Information Visualization

Intro, *Time Series Exercise*

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http://www.cs.ubc.ca/~tmm/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

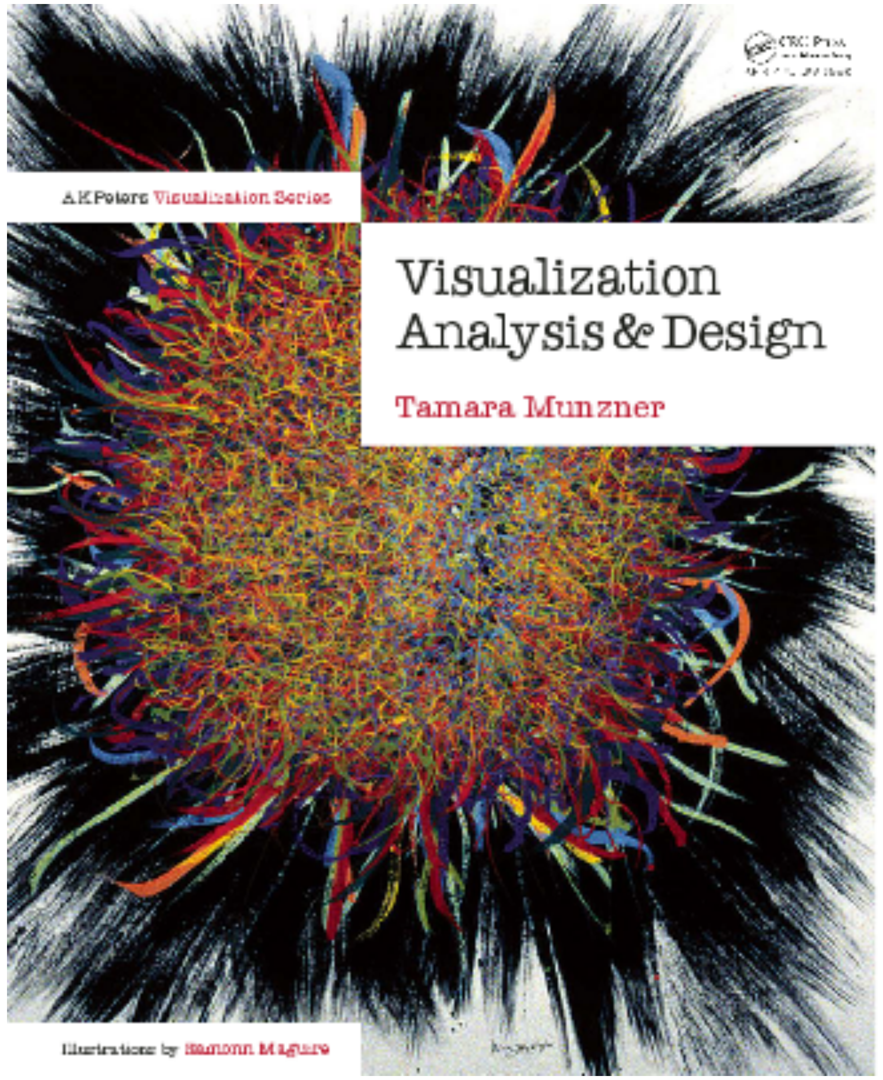
- marking by buckets
  - great 100%
  - good 89%
  - ok 78%
  - poor 67%
  - zero 0%

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
  - Tamara Munzner. Visualization Analysis and Design. AK Peters Visualization Series. CRC Press, 2014.
    - 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
  - 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

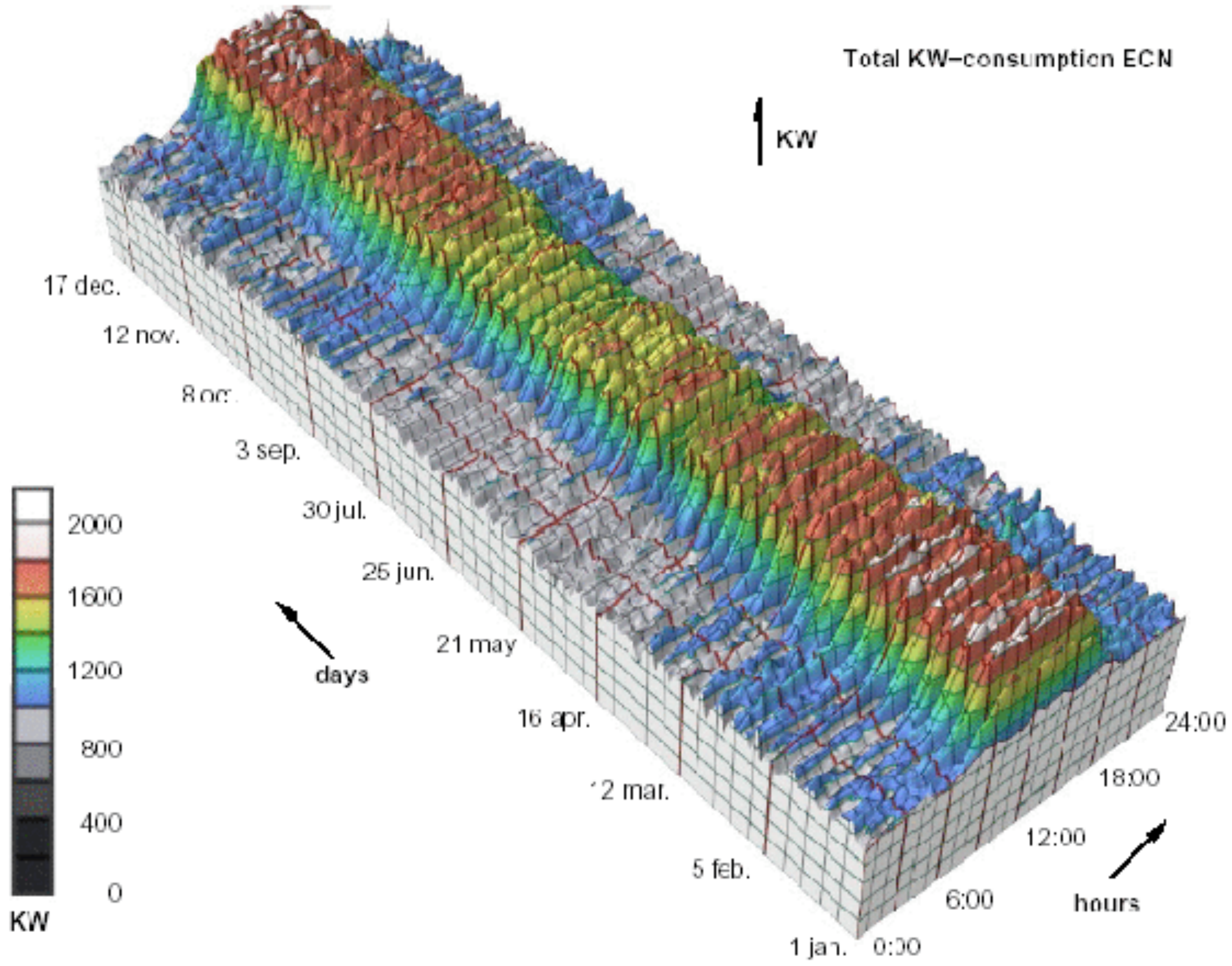
Exercise: Time Series

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)

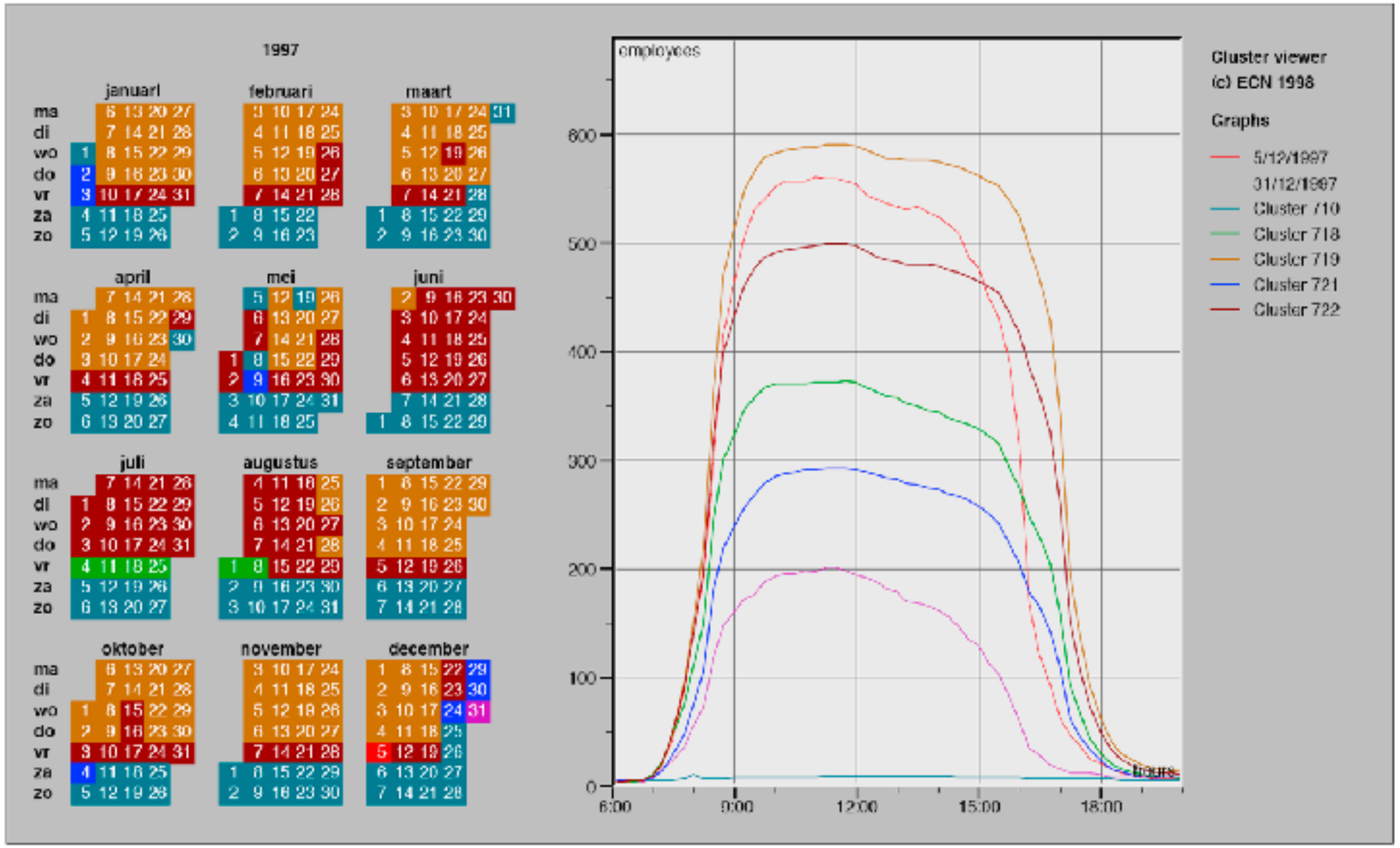
- extruded curves: detailed comparisons impossible



[Cluster and Calendar based Visualization of Time Series Data. van Wijk and van Selow, Proc. InfoVis 99.]

Case 1: Cluster-Calendar Solution

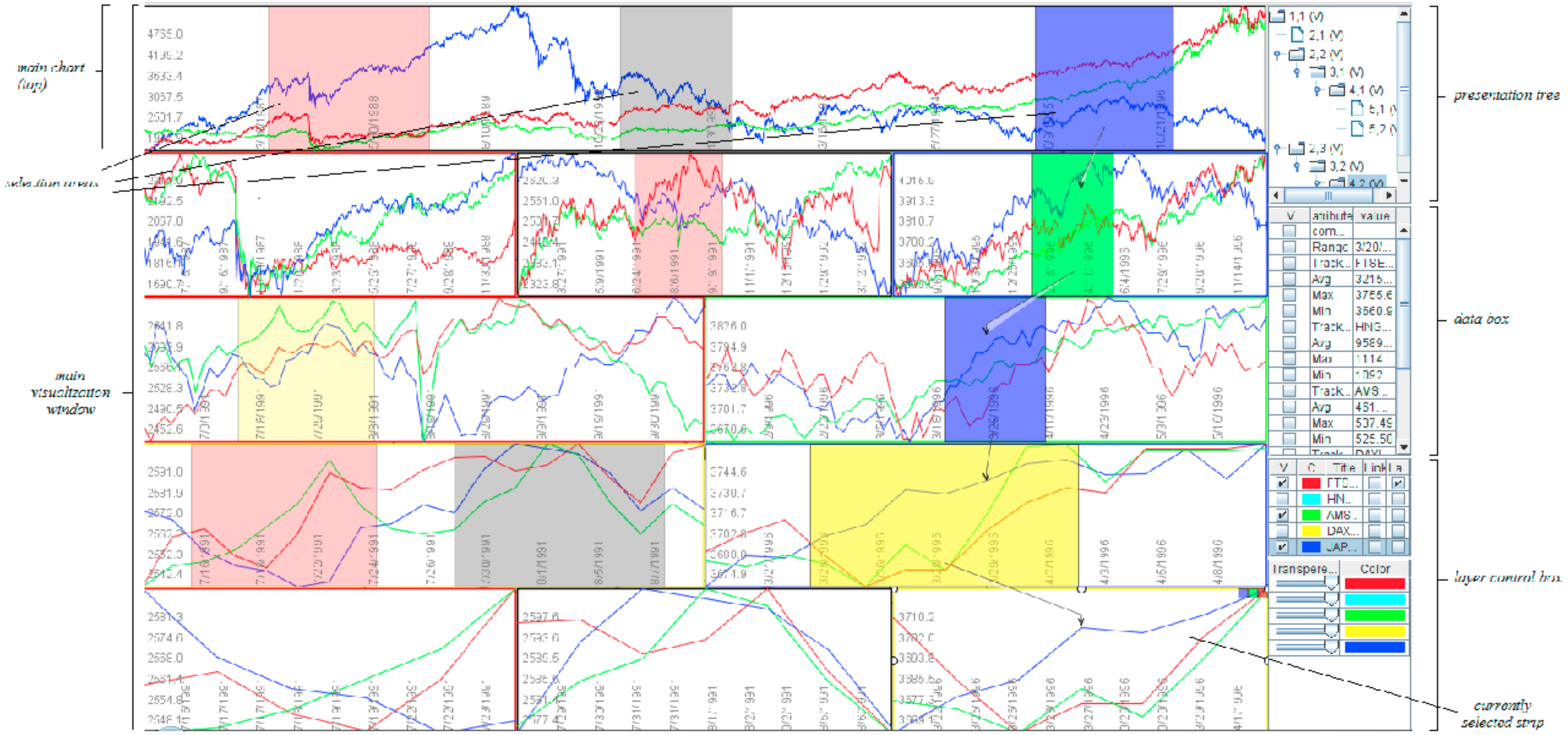
- derived data: cluster hierarchy
- juxtapose multiple views: calendar, superimposed 2D curves



[Cluster and Calendar based Visualization of Time Series Data. van Wijk and van Selow, Proc. InfoVis 99.]

Other Case (compare 2) : Stack Zooming

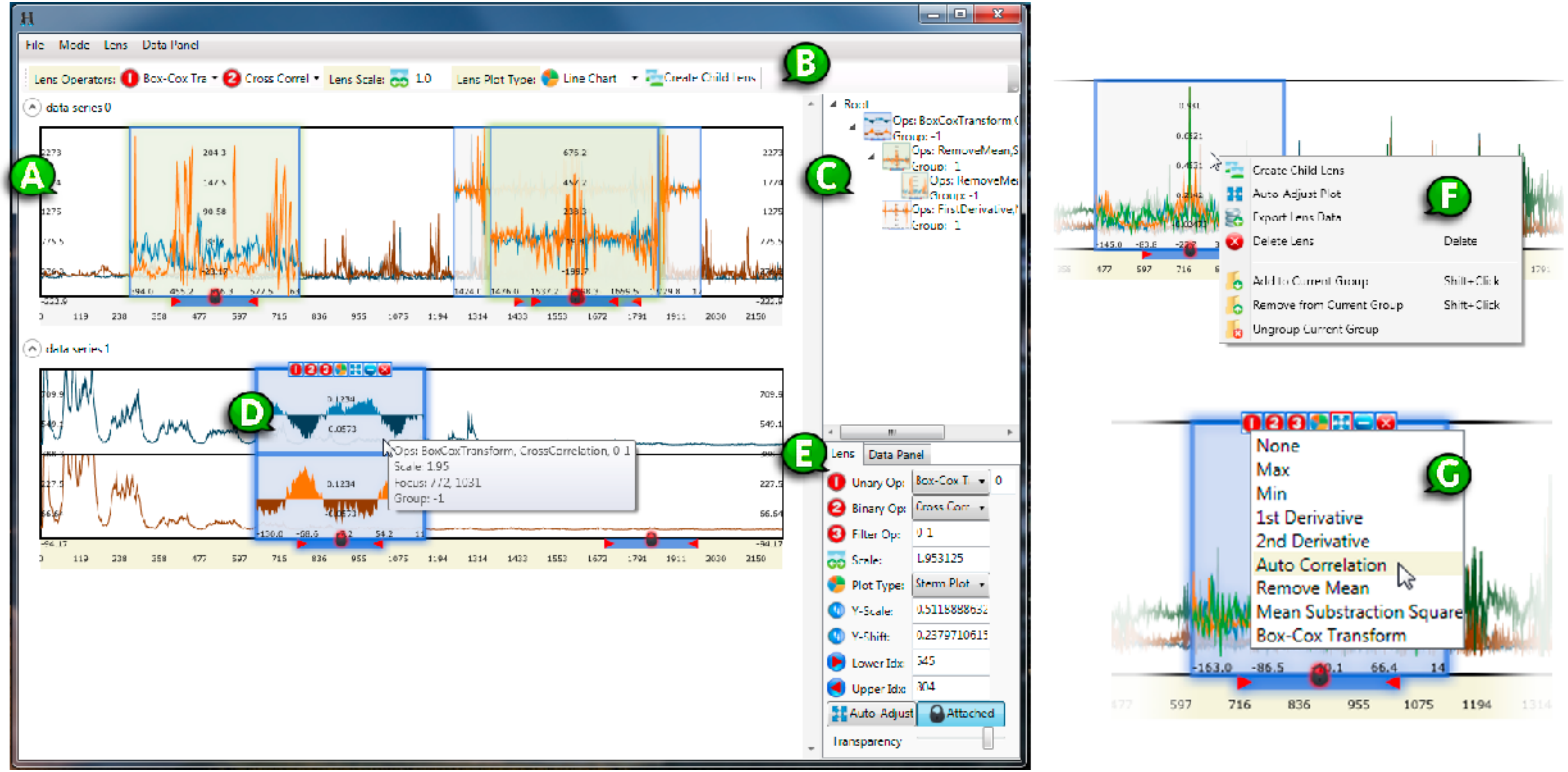
https://youtu.be/dK0De4XPm5Y



[Stack Zooming for Multi-Focus Interaction in Time-Series Data Visualization. Javed and Elmqvist. Proc PacificVis 2010, p 33-40.]

Case 2: ChronoLenses

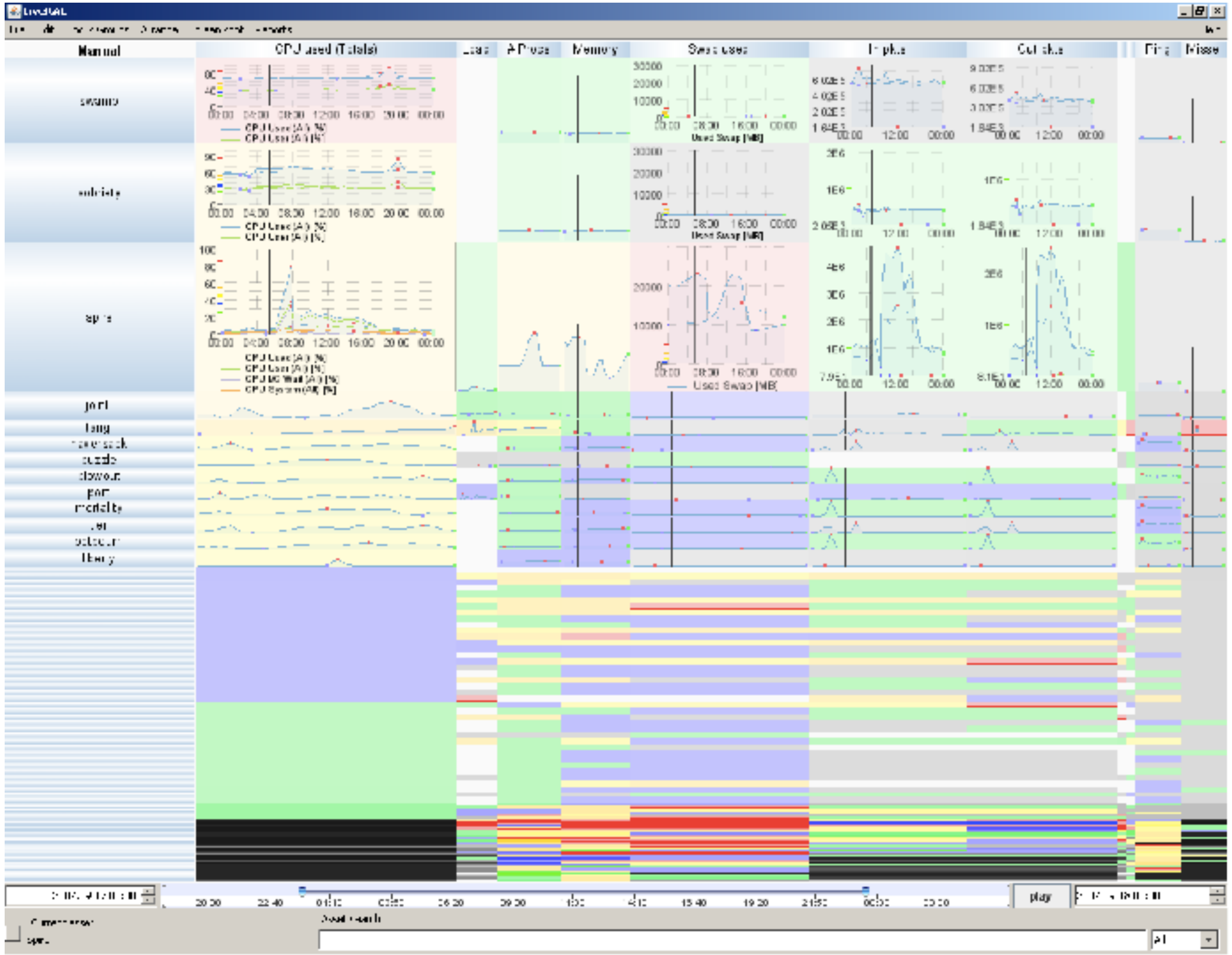
https://youtu.be/k7pI8ikczqk



[Exploratory Analysis of Time-Series with ChronoLenses. Zhao, Chevalier, Pietriga, and Balakrishnan. IEEE TVCG 17(12):2422-2431(Proc. InfoVis 2011).]

Case 3: LiveRAC

http://youtu.be/ld0c3H0VSkw



[LiveRAC - Interactive Visual Exploration of System Management Time-Series Data. McLachlan, Munzner, Koutsofios, and North. Proc. Conf. on Human Factors in Computing Systems (CHI) 2008, pp 1483-1492.]