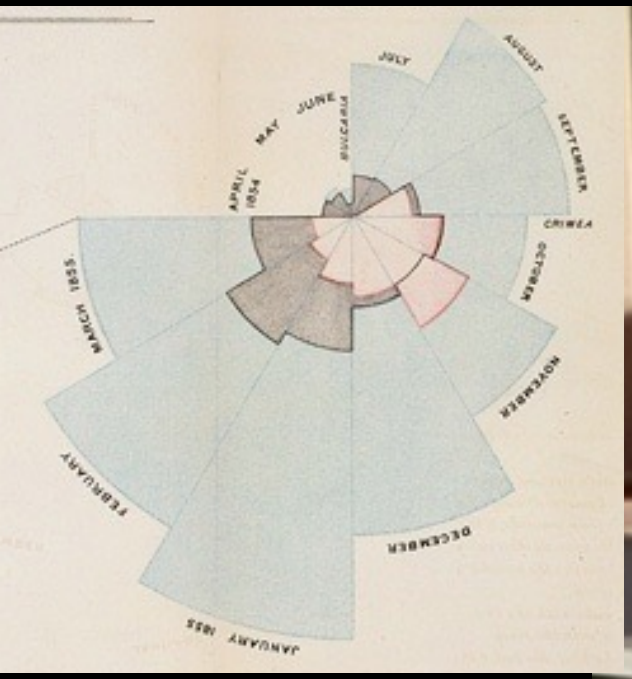
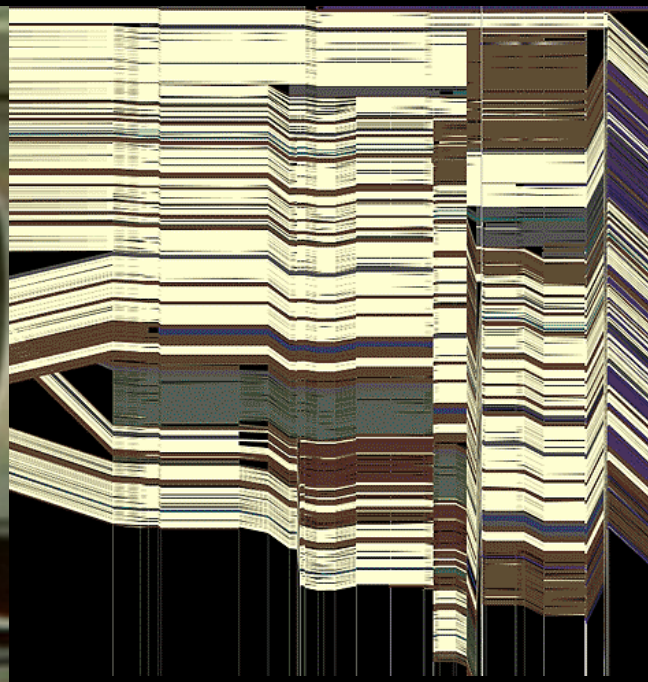
CSE 512 - Data Visualization

Design Critiques





Jeffrey Heer University of Washington

Final Project

Final Project

Design a new visualization system or technique.

Many options…

New system for a chosen domain + data set

Novel visualization / interaction technique

Design study or experiment

Deliverables

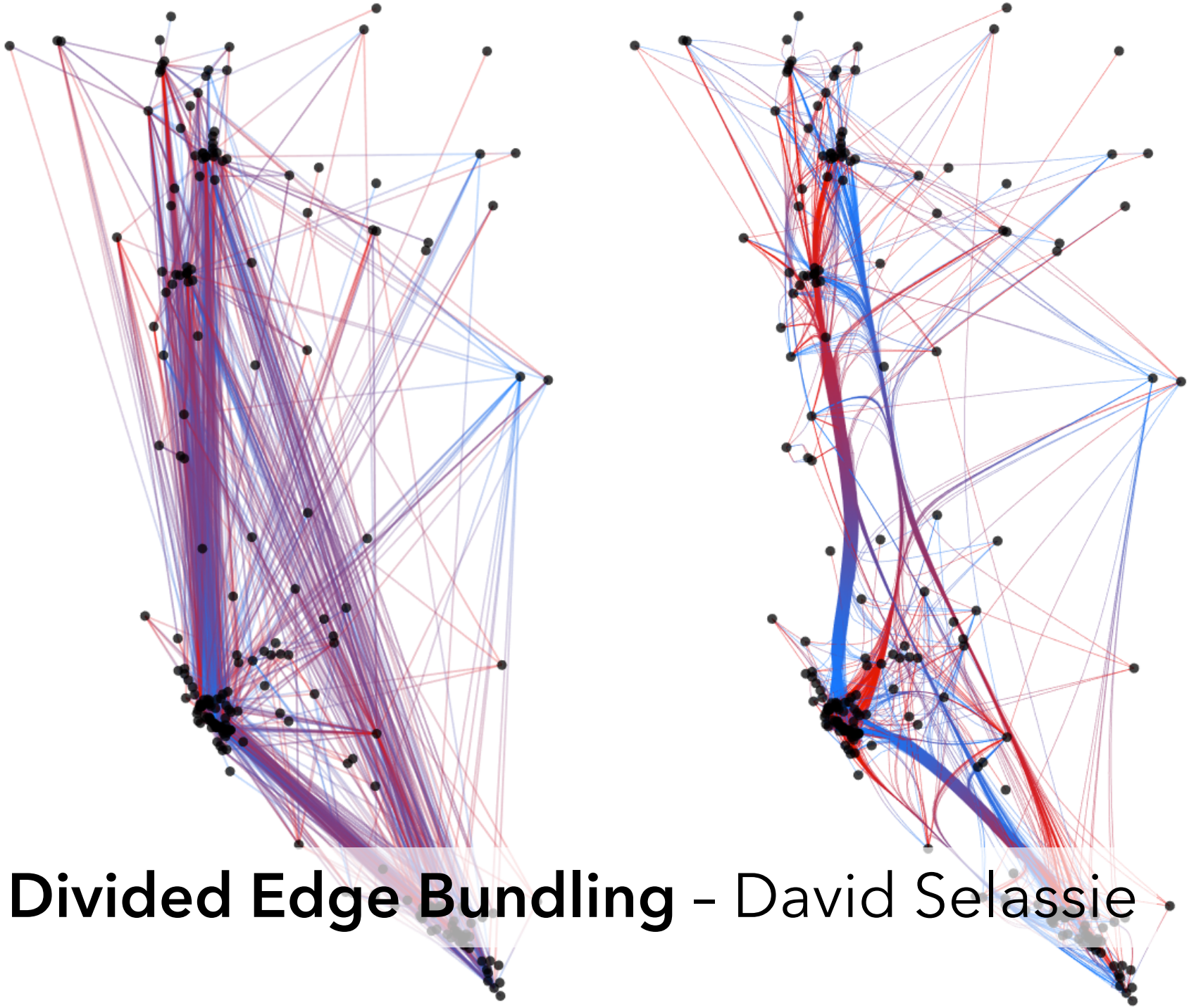
4-6 page paper in conference paper format

In-class progress report

Final poster & demo session

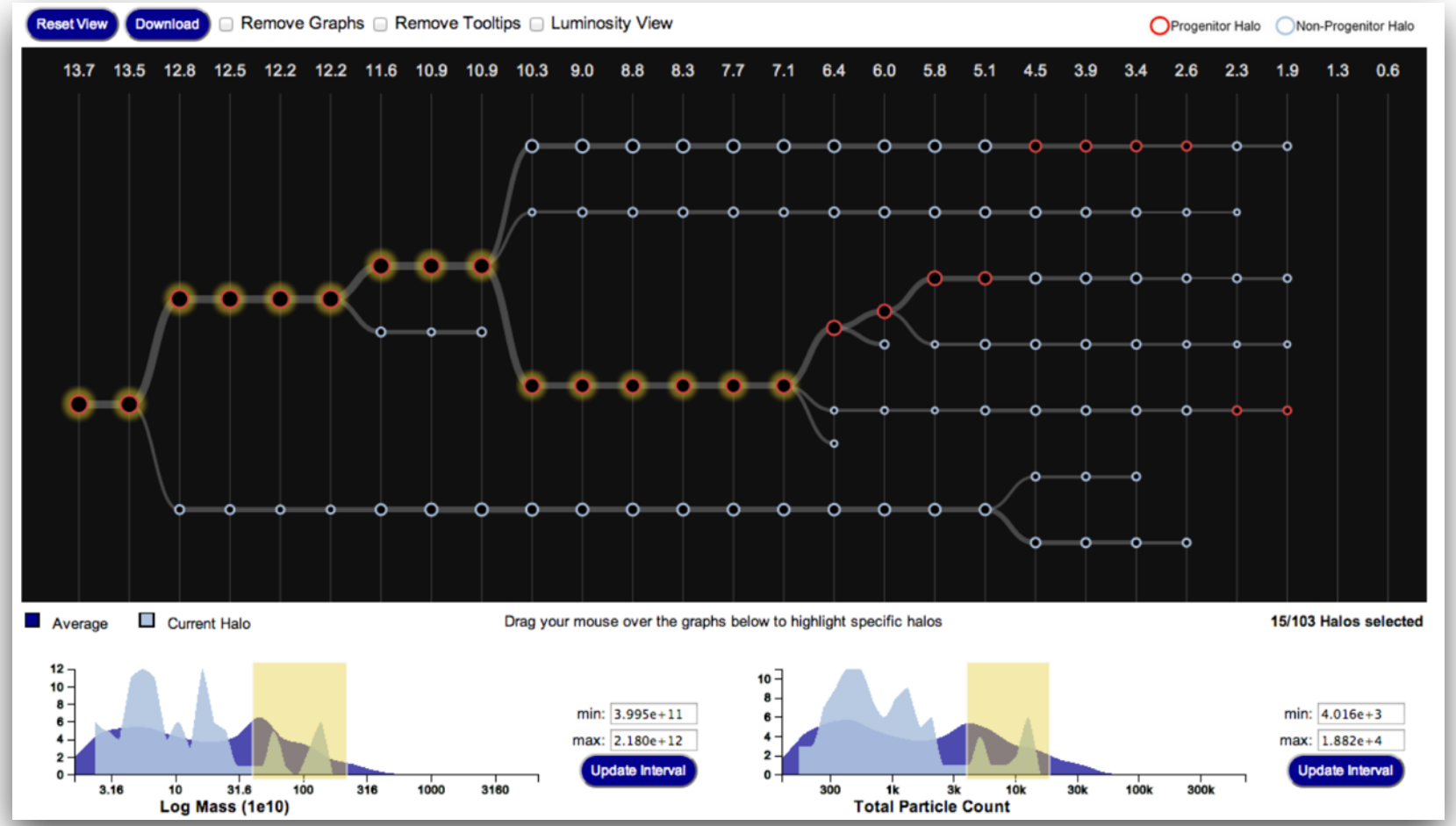
RunMonster

Troy Brant & Steve Marmon



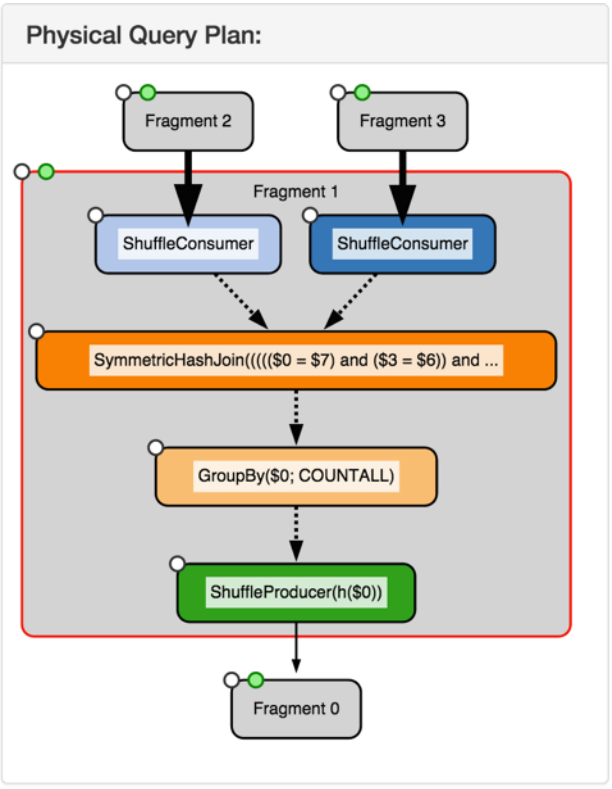
Divided Edge Bundling – David Selassie

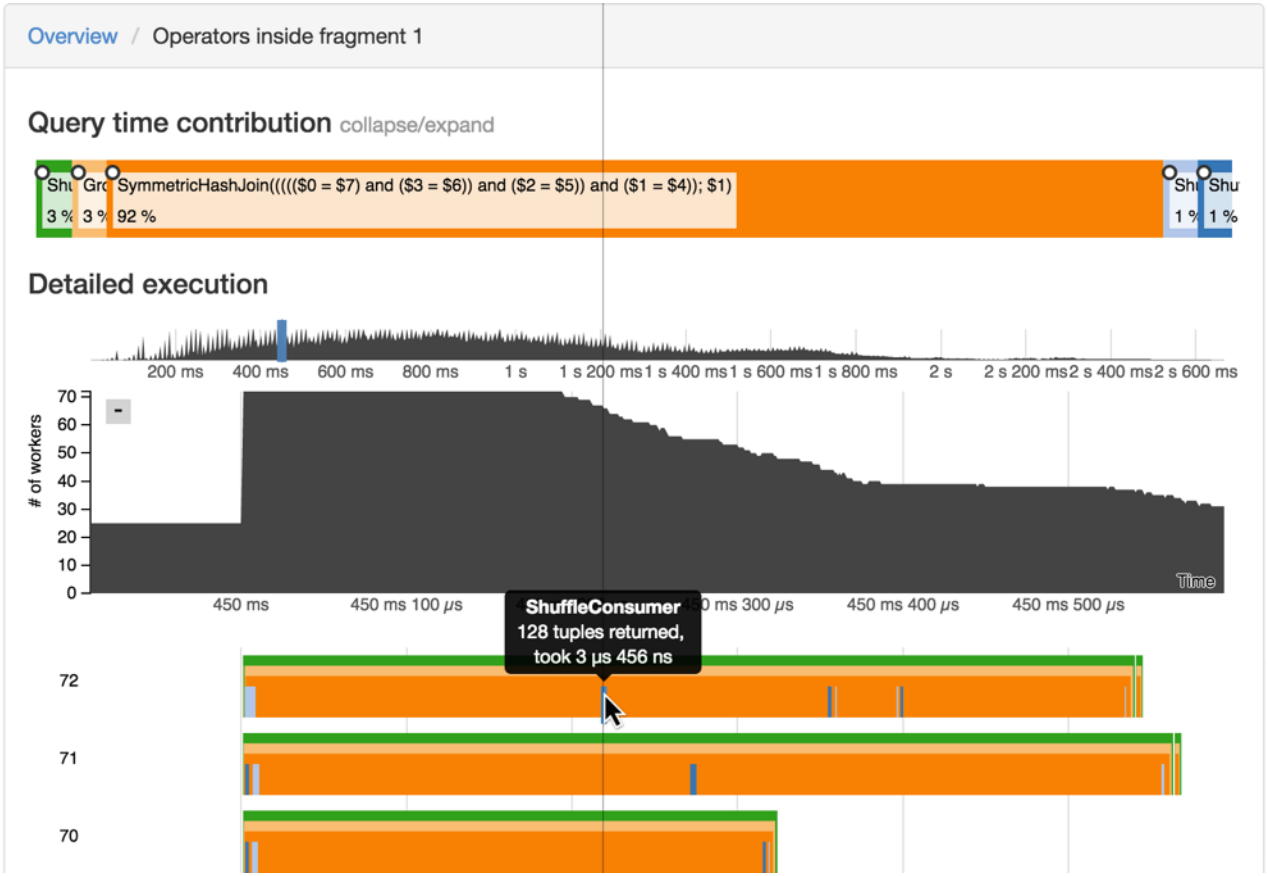
Visualizing Galaxy Merger Trees



S. Loebman, **J. Ortiz**, **L. Orr**, M. Balazinska, T. Quinn et al. [SIGMOD '14]

Perfopticon Distributed Query Performance

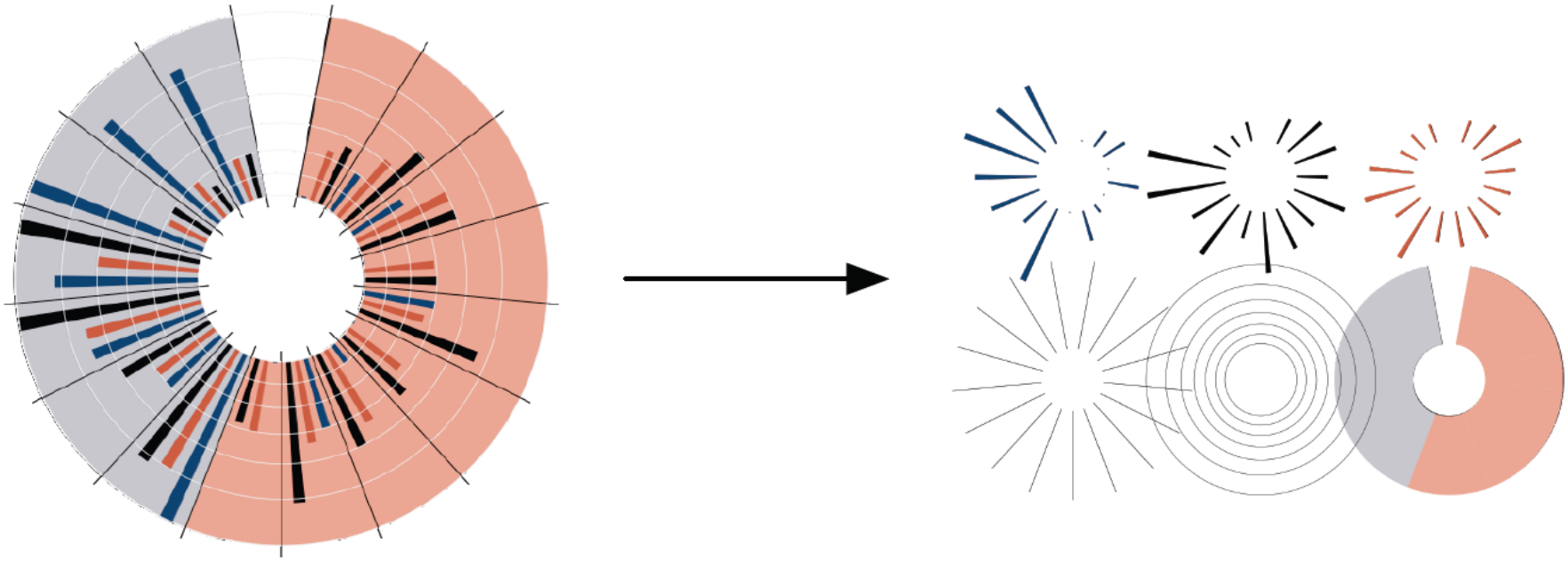


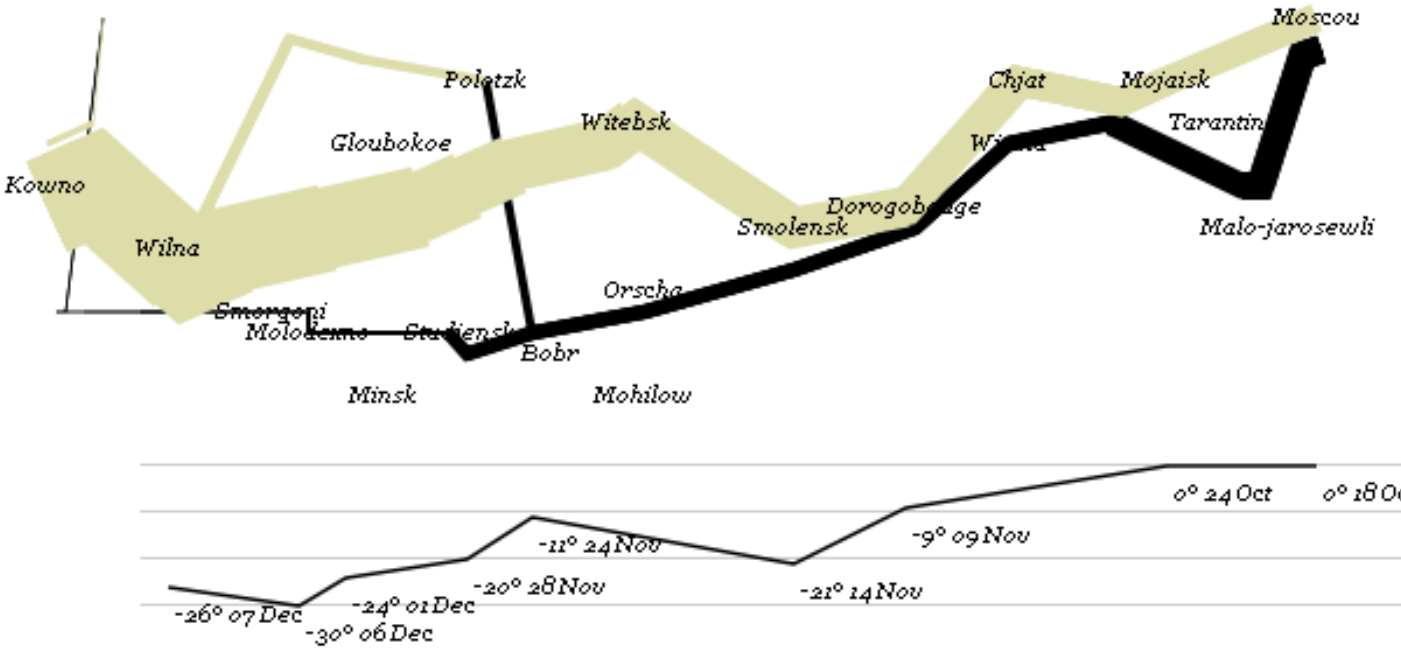


Dominik Moritz et al. [EuroVis '15]

Protovis: A Graphical Toolkit for Visualization

Mike Bostock



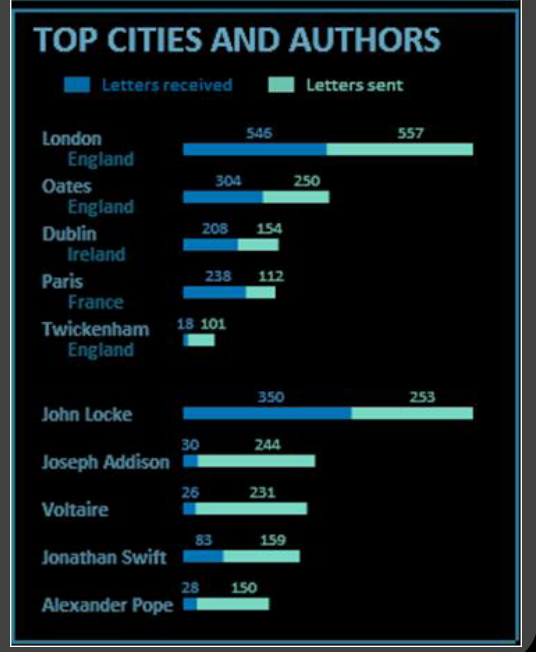



```
var army = pd.nest(napoleon.army, "dir", "group“);
var vis = new pv.Panel();

var lines = vis.add(pv.Panel).data(army);
lines.add(pv.Line)
  .data(function() army[this.idx])
  .left(lon).top(lat).size(function(d) d.size/8000)
  .strokeStyle(function() color[army[paneIndex][0].dir]);

vis.add(pv.Label).data(napoleon.cities)
  .left(lon).top(lat)
  .text(function(d) d.city).font("italic 10px Georgia")
  .textAlign("center").textBaseline("middle");
```

```
vis.add(pv.Rule).data([0,-10,-20,-30])
   .top(function(d) 300 - 2*d - 0.5).left(200).right(150)
   .lineWidth(1).strokeStyle("#ccc")
   .anchor("right").add(pv.Label)
     .font("italic 10px Georgia")
     .text(function(d) d+"°").textBaseline("center");

vis.add(pv.Line).data(napoleon.temp)
   .left(lon).top(tmp) .strokeStyle("#0")
  .add(pv.Label)
    .top(function(d) 5 + tmp(d))
    .text(function(d) d.temp+"° "+d.date.substr(0,6))
    .textBaseline("top").font("italic 10px Georgia");
```

Visualizing the Republic of Letters

Daniel Chang, Yuankai Ge, Shiwei Song



Possible Project Ideas

Team up with **local researchers**!
http://bit.ly/cse512-15sp-projects

Advance your **existing research**.

Pick an **open problem** of interest.

Work in a domain with **real stakeholders**.

Final Project Schedule

Proposal	Tues, May 12 (5pm)
Presentation	Thur, May 21 (slides: 5/20, 5pm)
Poster & Demo	Mon, Jun 8 (5-8pm)
Final Paper	Thur, Jun 11 (8am)

Logistics

Groups of up to 4 people

Clearly report responsibilities of each member

Tips for a Successful Project

Focus on a compelling **real-world problem**.
How will you gauge success?

Consider **multiple design alternatives**.
Prototype quickly (use Tableau, R, Gephi…).

Seek feedback (representative users, peers, …).
Even informal usage can provide insights.

Choose **appropriate team roles**.

Start early! (and read the suggested paper!)

A3 Design Critiques

Critique Questions

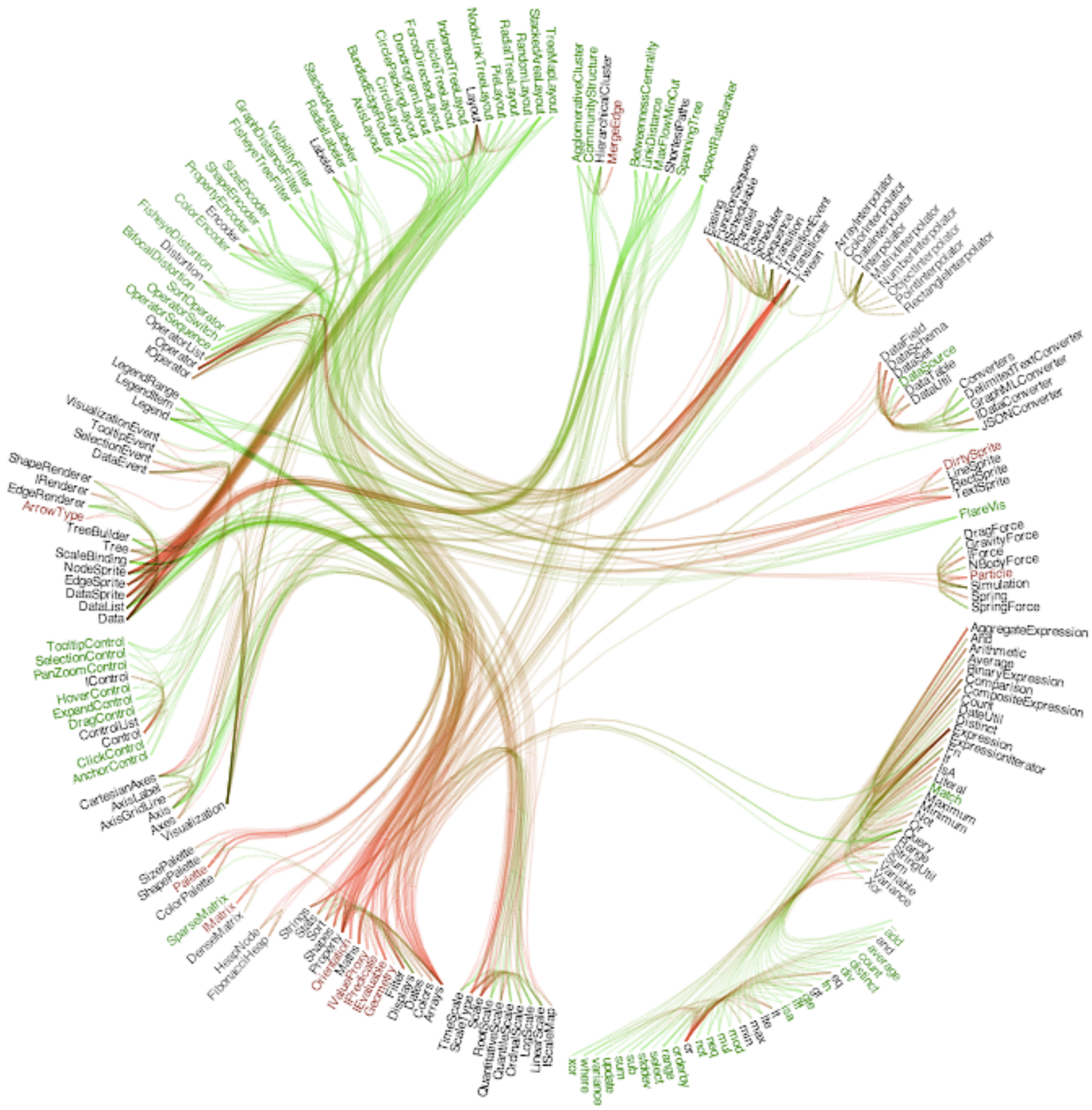
What is the purpose of the visualization?
Does it address an important topic?
Does it serve its purpose well?
Does it convey the data honestly?
Does it show the appropriate level of detail?
Are expressive & effective visual encodings used?
Do the interactions aid exploration of the data?
Is the design innovative?
How might things be done differently?

I Like… / I Wish… / What If?

I LIKE…
Praise for design ideas and/or well-executed implementation details. *Example: "I like the navigation through time via the slider; the patterns observed as one moves forward are compelling!"*

I WISH…
Constructive statements on how the design might be improved or further refined. *Example: "I wish moving the slider caused the visualization to update immediately, rather than the current lag."*

WHAT IF?
Suggest alternative design directions, or even wacky half-baked ideas. *Example: "What if we got rid of the slider and enabled direct manipulation navigation by dragging data points directly?"*


TreeMapLayout
StackedAreaLayout
RandomLayout
RadialTreeLayout
PieLayout
NodeLinkTreeLayout
Layout
IndentedTreeLayout
IcicleTreeLayout
ForceDirectedLayout
DendrogramLayout
CirclePackingLayout
CircleLayout
BundledEdgeRouter
AxisLayout
StackedAreaLabeler
RadialLabeler
Labeler
VisibilityFilter
GraphDistanceFilter
FisheyeTreeFilter
SizeEncoder
ShapeEncoder
PropertyEncoder
Encoder
ColorEncoder
FisheyeDistortion
Distortion
BifocalDistortion
SortOperator
OperatorSwitch
OperatorSequence
OperatorList
Operator
IOperator
LegendRange
LegendItem
Legend
VisualizationEvent
TooltipEvent
SelectionEvent
DataEvent
ShapeRenderer
IRenderer
EdgeRenderer
ArrowType
TreeBuilder
Tree
ScaleBinding
NodeSprite
EdgeSprite
DataSprite
DataList
Data
TooltipControl
SelectionControl
PanZoomControl
IControl
HoverControl
ExpandControl
DragControl
ControlList
Control
ClickControl
AnchorControl
CartesianAxes
AxisLabel
AxisGridLine
Axis
Axes
Visualization
SizePalette
ShapePalette
Palette
ColorPalette
SparseMatrix
IMatrix
DenseMatrix
HeapNode
FibonacciHeap
Strings
Stats
Sort
Shapes
Property
Maths
Orientation
IValueProxy
IPredicate
IEvaluable
Geometry
Filter
Displays
Dates
Colors
Arrays
TimeScale
ScaleType
Scale
RootScale
QuantitativeScale
QuantileScale
OrdinalScale
LogScale
LinearScale
IScaleMap
xor
where
variance
update
sum
sub
stddev
select
range
orderby
or
not
neq
mul
mod
min
max
lte
lt
isa
iff
gte
gt
fn
eq
div
distinct
count
average
and
add
AgglomerativeCluster
CommunityStructure
HierarchicalCluster
MergeEdge
BetweennessCentrality
LinkDistance
MaxFlowMinCut
ShortestPaths
SpanningTree
AspectRatioBanker
Easing
FunctionSequence
ISchedulable
Parallel
Pause
Scheduler
Sequence
Transition
Transitioner
TransitionEvent
Tween
ArrayInterpolator
ColorInterpolator
DateInterpolator
Interpolator
MatrixInterpolator
NumberInterpolator
ObjectInterpolator
PointInterpolator
RectangleInterpolator
DataField
DataSchema
DataSet
DataSource
DataTable
DataUtil
Converters
DelimitedTextConverter
GraphMLConverter
IDataConverter
JSONConverter
DirtySprite
LineSprite
RectSprite
TextSprite
FlareVis
DragForce
GravityForce
IForce
NBodyForce
Particle
Simulation
Spring
SpringForce
AggregateExpression
And
Arithmetic
Average
BinaryExpression
Comparison
CompositeExpression
Count
DateUtil
Distinct
Expression
ExpressionIterator
Fn
If
IsA
Literal
Match
Maximum
Minimum
Not
Or
Query
Range
StringUtil
Sum
Variable
Variance
Xor

I Like… / I Wish… / What If?

I LIKE…

The goal of supporting developers to improve decoupling.
The “cut-line” interaction to isolate links of interest.
The use of gradients to show edge directionality.

I WISH…

I could author multiple cut-lines for compound queries.
More details on demand were shown upon mouse-hover.

WHAT IF?

You could incorporate information from applications that use this code? How often are different modules used?

Web Preview

file:///Users/Jeff/Dropbox/School/10-11/Fall%2010-11/CS%2044BB/Projects/Assignment%203/Crash/Crash.html

Crash Compare

by Steve Lesser and Jeff Wear

Make
- [x] Isuzu
- [x] Jeep
- [ ] Lexus
- [ ] Lincoln
- [ ] Mazda

Model
- [ ] Amigo
- [ ] I-Mark
- [ ] Rodeo
- [ ] Spacecab
- [ ] Spacecab

Size
- [ ] mini
- [x] compact
- [ ] light
- [ ] medium
- [ ] heavy

Protection
- [ ] Seatbelts
- [ ] Driver Airbag
- [ ] D & P Airbags

Doors
- [x] 2
- [ ] 4
- [ ] Other

Driver

Make
- [ ] Acura
- [ ] Audi
- [ ] BMW
- [ ] Buick
- [ ] Cadillac

Model

Size
- [ ] compact
- [ ] light
- [ ] medium
- [x] heavy
- [ ] multi-purpose vehicle

Protection
- [ ] Seatbelts
- [ ] Driver Airbag
- [x] D & P Airbag

Doors
- [ ] 2
- [x] 4
- [ ] Other

Source: The National Transportation Safety Administration

Show options

I Like… / I Wish… / What If?

I LIKE…

The use of dummies, including dual encoding with bar charts.
The ability to form rich queries over the data.

I WISH…

The query widgets were less intimidating and faster to navigate.
The query widgets included more visualized information (scent).
One could author queries based on safety ratings, such as the most injuries overall, or more leg injuries, and so on…

WHAT IF?

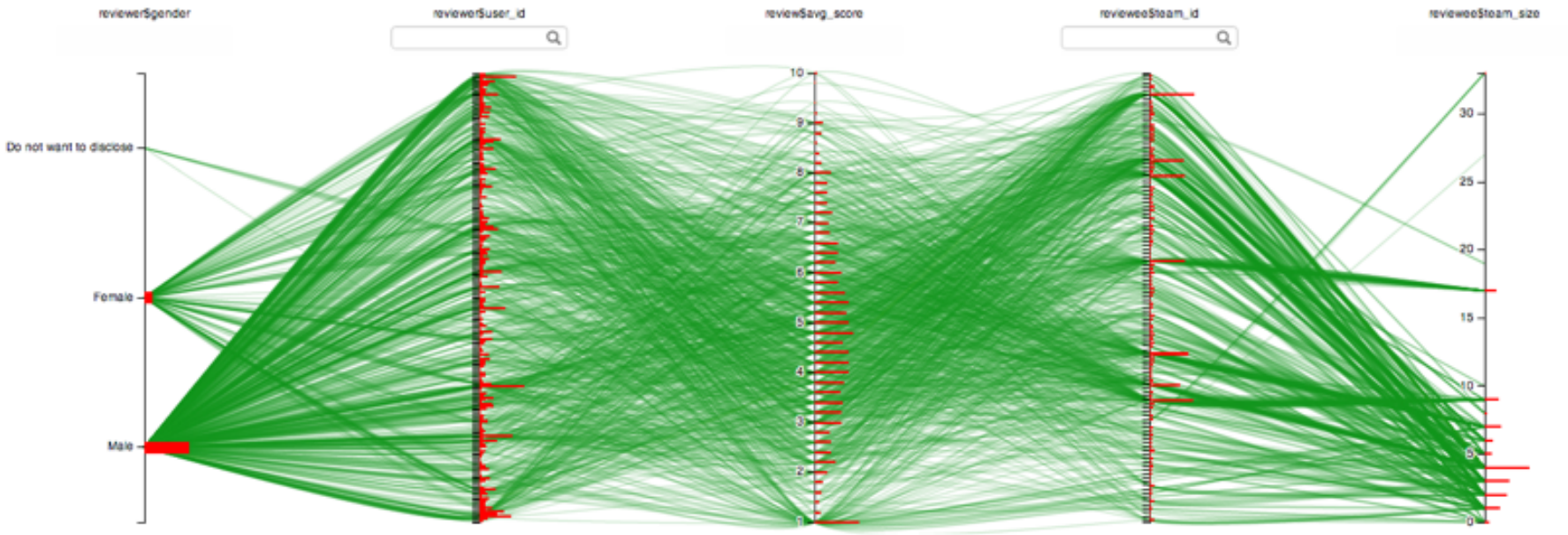
Instead of comparing two selections at a time, one could make comparison across the full space of the data? What might that look like? Small multiples or overlays?

Exploring Peer Evaluation on Venture-Lab Spring 2012 | 1. Select Axes | 2. Filter | About | Showing 1206 row(s)(s)

REVIEWER ☐ gpa ☐ academic_major ☐ age_range ☐ location ☑ gender ☐ signin_count ☑ user_id

REVIEW ☑ avg_score ☐ score1 ☐ score2 ☐ score3 ☐ score4 ☐ score5

REVIEWEE ☑ team_id ☑ team_size



reviewer$gpa	reviewer$acad...	reviewer$age_...	reviewer$locat...	reviewer$gender	reviewer$signi...	reviewer$user_id	review$avg_s...	review$score1	review$score2	review$score3	review$score4	review$score5	reviewee$tea...	reviewee$tea...
NULL	NULL	NULL	NULL	NULL	21	37212	4	4	5	6	4	1	5069	4
NULL	NULL	NULL	NULL	NULL	21	37212	7.4	8	7	7	6	9	5470	17
Does not ...	Science	26-30	Netherlands	Male	124	2230	6.8	7	7	8	7	5	5693	7
Does not ...	Science	26-30	Netherlands	Male	124	2230	2.2	2	1	3	4	1	5836	4
Do not w...	Business	31-35	Spain	Male	80	2848	4.4	4	1	7	9	1	5069	4
3-3.49	Other	21-25	Spain	Female	75	2826	5	5	5	5	5	5	5215	4
3-3.49	Engineering	over 50	United St...	Male	110	19502	3.6	5	5	2	3	3	5215	4
3.5-4.00	Science	36-40	Greece	Male	125	27386	3.6	3	6	5	3	1	5250	3
3-3.49	Engineering	over 50	United St...	Male	110	19502	7	9	5	9	6	6	5693	7

I Like… / I Wish… / What If?

I LIKE…

The 1D histograms on the parallel coordinates display.
The use of brushing and linking between components.
Attention to small details, such as white masks for axis labels.

I WISH…

The interaction was faster (lower latency).
A color-blind friendly color palette had been used.

WHAT IF?

One tried to visualize the data using a technique other than parallel coordinates? What encodings work best for the intended audience?

Instructions

1. Find your assigned team pairing.
2. Find assigned A3 submission: http://github.com/CSE512-15S
3. Read the submission, interact with the visualization.
4. Author a critique, noting both strengths & opportunities.
5. Post your comments to this discussion thread: Create a new top-level post, and prominently include the GitHub ids for the project you are reviewing.
6. Time permitting, repeat for another project of your choosing.

https://canvas.uw.edu/courses/964102/discussion_topics/2919826

Critique Questions

What is the purpose of the visualization?
Does it address an important topic?
Does it serve its purpose well?
Does it convey the data honestly?
Does it show the appropriate level of detail?
Are expressive & effective visual encodings used?
Do the interactions aid exploration of the data?
Is the design innovative?
How might things be done differently?