Guest Lectures: Bettina Speckmann, Cartography & Flow; Yang Wang, Architectures for Scale. Example Present: Biomechanical Motion; Proposals Expectations

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CPSC 547, Information Visualization
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http://www.cs.ubc.ca/~tmm/courses/547-19

News

- presentation days assigned
  - both times and papers; still need topics from two of you!
- today
  - guest lecture: Bettina Speckmann
    - Necklaces and Flows: Algorithms for Automated Cartography
  - guest lecture: Yang Wang
    - Architecting Visualizations at Scale
  - *break*
  - example presentation
  - proposals expectations
- next time:
  - topo fisheye views paper, chapters: reduce, embed, case studies

Example Presentation: Biomechanical Motion

Presentation expectations

- 20 minute time slots for presentations
  - aim for 18 min presenting and 2 min discussion
- slides required
  - if you're using my laptop, upload to Canvas by 12pm
  - if you're using your own, upload by 6pm (right after class)
- three goals: up to you whether sequential or interleaved
  - explain core technical content to audience
  - analyze with doing what/why/how framework
    - do scale analysis of data for this system in specific, not for technique in general
  - critique strengths/weaknesses of technical paper
- marking criteria
  - Summary 40%, Analysis 15%, Critique 15%
  - Presentation Style 15%, Materials Preparation 15%

Analysis & critique

- paper type dependent
  - required for design studies and technique papers
  - some possible for algorithm papers
    - but more emphasis on presenting algorithm clearly
  - minimal for evaluation papers
    - but can discuss study design and statistical analysis methods
- please distinguish: their analysis (future work, limitations) from your own thoughts/critiques
  - good to present both

Beyond paper itself

- check for author paper page
  - may have video
  - may have talk slides you could borrow as a base
    - do acknowledge if so!
  - may have demo or supplemental material
  - include paper page URL in slides if it exists
- if using video, consider when it's most useful to show
  - at very start for overview of everything
  - after you've explained some of background
  - after you've walked us through most of interface, to show interaction in specific

Slides

- do include both text and images
  - also must have slide numbers
- text
  - font must be readable from back of room
    - 24 point as absolute minimum
    - use different type sizes to help guide eye, with larger title font
    - avoid micro text with macro whitespace
  - bullet style not sentences
    - sub-bullets for secondary points
    - Compare what it feels like to read an entire long sentence on a slide; while complex structure is a good thing to have for flow in writing, it's more difficult to parse in the context of a slide where the speaker is speaking over it.
- legibility
  - remember luminance contrast requirements with colors!

Slide images

- figures from paper
  - good idea to use figures from paper, especially screenshots
    - judgement call about some/many/all
- new images
  - you might make new diagrams
  - you might grab other images, especially for background or if comparing to prev work
  - avoid random clip art
- images alone often hard to follow
  - images do not speak for themselves, you must walk us through them
    - text bullets to walk us through your highest-level points
      - hard to follow if they're only made verbally
    - judgement call on text/image ratio, avoid extremes

Style

- face audience, not screen
  - pro tip: your screen left/right matches audience left/right in this configuration
- project voice so we can hear you
  - avoid muttered comments to self, volume drop-off at end of slide
  - avoid robot monotone, variable emphasis helps keep us engaged
- avoid reading exactly what the slide says
  - judgement call: how much detail to have in presenter notes
- use laser pointer judiciously
  - avoid constant distracting jiggle
- practice, practice, practice
  - for flow of words and for timing
- question handling: difficult to practice beforehand…

Technical talks advice

- How To Give An Academic Talk
  - Paul N. Edwards
- How To Give a Great Research Talk
  - Simon L Peyton Jones, John Hughes, and John Launchbury
- How To Present A Paper
  - Leslie Lamport
- Things I Hope Not To See or Hear at SIGGRAPH
  - Jim Blinn
- Scientific Presentation Planning
  - Jason Harrison

Interactive Coordinated Multiple-View Visualization of Biomechanical Motion Data

Daniel F. Keefe, Marcus Ewert, William Ribarsky, Remco Chang. IEEE Trans. Visualization and Computer Graphics (Proc. Vis 2009), 15(6):1383-1390, 2009.

http://ivlab.cs.umn.edu/generated/pub-Keefe-2009-MultiViewVis.php

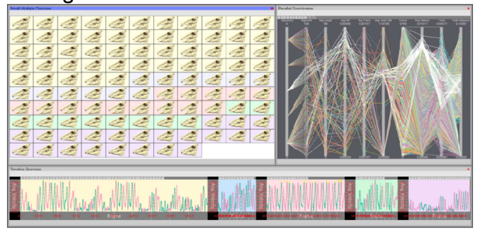
Biomechanical motion design study

- large DB of 3D motion data
  - pigs chewing: high-speed motion at joints, 500 FPS w/ sub-mm accuracy
- domain tasks
  - functional morphology: relationship between 3D shape of bones and their function
  - what is a typical chewing motion?
  - how does chewing change over time based on amount/type of food in mouth?
- abstract tasks
  - trends & anomalies across collection of time-varying spatial data
  - understanding complex spatial relationships
- pioneering design study integrating infovis+scivis techniques
- let's start with video showing system in action

https://youtu.be/OUNezRNtE9M

Multiple linked spatial & non-spatial views

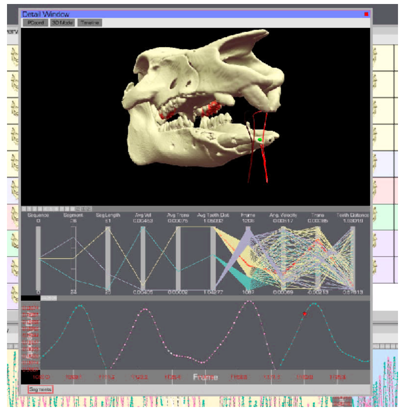
- data: 3D spatial, multiple attribs (cyclic)
- encode: 3D spatial, parallel coords, 2D line (xy) plots
- facet: few large multiform views, many small multiples (~100)
  - encode: color by trial for window background
  - view coordination: line in parcoord == frame in small mult



[Fig 1. Interactive Coordinated Multiple-View Visualization of Biomechanical Motion Data. Daniel F. Keefe, Marcus Ewert, William Ribarsky, Remco Chang. IEEE Trans. Visualization and Computer Graphics (Proc. Vis 2009), 15(6):1383-1390, 2009.]

3D+2D

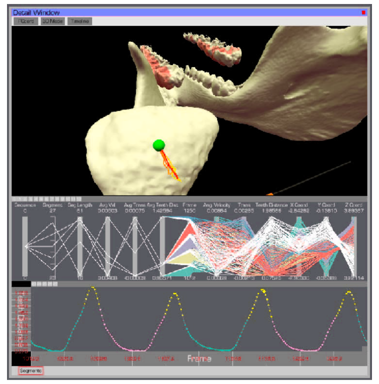
- change
  - 3D navigation
    - rotate/translate/zoom
- filter
  - zoom to small subset of time
- facet
  - select for one large detail view
  - linked highlighting
  - linked navigation
    - between all views
    - driven by large detail view



[Fig 3. Interactive Coordinated Multiple-View Visualization of Biomechanical Motion Data. Daniel F. Keefe, Marcus Ewert, William Ribarsky, Remco Chang. IEEE Trans. Visualization and Computer Graphics (Proc. Vis 2009), 15(6):1383-1390, 2009.]

Derived data: traces/streamers

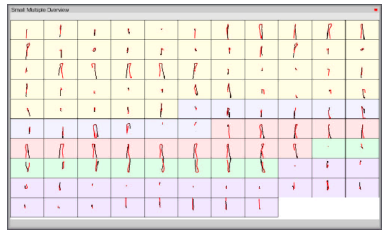
- derived data: 3D motion tracers from interactively chosen spots
  - generates x/y/z data over time
    - streamers
  - shown in 3D views directly
  - populates 2D plots



[Fig 4. Interactive Coordinated Multiple-View Visualization of Biomechanical Motion Data. Daniel F. Keefe, Marcus Ewert, William Ribarsky, Remco Chang. IEEE Trans. Visualization and Computer Graphics (Proc. Vis 2009), 15(6):1383-1390, 2009.]

Small multiples for overview

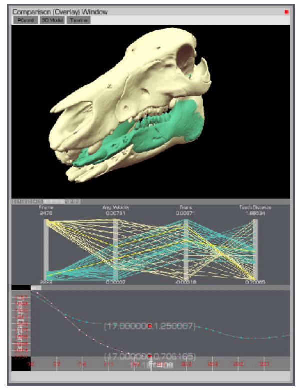
- facet: small multiples for overview
  - aggressive/ambitious, 100+ views
- encode: color code window bg by trial
- filter:
  - full/partial skull
  - streamers
    - simple enough to be useable at low information density



[Fig 2. Interactive Coordinated Multiple-View Visualization of Biomechanical Motion Data. Daniel F. Keefe, Marcus Ewert, William Ribarsky, Remco Chang. IEEE Trans. Visualization and Computer Graphics (Proc. Vis 2009), 15(6):1383-1390, 2009.]

Derived data: surface interactions

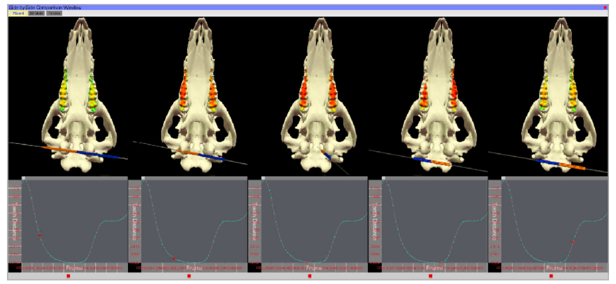
- derived data
  - 3D surface interaction patterns
- facet
  - superimposed overlays in 3D view
- encoding
  - color coding



[Fig 5. Interactive Coordinated Multiple-View Visualization of Biomechanical Motion Data. Daniel F. Keefe, Marcus Ewert, William Ribarsky, Remco Chang. IEEE Trans. Visualization and Computer Graphics (Proc. Vis 2009), 15(6):1383-1390, 2009.]

Side by side views demonstrating tooth slide

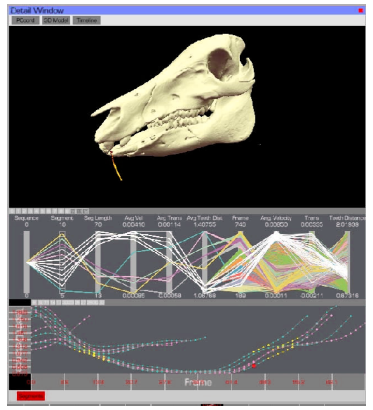
- facet: linked navigation w/ same 3D viewpoint for all
- encode: coloured by vertical distance separating teeth (derived surface interactions)
  - also 3D instantaneous helical axis showing motion of mandible relative to skull



[Fig 6. Interactive Coordinated Multiple-View Visualization of Biomechanical Motion Data. Daniel F. Keefe, Marcus Ewert, William Ribarsky, Remco Chang. IEEE Trans. Visualization and Computer Graphics (Proc. Vis 2009), 15(6):1383-1390, 2009.]

Cluster detection

- identify clusters of motion cycles
  - from combo: 2D xy plots & parcoords
  - show motion itself in 3D view
- facet: superimposed layers
  - foreground/background layers in parcoord view itself



[Fig 7. Interactive Coordinated Multiple-View Visualization of Biomechanical Motion Data. Daniel F. Keefe, Marcus Ewert, William Ribarsky, Remco Chang. IEEE Trans. Visualization and Computer Graphics (Proc. Vis 2009), 15(6):1383-1390, 2009.]

Analysis summary

- what: data
  - 3D spatial, multiple attribs (cyclic)
- what: derived
  - 3D motion traces
  - 3D surface interaction patterns
- how: encode
  - 3D spatial, parallel coords, 2D plots
  - color views by trial, surfaces by interaction patterns
- how: change
  - 3D navigation
- how: facet
  - few large multiform views
  - many small multiples (~100)
  - linked highlighting
  - linked navigation
  - layering
- how: reduce
  - filtering

[Interactive Coordinated Multiple-View Visualization of Biomechanical Motion Data. Daniel F. Keefe, Marcus Ewert, William Ribarsky, Remco Chang. IEEE Trans. Visualization and Computer Graphics (Proc. Vis 2009), 15(6):1383-1390, 2009.]

Critique

- many strengths
  - carefully designed with well justified design choices
  - explicitly followed mantra "overview first, zoom and filter, then details-on-demand"
  - sophisticated view coordination
  - tradeoff between strengths of small multiples and overlays, use both
    - informed by difficulties of animation for trend analysis
    - derived data tracing paths
- weaknesses/limitations
  - (older paper feels less novel, but must consider context of what was new)
  - scale analysis: collection size of <=100, not thousands (understandably)
  - aggressive about multiple views, arguably pushing limits of understandability

Proposals Expectations

Meetings

- each group needs signoff: at least one meeting
  - in some cases followup meeting needed; in some cases you're already set
- meetings cutoff is 6pm Fri Nov 1

Projects overall schedule

- Pitches: Tue Oct 8 in class
- Groups finalized: Fri Oct 25 5pm
- Meetings cutoff: Fri Nov 1 at 6pm
- Proposals due: Mon Nov 4 at 10pm
  - (no readings due Tue Nov 5)
- Peer Project Reviews 1: Tue Nov 19 in class
- Peer Project Reviews 2: Tue Dec 4 in class
- Final presentations: Tue Dec 10 1-5pm
- Final papers due: Fri Dec 13 at 11:59pm

Proposals

- projects: written proposals due Mon Nov 4 10pm
  - (no readings or comments due Tue Nov 5)
- heading
  - project title (real title, not just "CPSC 547 proposal" - can change later)
  - name & email of every person on team (do not include student numbers)
- intro: brief description of what you're proposing to do, at high level
  - include personal expertise in this area (for each group member)
- for design studies: domain, data, task
  - definitely in domain terms
  - get started on abstraction (even if preliminary)
    - do discuss scale of data: # items, # levels in each categorical attrib, range of ordered attribs
- for technique projects: explain proposed context of use

Proposals II

- proposed infovis solution (what you know so far)
  - do include illustration of what interface might look like, could be hand drawn sketch or mockup made with drawing program
  - do include scenario of use (how user would use solution to address task)
- implementation plan (high-level: platform, language, libraries)
  - clarify your scope/goal: building on work of others to enable more ambitious project, vs rolling your own to learn tool. amount of work depends on your existing expertise
- milestones
  - break into meaningful smaller pieces. specific to your project, in addition to generic
  - for each, estimate target date of completion *and* hours of work
  - be explicit about who will do what: work breakdown between group members
  - time scope: 70 hrs per person across whole project
  - very typical to structure as possibilities: after A&B, decide on C and do 2 of D-G

Proposals III

- http://www.cs.ubc.ca/~tmm/courses/547-17F/projectdesc.html#proposals
- also, consult final report structure to have future goal in mind http://www.cs.ubc.ca/~tmm/courses/547-17F/projectdesc.html#final

Next time

- deadlines
  - meetings due by Fri Nov 1, 6pm
    - several of the projects are not yet signed off, slots filling up fast
  - proposals due by Mon Nov 4, 10pm
- next week
  - presentations 1
  - finishing up discussions from today's reading