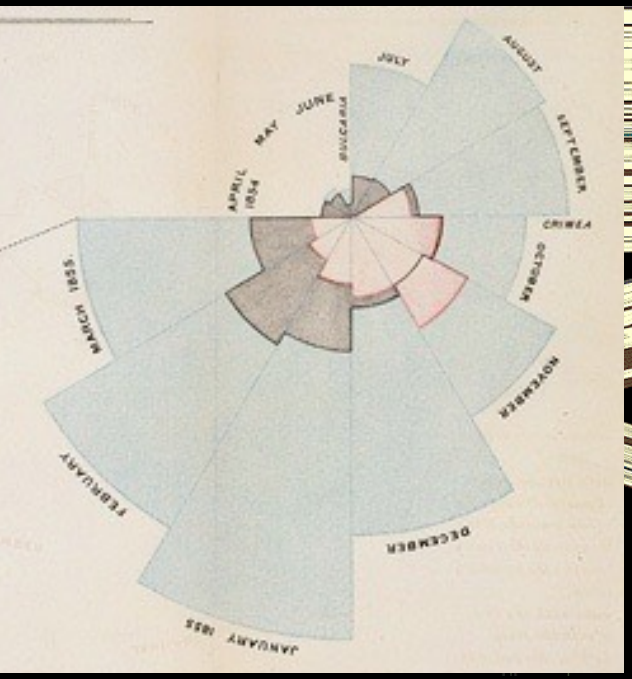
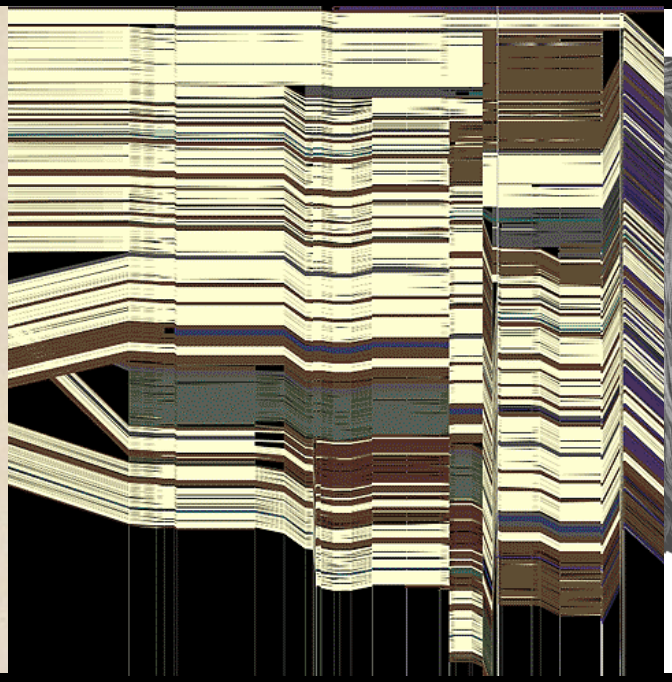
CSE 442 - Data Visualization

Design Review & Critique





Jeffrey Heer University of Washington

Final Project

Final Project

Produce an **explorable visual explanation**

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

Final deliverables and **video presentation**

Submit and **publish online** (GitHub)

Projects from **previous classes** have been:

- Published as research papers
- Shared widely (some in the New York Times!)
- Released as successful open source projects

Final Project Theme

Explorable Explanations

Goal: produce an interactive web page that explains a complex subject to the reader.

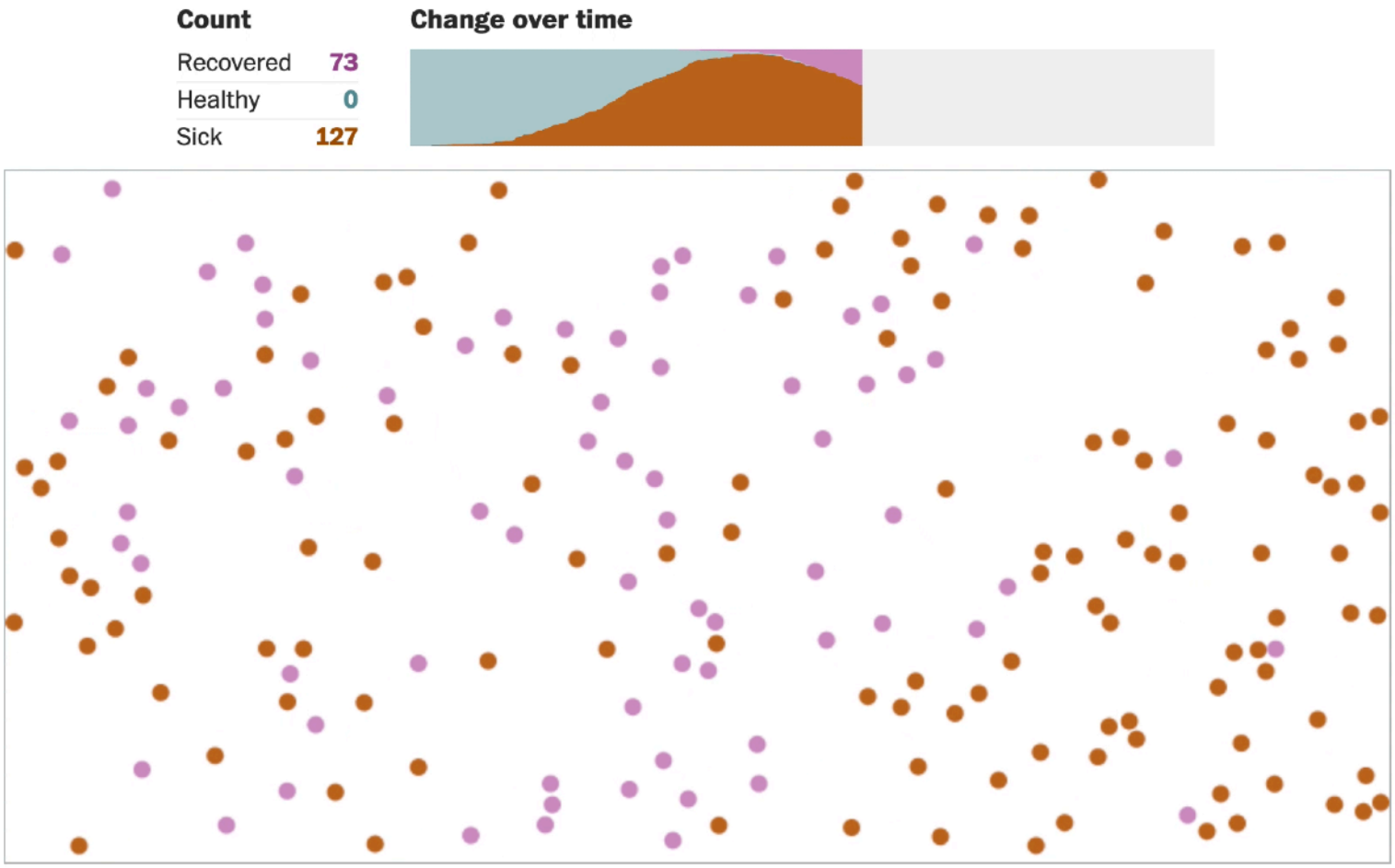
The topic could be a scientific phenomenon, a computer science algorithm, a mathematical concept, a sociological theory, or another topic that you're passionate about.

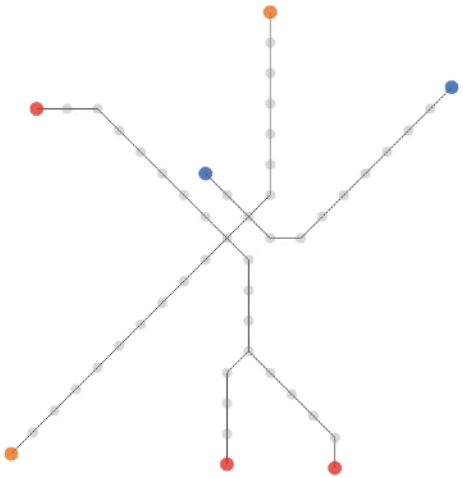
Focus on creating one or more interactive diagrams interlinked with explanatory text or annotations. We urge you to focus on a highly visual or interactive experience. Do not expect a viewer to read large amounts of article text.

Inspiration…

Why outbreaks like coronavirus spread exponentially, and how to “flatten the curve”

Harry Stevens, Washington Post 2020

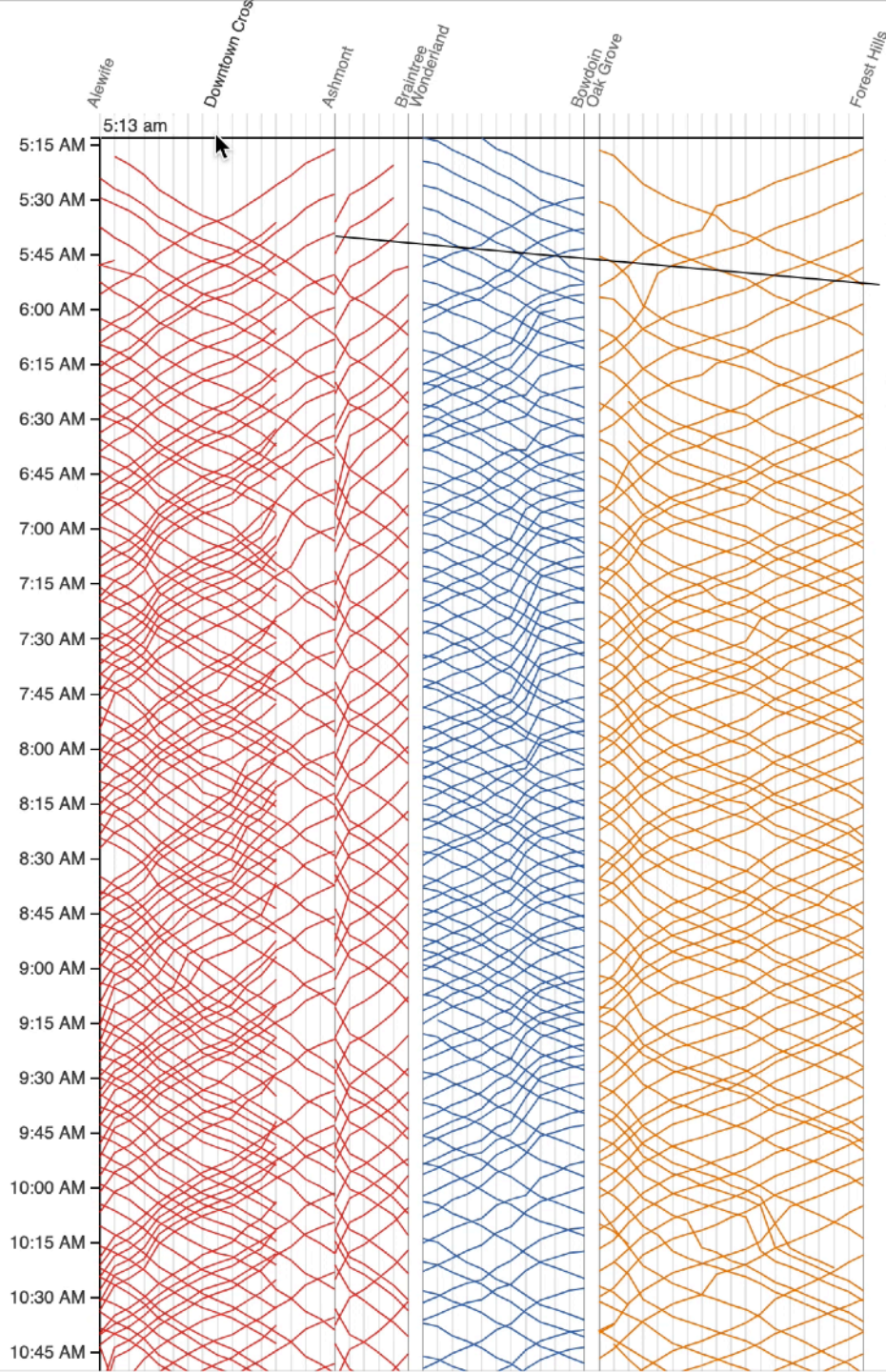




Locations of each train on the red, blue, and orange lines at 5:13 am. Hover over the diagram to the right to display trains at a different time.

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

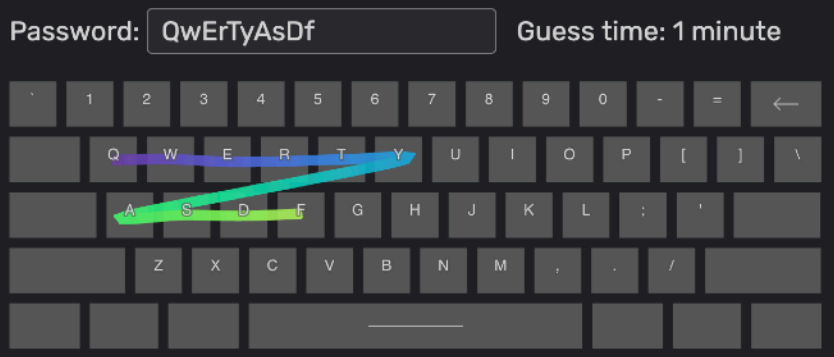
Barry & Card

KEYBOARD WALKING

Passwords with a “keyboard walking” pattern start at an arbitrary key, then move in a direction (usually right or down) while continuing to hit keys. Sometimes this is combined with holding down the SHIFT key, so that some characters are uppercase or symbols to improve complexity.

While the generated password may seem to be random and unhackable, password crackers check for these keyboard patterns and guess them early on.

Many passwords in the leaked passwords dataset have a spatial pattern. Other than the numeric passwords like 123456, common keyboard walking offenders include qwerty and 1qaz@wsx.



Semantic Passwords

Vishal Devireddy (CSE 512, Spring '21)

Final Project Schedule

Proposal	Fri Feb 18
Prototype	Mon Feb 28
Demo Video	Wed Mar 9
Video Showcase	Thu Mar 10 (in class)
Deliverables	Mon Mar 14

Logistics

Final project description posted online

Work in groups of up to 4 people

Start determining your project topic!

Tips for a Successful Project

Choose a **well-scoped topic** to explain.
Be clear about what you want people to learn.

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!)

A3 Prototype Peer Reviews

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?"*

TreeMapLayout
StackedAreaLayout
RandomLayout
RadialTreeLayout
PieLayout
NodeLinkTreeLayout
Layout
IndentedTreeLayout
IcicleTreeLayout
ForceDirectedLayout
DendrogramLayout
CirclePackingLayout
BundledEdgeRouter
AxisLayout
StackedAreaLabeler
RadialLabeler
Labeler
VisibilityFilter
GraphDistanceFilter
FisheyeTreeFilter
ShapeEncoder
PropertyEncoder
ColorEncoder
Encoder
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
Matrix
DenseMatrix
HeapNode
FibonacciHeap
String
Stats
Sort
Shape
Property
Orientation
Maths
IValueProxy
IPredicate
IEvaluable
Geometry
Filter
Displays
Data
Colors
Arrays
TimeScale
ScaleType
Scale
RootScale
QuantitativeScale
QuantileScale
OrdinalScale
LogScale
LinearScale
IScaleMap
AgglomerativeCluster
CommunityStructure
HierarchicalCluster
MergeEdge
BetweennessCentrality
LinkDistance
MaxFlowMinCut
ShortestPaths
SpanningTree
AspectRatioBanker
Easing
FunctionSequence
IEvaluable
Parallel
Pause
Scheduler
Sequence
Transition
TransitionEvent
Transitioner
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
false
gt
gte
if
isa
lt
lte
max
min
mod
mul
neg
not
or
query
range
sub
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?

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

A3 Peer Reviews

Review **three** A3 submissions (assigned on Canvas)

Submit **three** critique forms by **Mon 2/21, 11:59**

Follow **I like / I wish / What if?** format for critiques
Be positive! Be constructive! Share wild ideas!

https://courses.cs.washington.edu/courses/cse442/22wi/a3-review.html

Reminders!

Final Project Proposal Due **Fri 2/18, 11:59pm**

https://courses.cs.washington.edu/courses/cse442/22wi/fp.html

Three Peer Evaluations Due **Mon 2/21, 11:59pm**

https://courses.cs.washington.edu/courses/cse442/22wi/a3-review.html