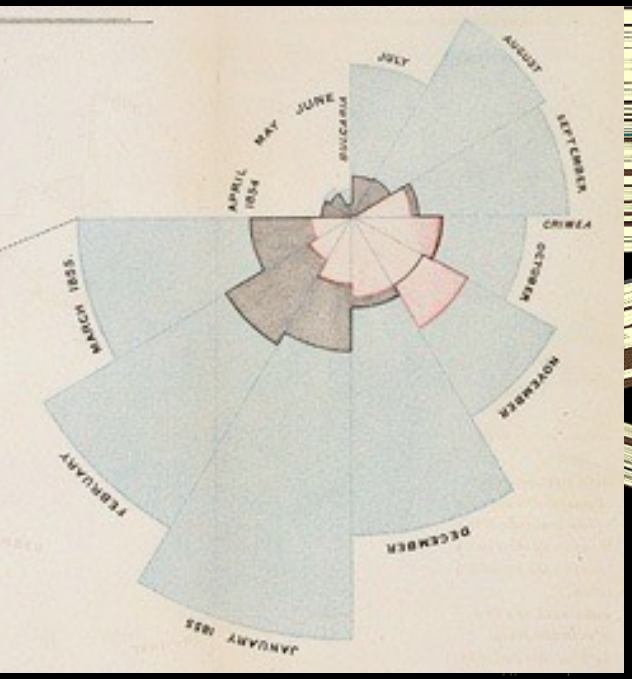
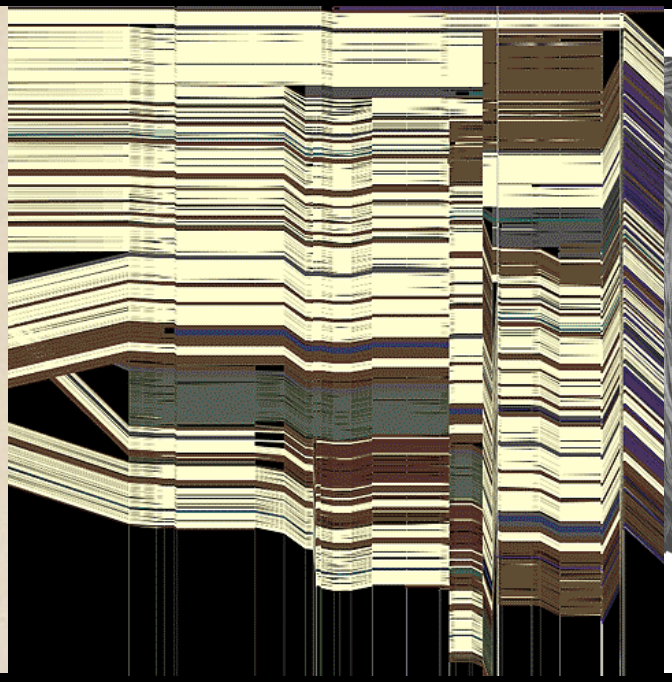
CSE 442 - Data Visualization

Design Review & Critique





Jeffrey Heer University of Washington

Final Project

Final Project

Produce **interactive web-based visualizations**

Initial **prototype** and **design review**

Final deliverables and **video presentation**

Submit and publish on GitHub

Projects from **previous classes** have been:

- Published as research papers
- Featured in the New York Times
- Released as successful open source projects

Final Project Theme

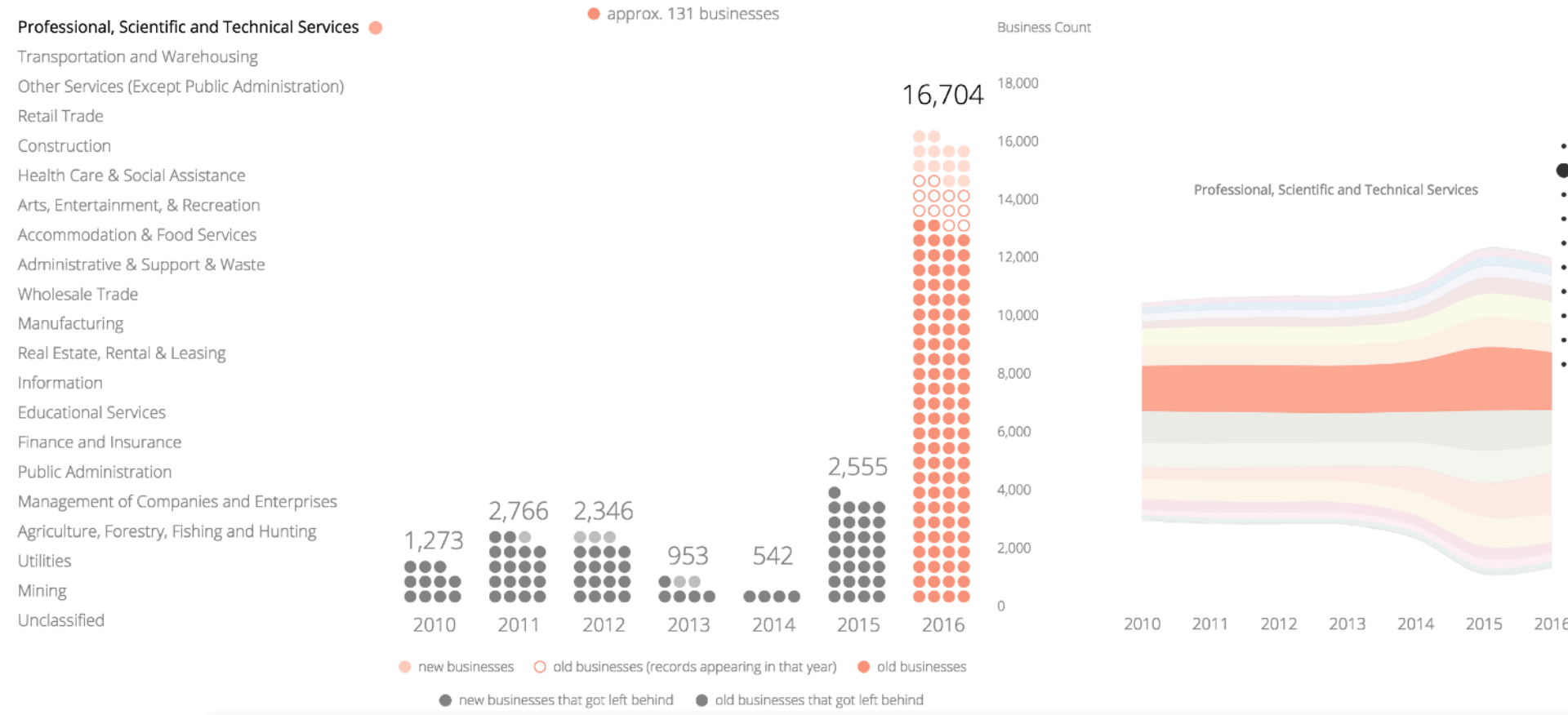
Data Visualization for Social Good

Goal: find data of social or scientific import, design visualizations to explore or communicate it effectively.

The specific data domain is open-ended. Possibilities include transportation, housing, public health, education, climate, campaign finance, scientific research, and so on…

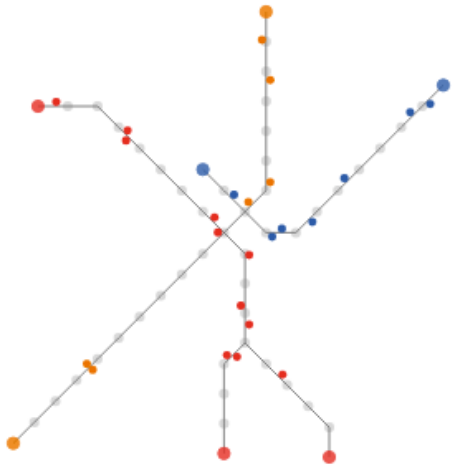
You must identify a target audience. May be general (residents, voters) or specialized (scientists, policy makers).

Inspiration…



Change In Times (CSE 442, Spring 2017)

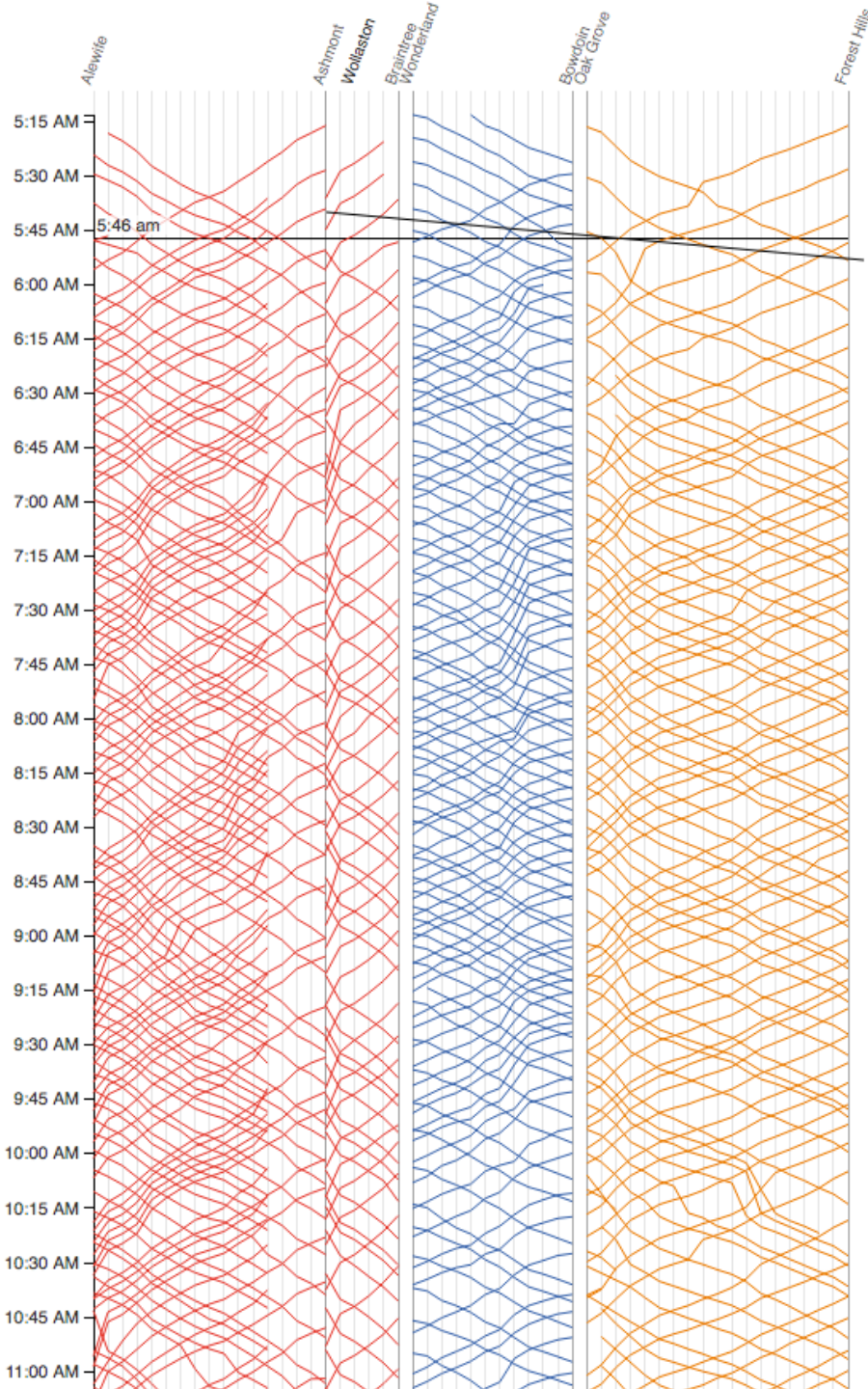
Gunnar Olson, Halden Lin, Lilian Liang, and Shobhit Hathi



Locations of each train on the red, blue, and orange lines at 5:46 am. Hover over the diagram to the right to display trains at a different time.

Trains are on the right side of the track relative to the direction they are moving.

See the morning rush-hour, midday lull, afternoon rush-hour, and the evening lull.



Service starts at 5AM on Monday morning. Each line represents the path of one train. Time continues downward, so steeper lines indicate slower trains.

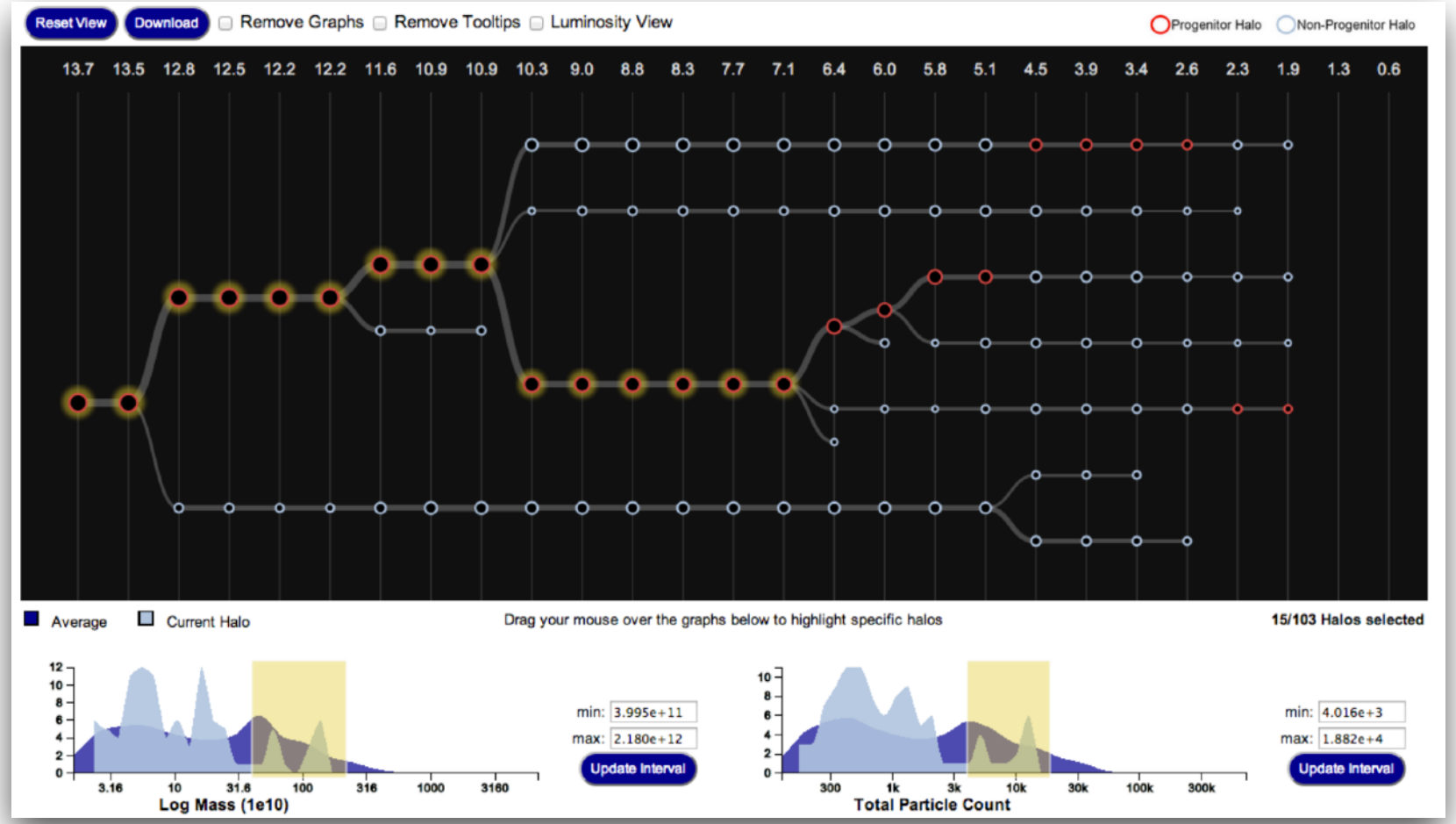
Since the red line splits, we show the Ashmont branch first then the Braintree branch. Trains on the Braintree branch "jump over" the Ashmont branch.

Train frequency increases around 6:30AM as morning rush hour begins.

MBTA Viz

Barry & Card

Visualizing Galaxy Merger Trees

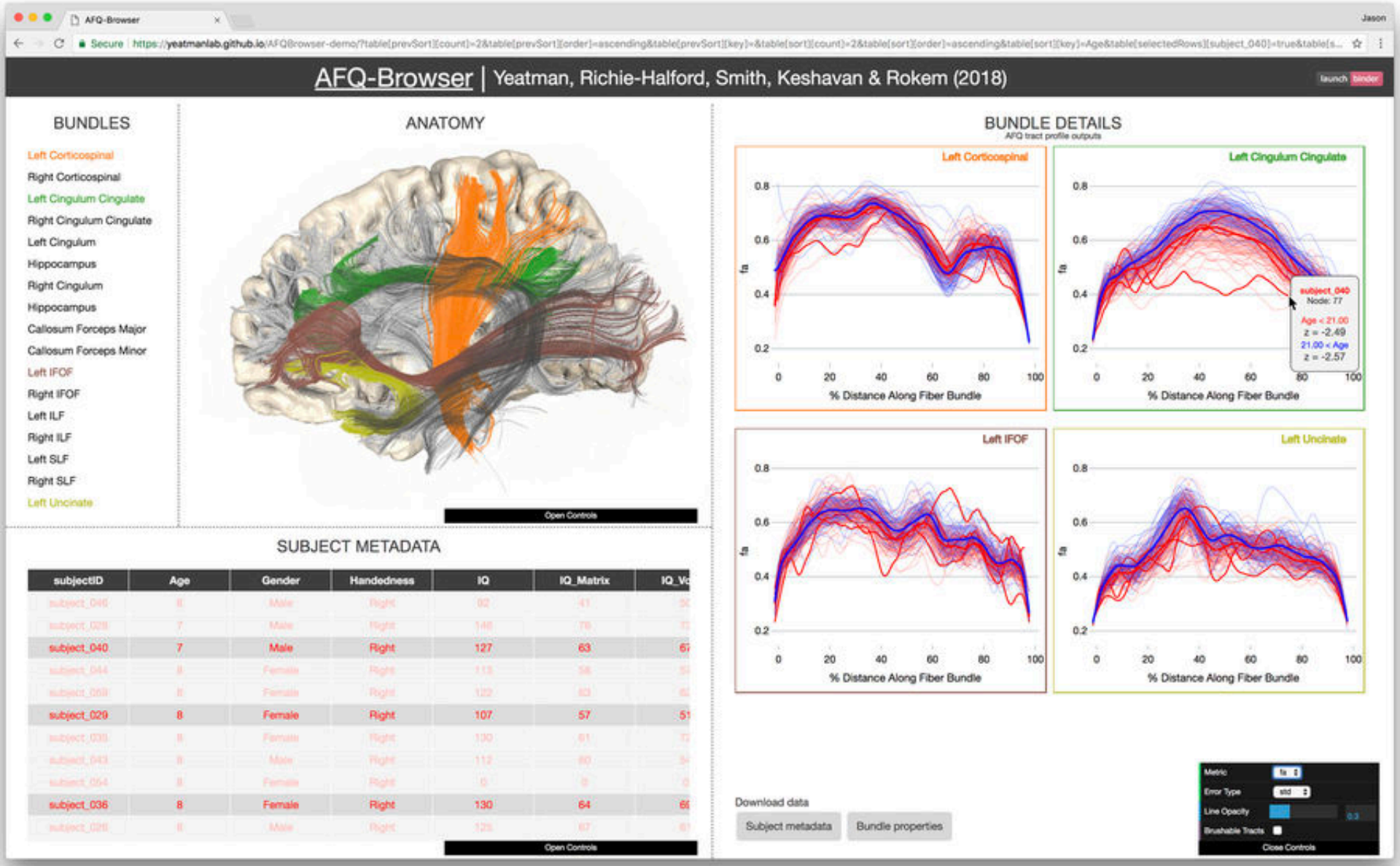


S. Loebman, **J. Ortiz**, **L. Orr**, M. Balazinska, T. Quinn et al. [SIGMOD '14]

nature COMMUNICATIONS

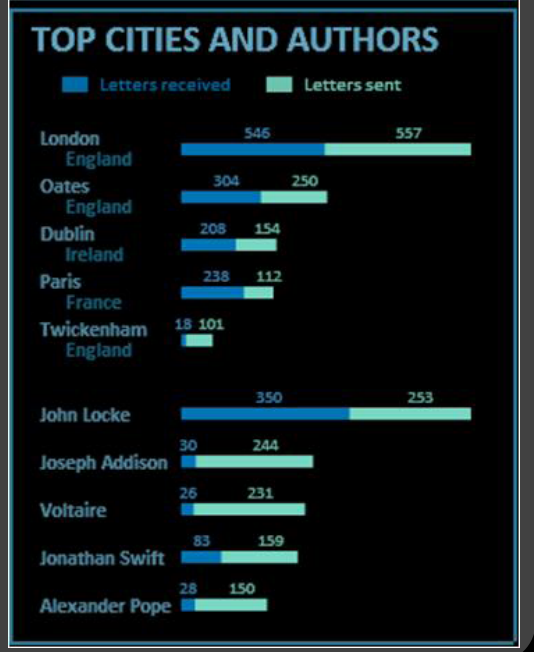
A browser-based tool for visualization and analysis of diffusion MRI data

Jason D. Yeatman, Adam Richie-Halford, Josh K. Smith, Anisha Keshavan & Ariel Rokem



Visualizing the Republic of Letters

Daniel Chang, Yuankai Ge, Shiwei Song



Final Project Schedule

Proposal	Fri Nov 9
Milestone	Tue Nov 27
Reviews	Wed Nov 28, Fri Nov 30
Deliverables	Thu Dec 6
Showcase	Fri Dec 7 (in class)

Logistics

Final project description posted online

Work in groups of up to 5 people

Start determining your project topic!

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, *etc*…).

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

Choose **appropriate team roles**.

Start early (and read the suggested paper!)

Prototype
Peer Critiques

Critique Questions

What is the purpose of the visualization?
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 understanding of the data?
Is the design well-organized? Is it innovative?
What would like to change or refine?
How might things be done differently?

I Like… / I Wish… / What If?

I LIKE…

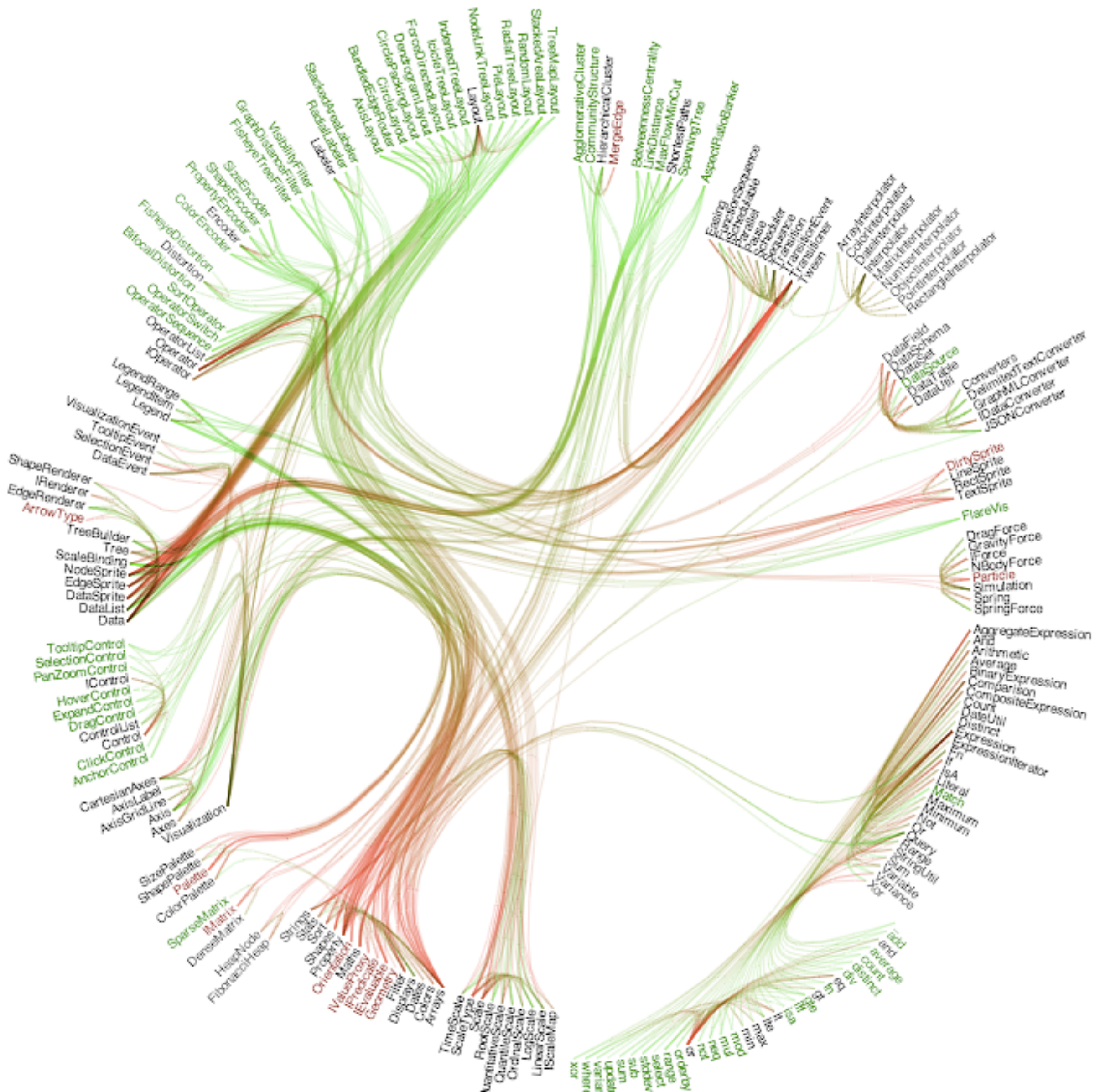
Praise for design ideas and/or well-executed implementation details. *Example: "I like the navigation through time via the slider; the patterns observed as one moves forward are compelling!"*

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?"*


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
add
and
average
count
distinct
div
eq
fn
gt
gte
iff
isa
lt
lte
max
min
mod
mul
neq
not
or
orderby
range
select
stddev
sub
sum
update
variance
where
xor
IScaleMap
LinearScale
LogScale
OrdinalScale
QuantileScale
QuantitativeScale
RootScale
Scale
ScaleType
TimeScale
Arrays
Colors
Dates
Displays
Filter
Geometry
IEvaluable
IPredicate
IValueProxy
Maths
Orientation
Property
Shapes
Sort
Stats
Strings
FibonacciHeap
HeapNode
DenseMatrix
IMatrix
SparseMatrix
ColorPalette
Palette
ShapePalette
SizePalette
Visualization
Axes
Axis
AxisGridLine
AxisLabel
CartesianAxes
AnchorControl
ClickControl
Control
ControlList
DragControl
ExpandControl
HoverControl
IControl
PanZoomControl
SelectionControl
TooltipControl
Data
DataList
DataSprite
EdgeSprite
NodeSprite
ScaleBinding
Tree
TreeBuilder
ArrowType
EdgeRenderer
IRenderer
ShapeRenderer
DataEvent
SelectionEvent
TooltipEvent
VisualizationEvent
Legend
LegendItem
LegendRange
IOperator
Operator
OperatorList
OperatorSequence
OperatorSwitch
SortOperator
BifocalDistortion
Distortion
FisheyeDistortion
ColorEncoder
Encoder
PropertyEncoder
ShapeEncoder
SizeEncoder
FisheyeTreeFilter
GraphDistanceFilter
VisibilityFilter
Labeler
RadialLabeler
StackedAreaLabeler
AxisLayout
BundledEdgeRouter
CircleLayout
CirclePackingLayout
DendrogramLayout
ForceDirectedLayout
IcicleTreeLayout
IndentedTreeLayout
Layout
NodeLinkTreeLayout
PieLayout
RadialTreeLayout
RandomLayout
StackedAreaLayout
TreeMapLayout

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?

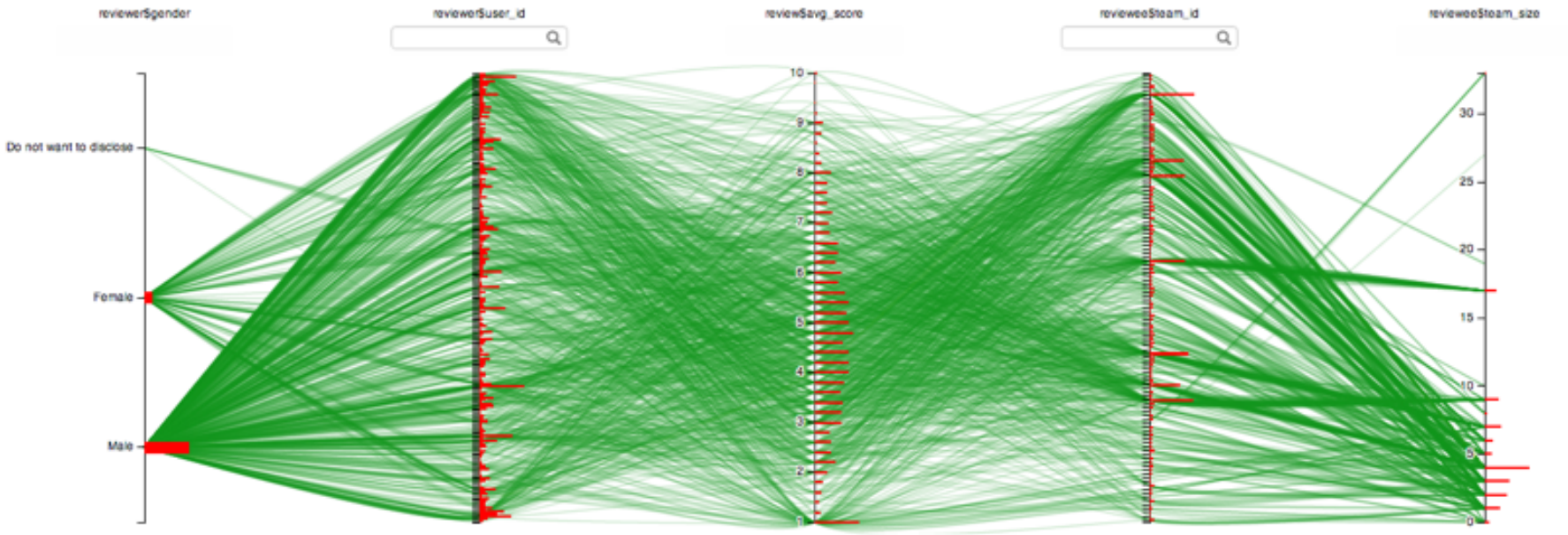
You could incorporate information from applications that use this code? How often are different modules used?

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…

Data fields were configured to focus on the most relevant features.
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?

Critique Categories

Visualization Design
Choice of visual encodings (expressive, effective?)
Is the appropriate information visible by default?

Interaction Design
Choice of interaction techniques
Do they enhance understanding of the data?
Usability, discoverability, performance

Overall Design Quality
Organization, legibility, fitness for chosen goals

https://cse442-18f.github.io/A3-Trial-by-Fire
https://cse442-18f.github.io/A3-fakenews
https://cse442-18f.github.io/A3-superviz
https://cse442-18f.github.io/A3-An-Overview-of-Food-Prices
https://cse442-18f.github.io/A3-Opioid-Crisis-Tracker
https://cse442-18f.github.io/A3-fightingFire
https://cse442-18f.github.io/A3-Video-Games-Sales
https://cse442-18f.github.io/A3-Evolution-of-Chicago-Crime
https://cse442-18f.github.io/A3-college
https://cse442-18f.github.io/A3-theYoungWranglers
https://cse442-18f.github.io/A3-Global-HIV-Incidence-and-Prevalence
https://cse442-18f.github.io/A3-Food-Safety-in-King-County
https://cse442-18f.github.io/A3-Student-Performance-Indicators
https://cse442-18f.github.io/A3-Connect-the-Dots
https://cse442-18f.github.io/A3-What-movies-pass-the-Bechdel-Test
https://cse442-18f.github.io/A3-US-Forest-Fires
https://cse442-18f.github.io/A3-Snowfall-in-the-US
https://cse442-18f.github.io/A3-Seattle-Crime-Visualizer
https://cse442-18f.github.io/A3-US-Food-Import-Map
https://cse442-18f.github.io/A3-American-Masculinity
https://cse442-18f.github.io/A3-us_historical_elections
https://cse442-18f.github.io/A3-Riding-With-Strangers
https://cse442-18f.github.io/A3-Life-After-College
https://cse442-18f.github.io/A3-Election-Integrity
https://cse442-18f.github.io/A3-Money-In-Politics
https://cse442-18f.github.io/A3-Medicaid-Across-America