extensive computational benchmarks, utility to target audience

Sample outlines: Study design I

- **Introduction**
  - give big picture, establish scope, some background material might be appropriate
  - related work
  - include both work aimed at similar problems and similar solutions
  - no requirement for research novelty, but still frame how your work relates to it
- **Conclusions**
  - summarize what you’ve done
  - different than abstract since reader has seen all the details
- **Bibliography**
  - make sure to use real references for work that’s been published academically
  - much shorter than the corresponding one for design studies, framing correct not core facts
- **Solutions**
  - describing proposed ideas exactly, not justifying use for particular domain problem
  - as above, analyze in terms of design choices, justify why appropriate or alternatives
  - implementation (same as above)
- **Results**
  - two phases or scenarios with particular target users
  - more emphasis on characterizing the breadth of possible uses
  - cell definitely include screenshots of the system in action
  - Discussion / Future Work, Conclusions, Bibliography (same as above)

Sample outlines: Study design II

- **Data and task abstractions**
  - analyze your domain problem according to book framework (what/why)
  - include both domain-language descriptions and abstract versions
  - could split into data vs task, then domain vs abstract - or vice versa!
  - sketch out data first then task, so that can refer to data abstr within task abstr
- **Solutions**
  - describe your solution idiom (visual encoding and interaction)
  - analyze it according to book framework (how)
  - justify your design choices with respect to alternatives
  - if significant algorithm work, discuss algorithm and data structures

Sample outlines: Design study IV

- **Conclusions**
  - summarize what you’ve done
  - different than abstract since reader has seen all the details
- **Bibliography**
  - make sure to use real references for work that’s been published academically
  - much shorter than the corresponding one for design studies, framing correct not core facts
- **Solutions**
  - describing proposed ideas exactly, not justifying use for particular domain problem
  - as above, analyze in terms of design choices, justify why appropriate or alternatives
  - implementation (same as above)
- **Results**
  - two phases or scenarios with particular target users
  - more emphasis on characterizing the breadth of possible uses
  - cell definitely include screenshots of the system in action
  - Discussion / Future Work, Conclusions, Bibliography (same as above)

Sample outlines: Survey (diffs)

- **Abstract**
  - Introduction (same as above)
- **Related Work**
  - base on previous surveys, some discussion of similar problems (same table/diabonde)
- **Data and Task Abstractions**
  - as above, analyze in terms of design choices, justify why appropriate or alternatives
  - implementation (same as above)
- **Results**
  - two phases or scenarios with particular target users
  - more emphasis on characterizing the breadth of possible uses
  - cell definitely include screenshots of the system in action
  - Discussion / Future Work, Conclusions, Bibliography (same as above)

Sample outlines: Other types

- see page for implementation & analysis project types
- implementation: analysis

Paper marking

- required: at least material I’ve listed
  - implementation: more raw material, you may choose alternate orderings
- probable marking scheme (may change!)
  - design study & technique: 12.5% each for
    - intro, related work, abstractions, solution, implementation, results, discussion, style
    - style: 10% max, 2.5% bibliogaphy
  - survey intro: (10%), network: (10%), main: (60%), style (20%)
  - analysis: intro/diagram (8%), abstr: (8%), network: (8%), analysis (52%), methods/tools (42%), discussion (8%), style (8%)
  - reminder: project content is 60% of entire project mark
  - report is 25%, presentation is 15%

Code / Video

- required: submit your code
  - so I can see what you’ve done, but I will not post
  - include README file at root with brief roadmap/overview of organization
  - which parts any code is library: includes
  - how to compile and run
  - I do not necessarily expect your code compile on my machine
- encouraged but not required
  - submit live demo LUL
  - open-source your code (if so, fine to just send me that URL)
  - submit supporting video
  - web or without webserver
  - nice to have if you have your code on github, bitbucket, etc
  - can be same or different from what you show in final presentation

Showcase image

- new this year: showcase image for projects page
  - 100x100 image
  - call it showcase.png or showcase.jpg
Why bother with reproducibility
• moral high ground
  – for Science!
• enlightened self-interest
  – make your own life easier
  – you’ll be cited more often as academics
  – your work is more likely to be used by industry

Reproducibility: Levels to consider
• paper
  – post it online
  – make sure it stays accessible when you move on to new place
• algorithm
  – well documented in paper itself
  – document further with supplemental materials
• code
  – make available as open source
  – pick right spot on continuum of effort involved
  – just put it up online and wait
  – build a whole community

Reproducible research
• 5: 15 minutes with proprietary tools
• 4: 15 minutes with proprietary tools
• 3: considerable effort
• 2: 15 minutes with free tools
• 1: cannot seem to be reproduced
• 0: cannot be reproduced

View from industry
• Increasing the Impact of Visualization Research panel,ViS 2017
  – Krist Weng encompass, Data Visualization Scientists, Twitter

Terrain of blog critiques
• meta methods: for methodological critique
  – Uri Simonsohn post Mench’splaining: Three...Leading me to pick my tone with suitable care
  – I did not reach out, but now I think it would be wise indeed

Replication: crisis in psychology, medicine, etc
• early rumblings left me with (ignorable) qualms
  – papers: Is most published research false?
  – Storks Deliver Babies (p= 0.008), The Earth is spherical (p < 0.05), False-Positive Psychology
  – lead me to pick my tone with suitable care
  – I did not reach out, but now I think it would be wise indeed

Replication: crisis in psychology, medicine, etc
• Replication: crisis in psychology, medicine, etc
  – early rumblings left me with (ignorable) qualms
  – many willing to repudiate (their own) earlier styles of working

Why bother with reproducibility
• moral high ground
  – for Science!
• enlightened self-interest
  – make your own life easier
  – you’ll be cited more often as academics
  – your work is more likely to be used by industry

Reproducibility: Levels to consider
• paper
  – post it online
  – make sure it stays accessible when you move on to new place
• algorithm
  – well documented in paper itself
  – document further with supplemental materials
• code
  – make available as open source
  – pick right spot on continuum of effort involved
  – just put it up online and wait
  – build a whole community
Visualization course in Psych
• Ron Rensink course
  Special Topics in Perception: Visual Display Design
• http://www2.psych.ubc.ca/~rensink/courses/psych579/