Information Visualization

Intro, *Time Series Exercise*

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http://www.cs.ubc.ca/~tmn/courses/547-21
Welcome!
Intros

• async: Piazza self-intro thread

• sync: also sign up on spreadsheet so I see who’s here vs who’s registered
  – will use that for breakouts today also
  – if you have privacy concerns, ok to leave off email (and/or last name) and send it to me directly
  – link on course page

http://www.cs.ubc.ca/~tmm/courses/547-21
Course Logistics
Finding info; finding me

• course page is font of all information
  – don’t forget to refresh, frequent updates
  – http://www.cs.ubc.ca/~tmm/courses/547-21

• email is the best way to reach me: tmm@cs.ubc.ca

• office hours Wed right after class (6:15-7:15pm)
  – or by appointment (in-person or zoom)
  – unlikely to catch me by dropping by, usually either in meeting or elsewhere
  – X661 (X-Wing of ICICS/CS bldg)
Audience

• no formal prerequisites
  – many areas helpful but not required
    • human-computer interaction (HCI), eg CPSC 544 this term or equivalent
    • computer graphics, cognitive psychology, machine learning, statistics, algorithms, <application domain>...
  – programming skills required for most project types

• open to non-CS people
  – if no programming background, can do analysis or survey project

• communication skills in English important for success
  – substantial reading, writing, discussion, presentations

• need strength in at least one of these 3: programming, English, HCI
  – unsuccessful combination: weak ESL, weak programming, no HCI background

• open to informal auditors
  – some or all days of readings/discussion/exercises, you’ll get out of it what you put into it...
Schedule, big picture

• once/week, 3-6pm Wednesdays, 12 sessions
  – with short break roughly halfway through
• Sep 10, first class: today!
• Oct 27, no class: annual VIS conference. attend some of it virtually!
• Dec 15, final presentations: afternoon, exact time TBD (2-6pm?)
• Dec 17, final reports due (8pm)
Marking

• 50% Project
  – 25% Intermediate Milestones (pass/fail)
    – so you'll get feedback along the way
    – formative not summative, goal to help you make projects the best they can be!
  – 15% Final Presentation
  – 25% Final Report
  – 60% Content

• 36% Asynchronous Readings & Online Discussion
  – 9 weeks, 4% per week. 75% Comments on Readings, 25% Responses to Others

• 14% In-Class Participation
  – 12% In-Class Exercise Participation (12 sessions, 1% per session)
  – 2% Final Presentations Participation

• marking by buckets
  – great 100%
  – good 89%
  – ok 78%
  – poor 67%
  – zero 0%
Fundamental material

• first part: read & participate [50%]
  – before class: async discussion [36%]
    • you do readings (3/week, mix of chapters & papers)
    • you submit comments before class (by Mon noon)
    • you respond to at least one comment from classmates (by Wed noon)
  – during class [14%]
    • some lecture & discussion
    • frequent in-class work/exercises/critique
Readings

• textbook
    • http://www.cs.ubc.ca/~tmm/vadbook/
    – library has multiple free ebook copies
    – to buy yourself, cheapest is amazon.com
      • hardcover bundled with ebook

• papers
  – links posted on course page
  – if DL links, use library EZproxy from off campus

• 3 each session: mix of chapters & papers
Comments submission & marking

• written comments on reading in advance, in two rounds
• round 1 due noon Mon (2 days before class), 75% of comment mark
  – 1 for each reading
  – post to Piazza
• round 2 due noon Wed (3 hrs before class), 25% of comment mark
  – written response to at least 1 comment per session/week
• start as pass/fail marking, see how it goes
  – switch to explicit marking if quality concerns
Comments content

• comments or questions
• fine to be less formal than written report
  – correct grammar and spelling still expected
  – be concise: one paragraph is good
• should be thoughtful, show you’ve read and reflected
  – poor to ask something trivial to look up
  – ok to ask for clarification of genuinely confusing section
  – good to show that you’re thinking carefully about what you read
  – great to point out something that I haven’t seen before
• examples on http://www.cs.ubc.ca/~tmm/courses/547-21/structure.html
Participation

• in-class group/individual exercises
• workshopping/critique for projects
• crucial part of course, attendance expected
  – tell me in advance if you’ll miss class (and why)
    • unless ill or emergency
  – written comments credit still possible if submitted in advance for async

• if you cannot attend class (illness, quarantine, other)
  – UBC policy is to self-declare illness (no need for doctor note)
  – you can work through in-class exercises solo
    – inform me by private post on Piazza when done
Pandemic mode

• UBC mask requirement for indoor public spaces

  – if you need to declare a medical exemption, paperwork is centralized through Centre For Accessibility

  – please don't eat; if you drink, remask between sips

  – we follow guidance from PHO which could change over the term
Projects [50%]

• groups of 2, 3, or 4
  – amount of work commensurate with group size
  – permission for solo project granted in exceptional circumstances, by petition

• stages
  – milestones along the way, mix of written & in-class
    • new last few years: formative feedback only
    • pitches (data/task), proposals, peer project reviews
  – final versions
    • final presentations (oral): Wed Dec 15, afternoon (2-6?)
      – whole dept invited, refreshments served. live talk or prerecorded video, your choice
    • final reports (written): Fri Dec 17, 8pm
    • summative written feedback for both

• resources
  – more on datasets and tools later
Projects

• programming
  – common case *(I will only consider supervising students who do these)*
  – four types
    • problem-driven design studies (target specific task/data)
    • technique-driven (explore design choice space for encoding or interaction idiom)
    • algorithm implementation (as described in previous paper)
    • interactive explainer (like distill articles)

• analysis
  – use existing tools on dataset
  – detailed domain survey
  – particularly suitable for non-CS students

• survey
  – very detailed domain survey
  – particularly suitable for non-CS students
Projects: Design studies

• **BYOD (Bring Your Own Data)**
  – you (or your teammates) have your own data to analyze
    • thesis/research topic
    • personal interest
    • dovetail with another course (sometimes works, but timing may be tricky)

• **FDOI (Find Data Of Interest)**
  – many existing datasets, see resource page to get started
    • [http://www.cs.ubc.ca/group/infovis/resources.shtml](http://www.cs.ubc.ca/group/infovis/resources.shtml)
  – can be tricky to determine reasonable task
Project examples

• http://www.cs.ubc.ca/~tmm/courses/547-21/projectdesc.html#examp
Enrollment

• don't worry if you're not registered yet, just attend and keep up
  – major churn is normal the first few weeks
  – spaces will definitely open up

• do make sure you've signed up on spreadsheet!
This week

• async read only
  – Course Logistics (no comments, no responses)

• async read & comment
  – VAD Chapter 1 (comments only, no responses)

• async discuss
  – self-intros

• sync (now!)
  – logistics Q&A
  – time series exercise
    • small groups mixed with lecture / discussion
Next Time

• to read & discuss (async, before next class)
  – VAD book, Ch 2: What: Data Abstraction
  – VAD book, Ch 3: Why: Task Abstraction
  – paper: Nested Model
Visualization
Visualization (vis) defined & motivated

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

Visualization is suitable when there is a need to augment human capabilities rather than replace people with computational decision-making methods.

• human in the loop needs the details
  – doesn't know exactly what questions to ask in advance
  – longterm exploratory analysis
    • speed up through human-in-the-loop visual data analysis
      – presentation of known results
      – stepping stone towards automation: refining, trustbuilding
• intended task, measurable definitions of effectiveness
Exercise: Time Series
Now: In-class design exercise, in small groups

• Three time-series scenarios
  – 1: every 5 min, duration 1 year, 1 thing: building occupancy rates
  – 2: several years and several things: every 5 min, 5 years, 10 currencies
  – 3: several parameters, many things: every 5 min, 1 year, 10 params on 1000 machines

• Small-group exercise: 60+ min
  – breakout groups (4 people/group)
  – brainstorm possible visual encodings & interactions for each scenario
  – document in your group's googledoc w/ text & sketch images
  – reportback: I'll flip through googledocs, some questions for group spokesperson

• Design space examples/discussion: 15-20 min
Case 1: 3D Approach (Not Recommended)

- extruded curves: detailed comparisons impossible

[Cluster and Calendar based Visualization of Time Series Data. van Wijk and van Selow, Proc. InfoVis 99.]
Case 1: Cluster-Calendar Solution

- derived data: cluster hierarchy
- juxtapose multiple views: calendar, superimposed 2D curves

[Cluster and Calendar based Visualization of Time Series Data. van Wijk and van Selow, Proc. InfoVis 99.]
Other Case (compare 2) : Stack Zooming

https://youtu.be/dK0De4XPm5Y

Case 2: ChronoLenses

Case 3: LiveRAC