CSE512 :: 27 Feb 2014

Final Project Progress Presentation

@CSE305

CSE512 Students University of Washington

Where is your bus?

Let's find out. We provide easy access to real-time transit information for the Puget Sound region and beyond.

Our Goal

What is OneBusAway? **Find out.**

We want to make it easier to use public transit by providing easy access to schedule and real-time arrival information for the buses and trains you ride every day.

We provide:

- Real-time arrival information for a number of transit agencies.
- Arrival info for every bus stop.
- Easy access to information across a variety of devices.

Why? We're riders just like you and we don't like waiting for the bus any more than we have to.

Our Tools

Our tools are available across a number of interfaces:

Web | Phone | SMS

iPhone | Android | WP7

Mobile

Our Research

OneBusAway was started by students at the University of Washington, and it supports research on improving the usability of public transportation, such as the Explore Tool shown above. Check out our research page for more information.

Our work is all open-source software, so that others may reuse and build upon our efforts.

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OneBusAway

Home | Tools | Research | Contact Us | Settings

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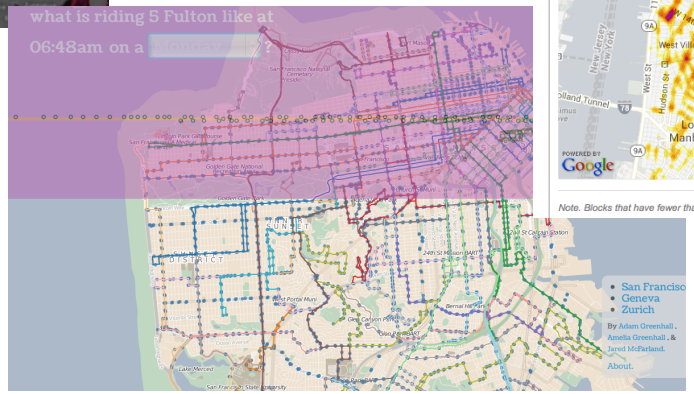
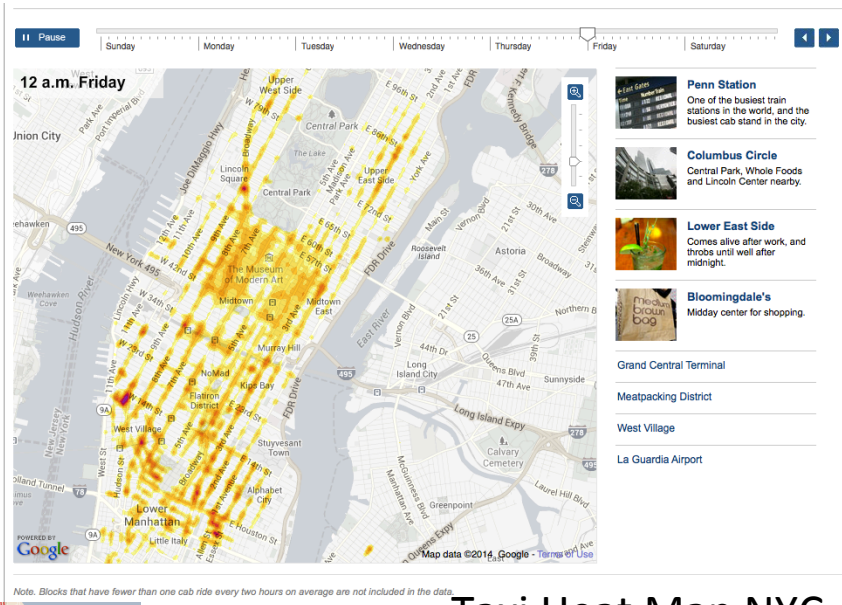
All the Ships in the World @ Google I/O 2013

youtube.com/watch?v=MT7cd4M9vzs



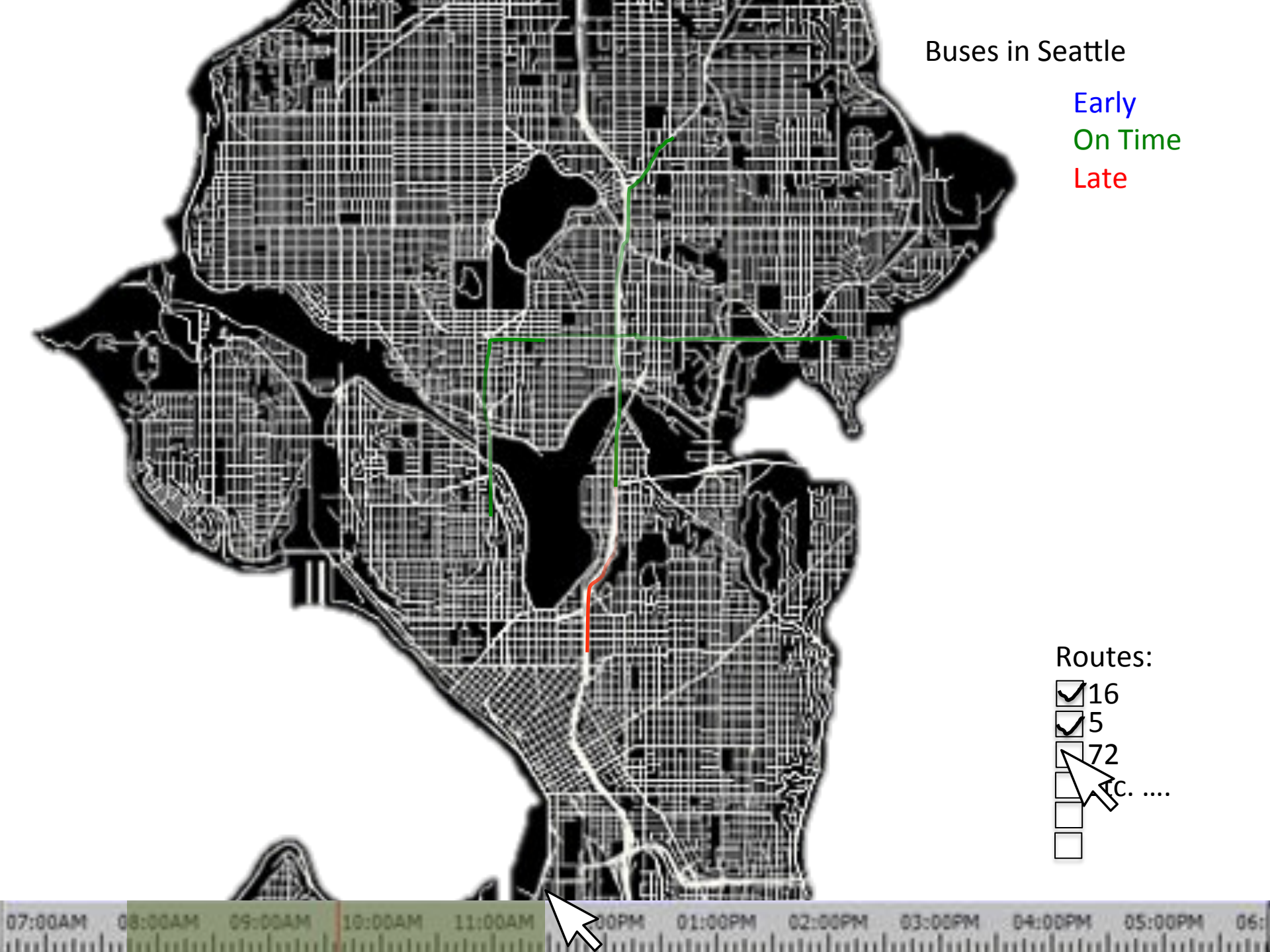
Dots on the Bus: San Francisco

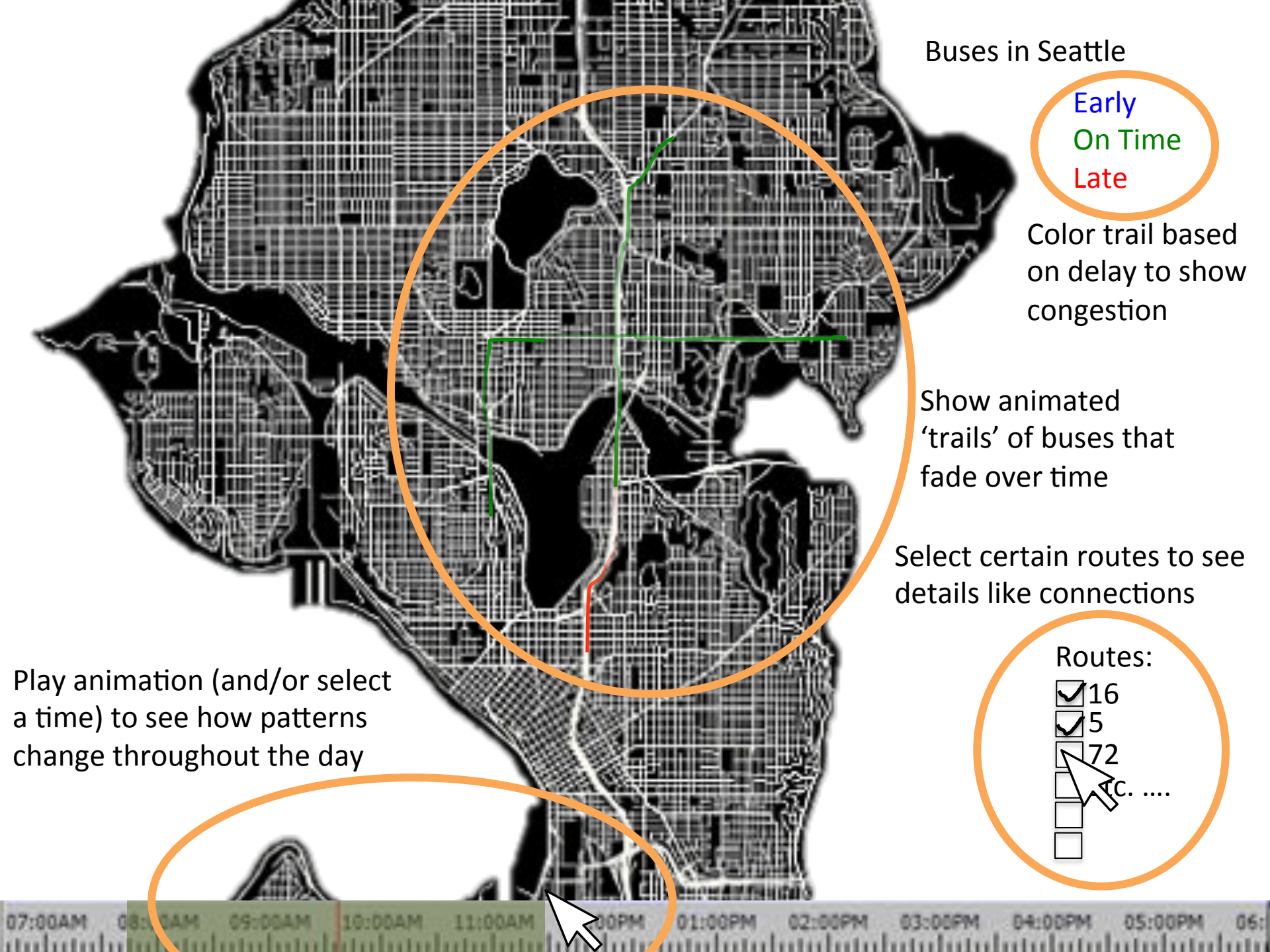
urban-data.herokuapp.com



Taxi Heat Map NYC

nytimes.com/interactive/2010/04/02/nyregion/taxi-map.html


Buses in Seattle
Early
On Time
Late
Routes:
16
5
72
c. ....
07:00AM
08:00AM
09:00AM
10:00AM
11:00AM
01:00PM
02:00PM
03:00PM
04:00PM
05:00PM


Buses in Seattle
Early
On Time
Late
Color trail based on delay to show congestion
Show animated 'trails' of buses that fade over time
Select certain routes to see details like connections
Routes:
16
5
72
etc. ....
Play animation (and/or select a time) to see how patterns change throughout the day
07:00AM
09:00AM
10:00AM
11:00AM
01:00PM
02:00PM
03:00PM
04:00PM
05:00PM

We'd like feedback on:

- Advice for geography tools that 'play nice' with D3 and Google
- Ideas on how to deal with "bus bunching"
- Suggestions for how to implement this so that the trails stick to routes instead of jumping across streets?

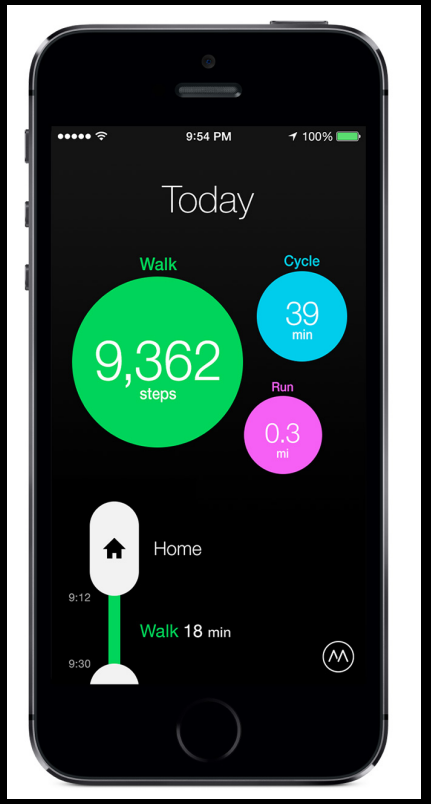
Camille Cobb, Caitlin Bonnar, Yi Pan, Katie Kuksenok

StepItUp: Context-Aware Visualizations to Motivate Increased Physical Activity

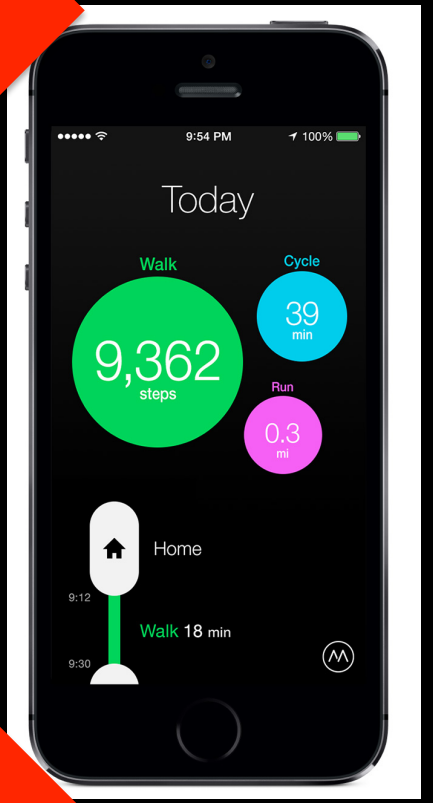
Daniel Epstein Felicia Cordeiro

CSE 512

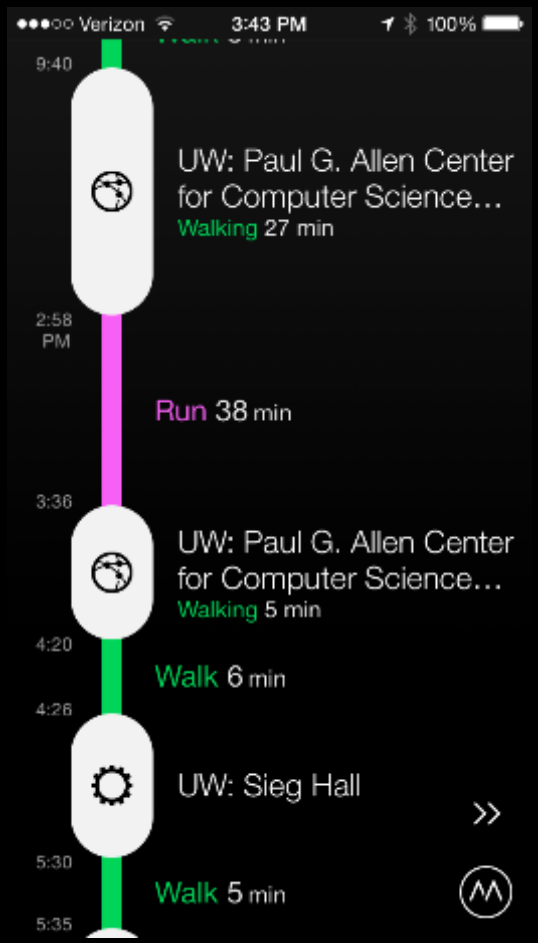
Problem Statement



Problem Statement

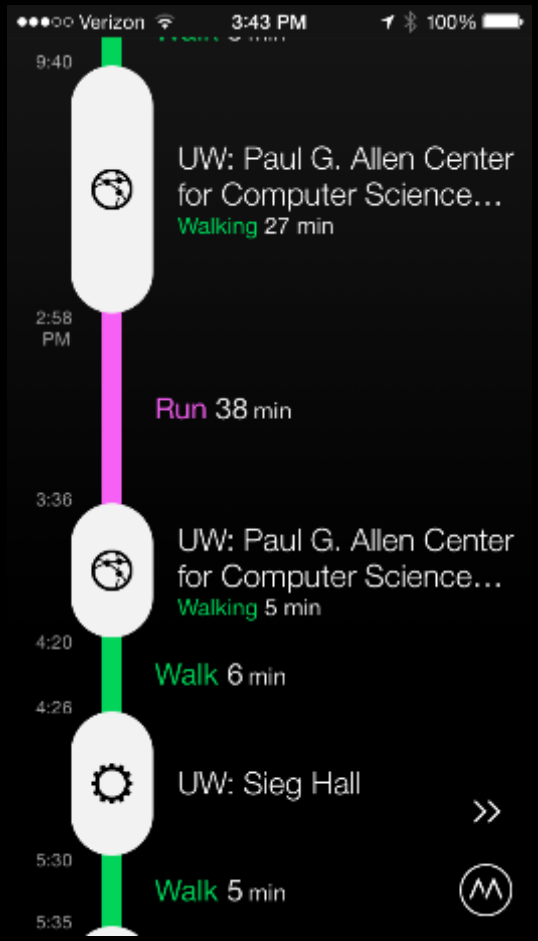


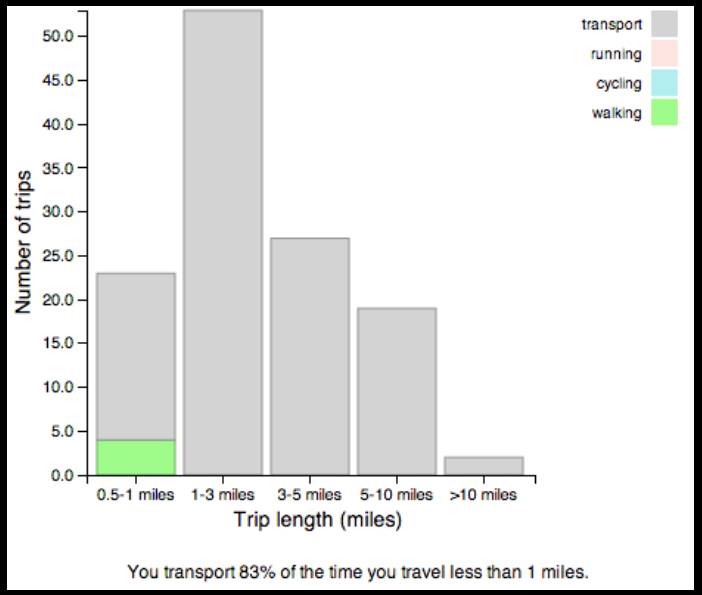
Related Work



Epstein DA, Cordeiro, F, Bales, E, Fogarty, J, & Munson, SA. Taming Data Complexity in Lifelogs: Exploring Visual Cuts through Personal Informatics Data. Submitted to DIS 2014.

Related Work





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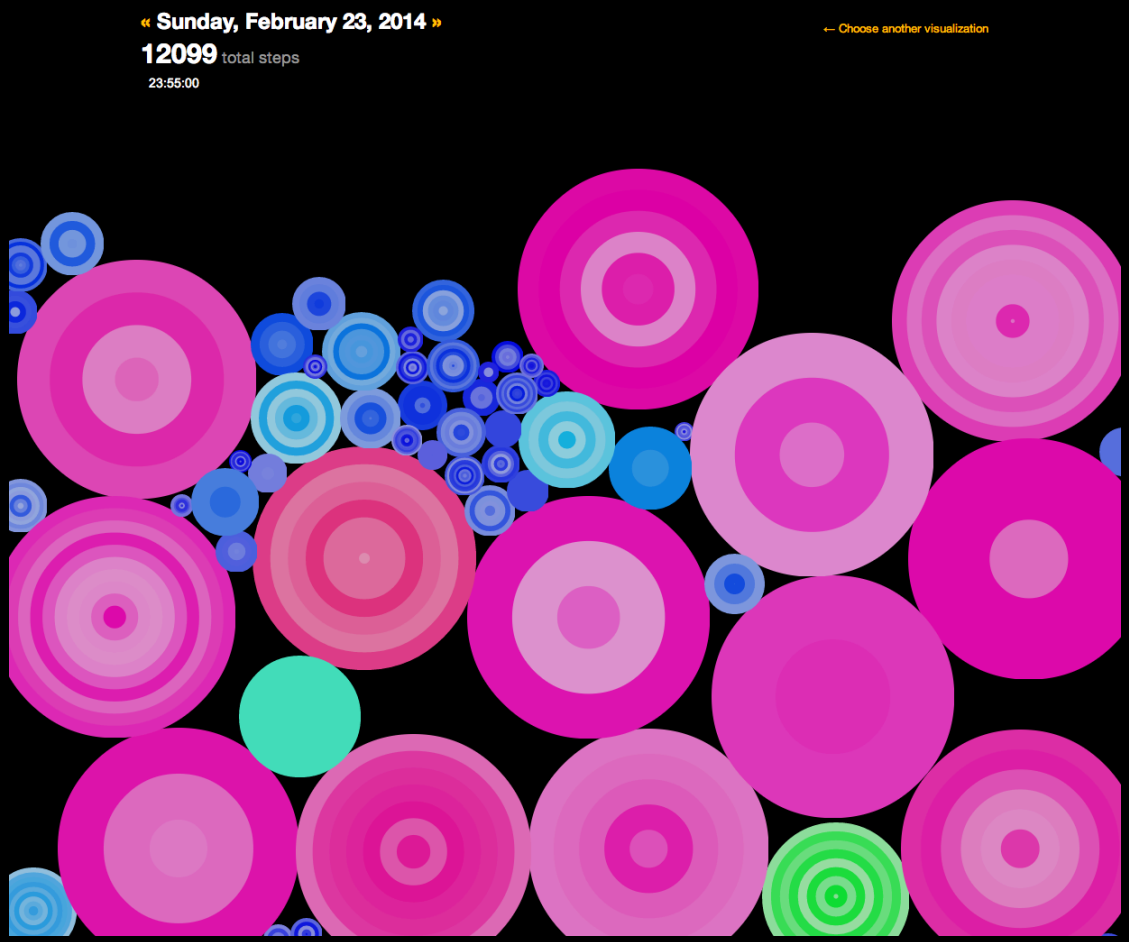
Related Work



Fan, C, Forlizzi, J, & Dey, A. A Spark of Activity: Exploring Information Art as Visualization for Physical Activity. UbiComp 2010.

Our Approach

Our Approach

Real-time

Our Approach

Real-time

Meaningful

Our Approach

Real-time

Meaningful

Motivational

Our Approach

Real-time

Meaningful

Motivational

Context-Aware

Our Approach

Real-time

Meaningful

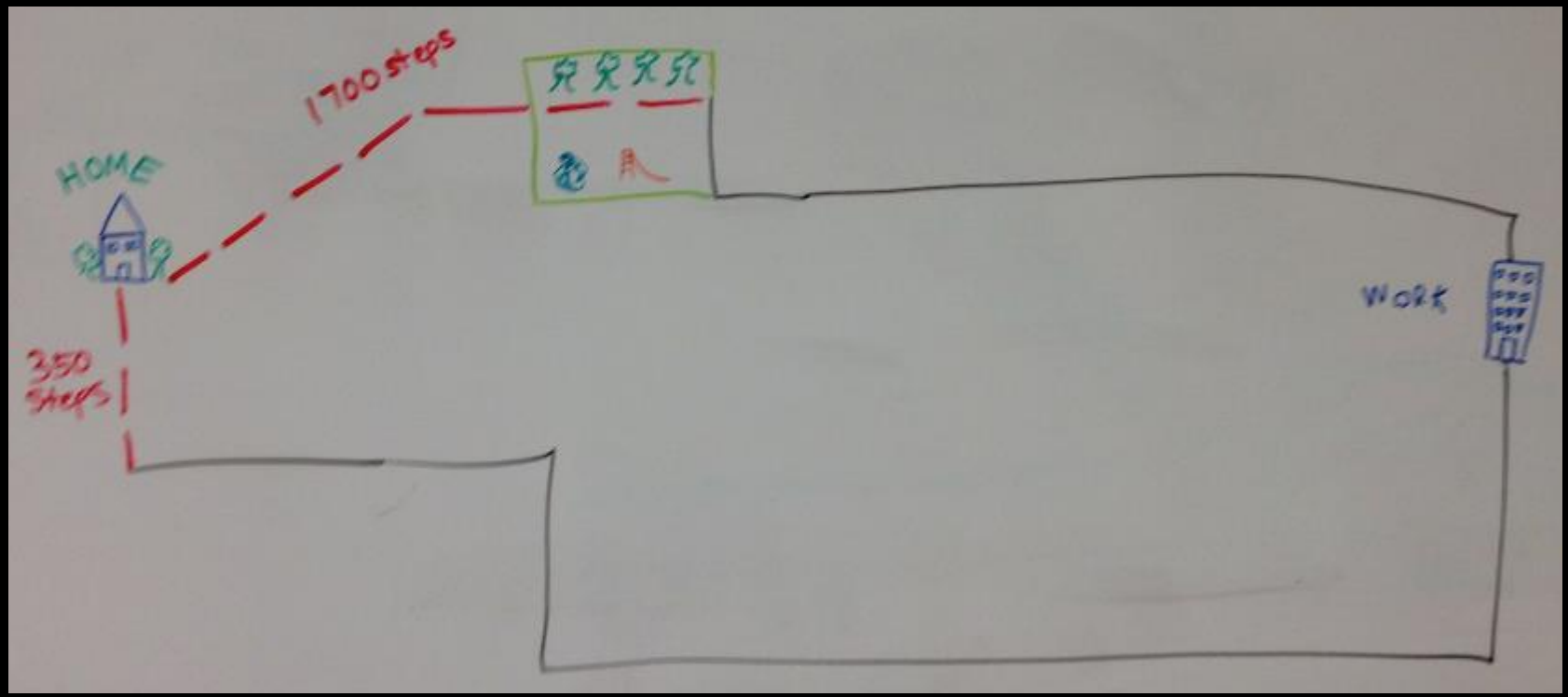
Motivational

Context-Aware

Visualizations!!

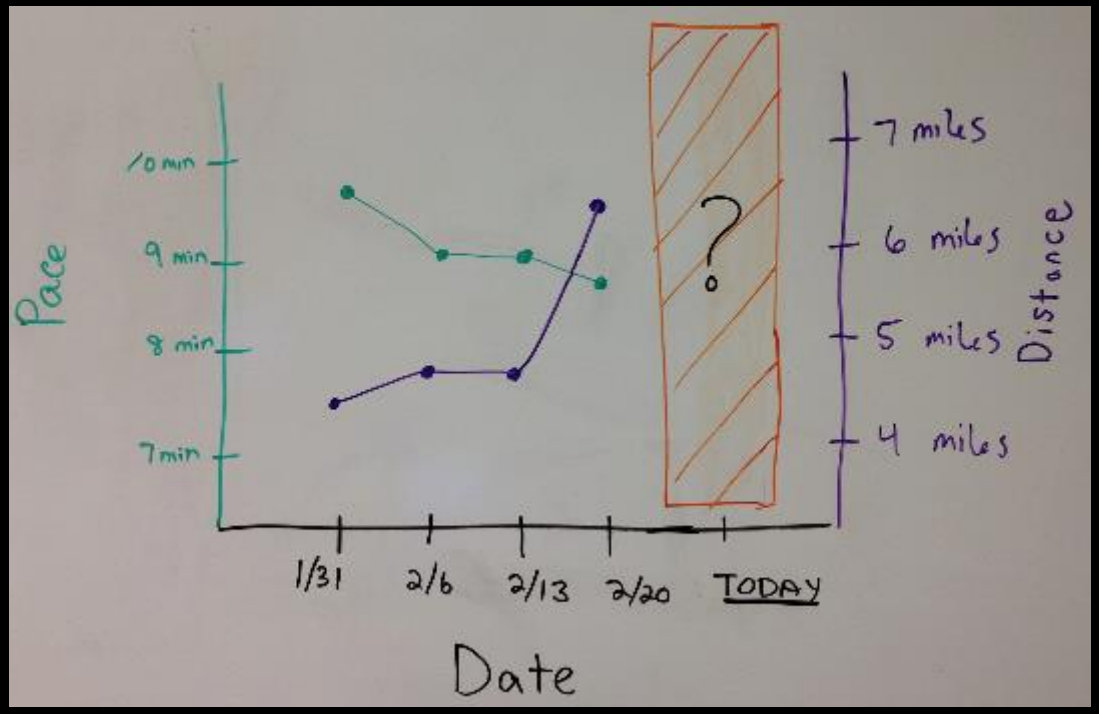
Current Progress

- You're about to leave work to go home.
- We know you always take the bus one of 2 ways.
- One way gets more steps than the other.
- We know you are short on steps for the day.
- We could present:



Current Progress

- We notice that you always run on Thursdays.
- It is Thursday evening, and you haven't run yet.
- We could present:

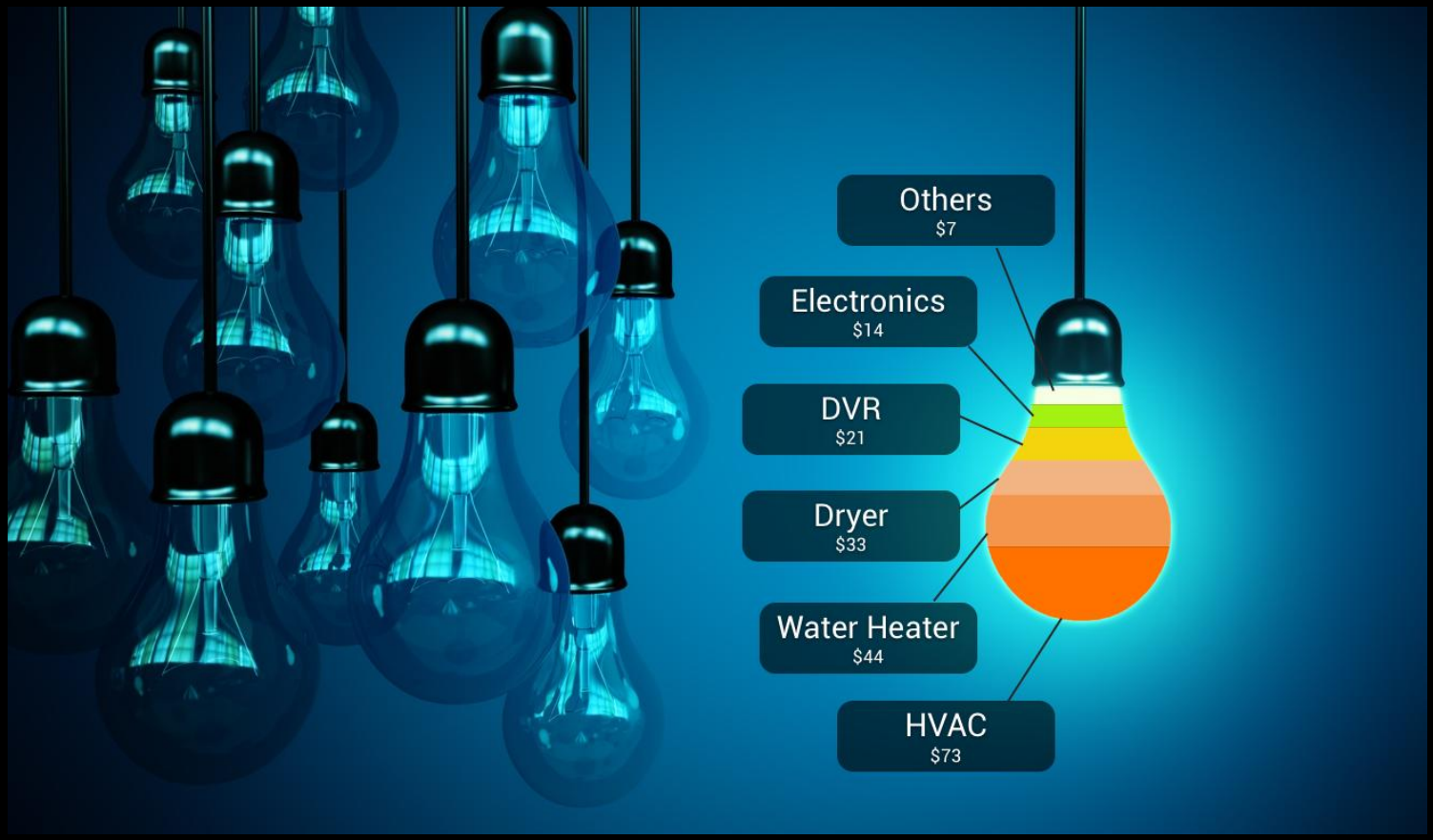


Feedback We Want

- What other scenarios can you imagine that utilize the ability to predict if someone is going to reach their step goal?

- Thoughts on what visualizations would be most effective in different situations. For example, how complex should the vis be for most impact on a mobile phone?

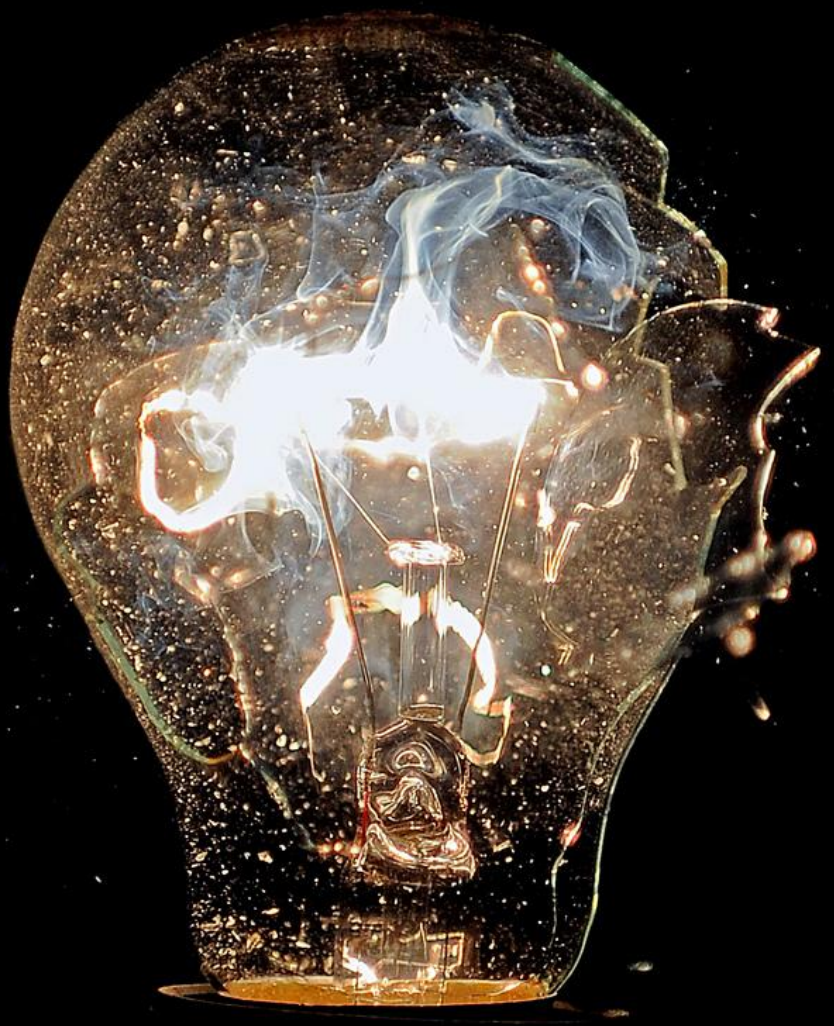
Real-Time Interactive Visualization of Disaggregated Energy Usage



Eric Mullen, Md Tanvir Islam Aumi, & Will Scott


Energy usage is
vastly misunderstood

Not just ‘visible’
Energy usage



400 homes survey by *Kempton et al.*

Consumers **incorrectly believed** they could save 2X more energy by reducing lighting rather than hot water usage

Your Energy Efficiency Report

ComEd
A Unicom Company

in partnership with
Belkin International, Inc.
PO Box 88888888
Cityname, ST 88888-8888

This report tells you specifically how your electricity was used last month, and suggests ways to save.

CHAD SINGER
2216 S. BENTLEY AVE #9
LOS ANGELES, CA 90064

Your billing period	Total Cost	Compared to last bill	Compared to Similar neighbors*
Sep 1 - Sep 28, 2011	$161.68	↓ $56.98 less (26%)	Similar

★ **You reduced the amount of power used for air conditioning by 76% last month!**

- That's 33% lower than that of similar neighbors!*
- If you maintain this level of usage, you'll save an estimated $271 this year.

⚠ **Your dishwasher used 53% more energy this month than your neighbors'.**

- You could save up to $180 a year by upgrading to an efficient dishwasher.
- If you find you often want to run the dishwasher before it is full, try the rinse-only feature common on newer models.

	Your top energy consumers	Estimated Cost**	Compared to last bill	Compared to similar neighbors*
	Electric Water Heater	$31.50	↑ $8.12 (26%)	similar
★	Air Conditioner	$29.82	↓ $48.23 (76%)	☺ 33% lower
	Refrigerator	$22.66	similar	11% higher
	Lighting	$13.90	↓ $14.06 (53%)	☺ 21% lower
⚠	Dishwasher	$11.55	similar	! 53% higher
	Stove	$10.01	↑ $0.61 (5%)	6% lower
	Dryer	$7.56	↑ $0.63 (11%)	similar
	Clothes Washer	$3.66	↓ $0.09 (4%)	similar

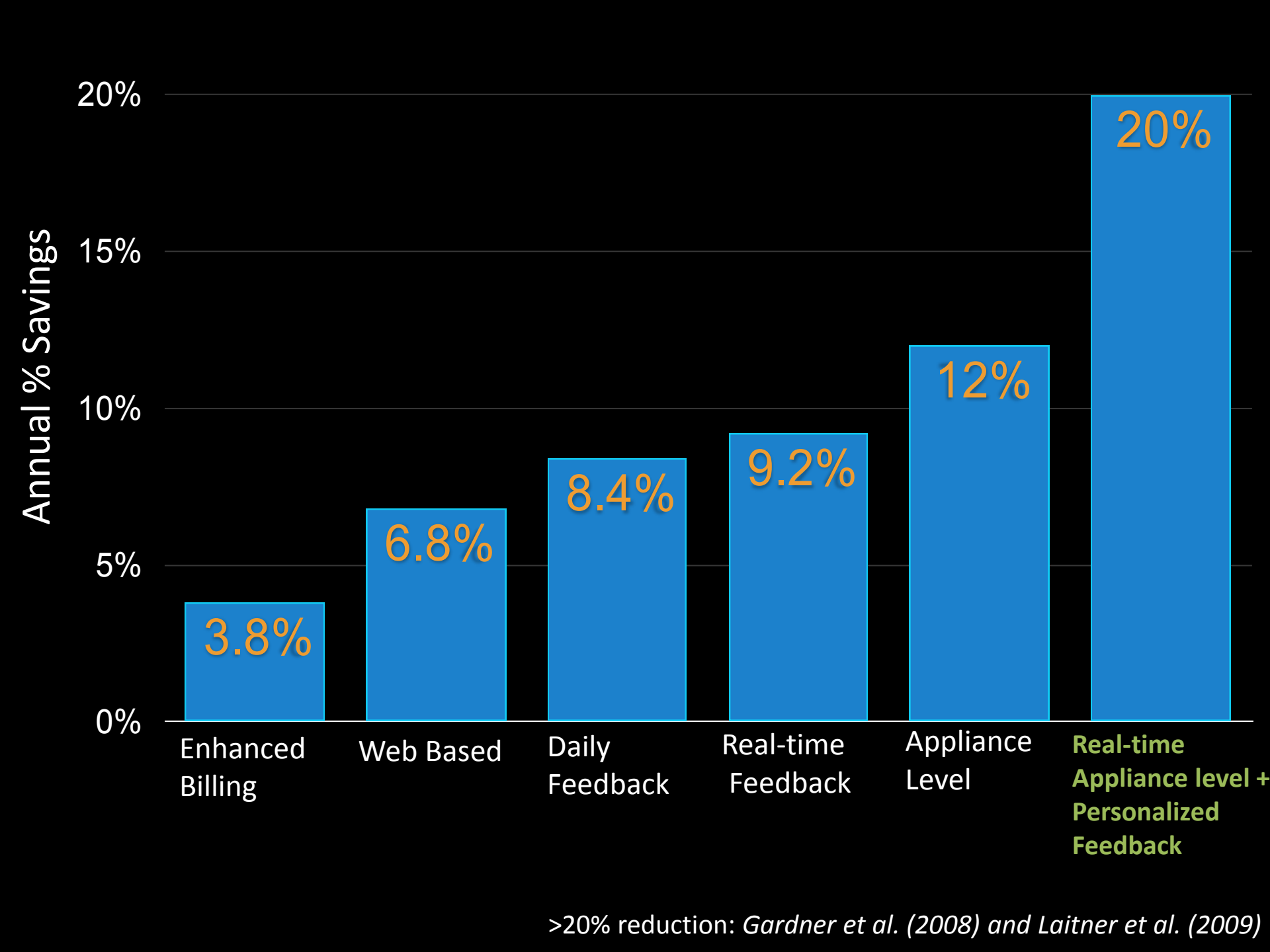
THINGS YOU CAN DO RIGHT NOW TO IMPROVE YOUR EFFICIENCY

Target 68°

Save more on heating costs this winter. Setting your thermostat a few degrees lower will really add to your savings.

Insulate your water heater

Adding an insulating blanket to your water heater can reduce standby heat losses and save water heating costs.



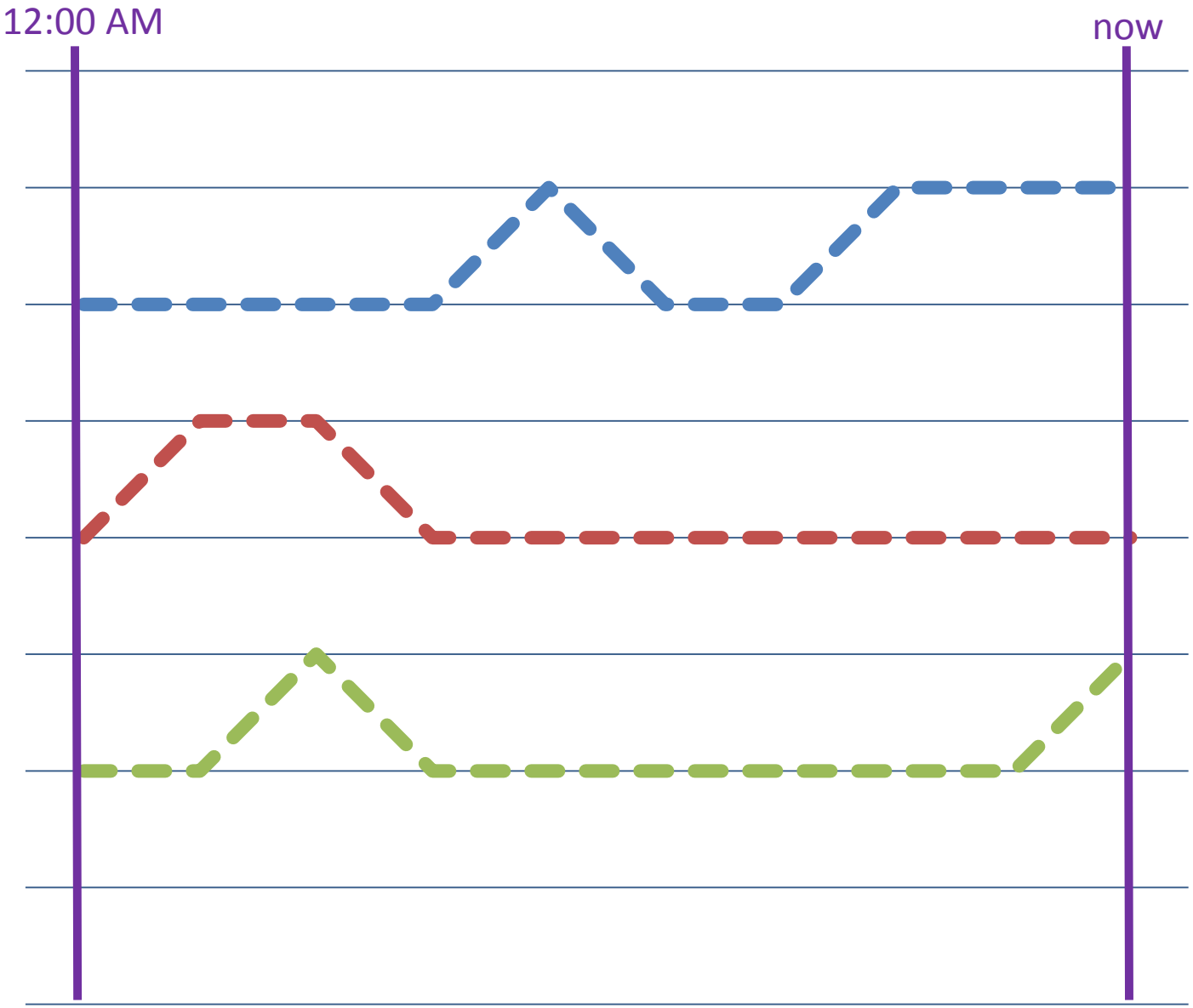
>20% reduction: *Gardner et al. (2008) and Laitner et al. (2009)*

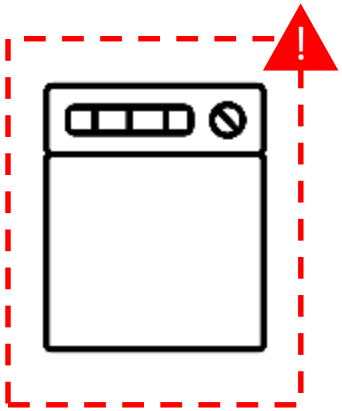
How much does each appliance consume in GALLONS OF GAS per YEAR ?

Appliance total 1,889 GALLONS OF GAS

Energy Dashboard

Total Usage Today:
121 kWh

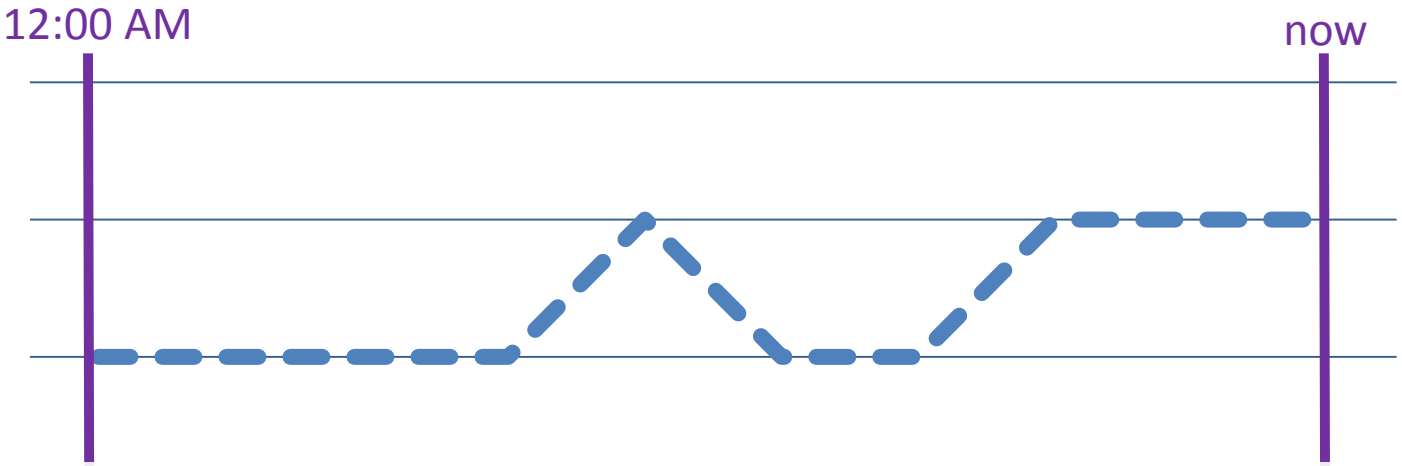


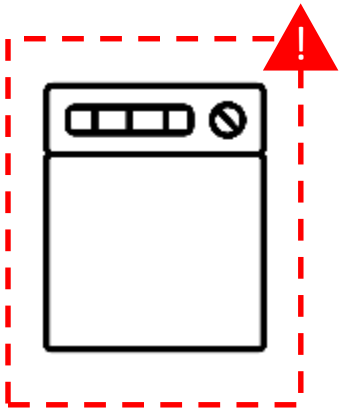


7

Energy Dashboard

Total Usage Today:
121 kWh





Dishwasher:

27%

of total usage

Replacement pays for self in:

2.5

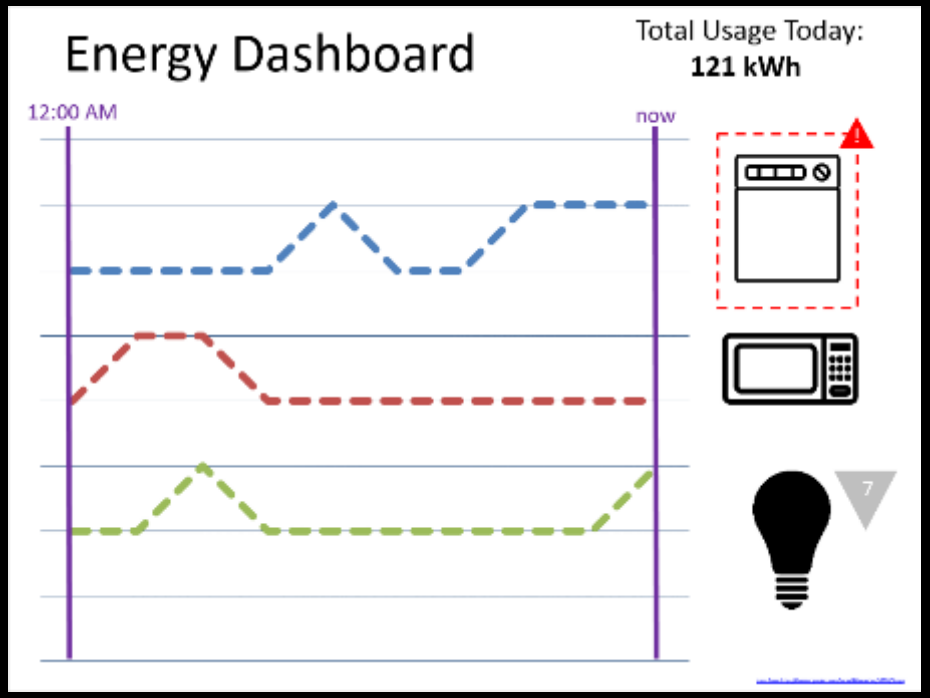
years

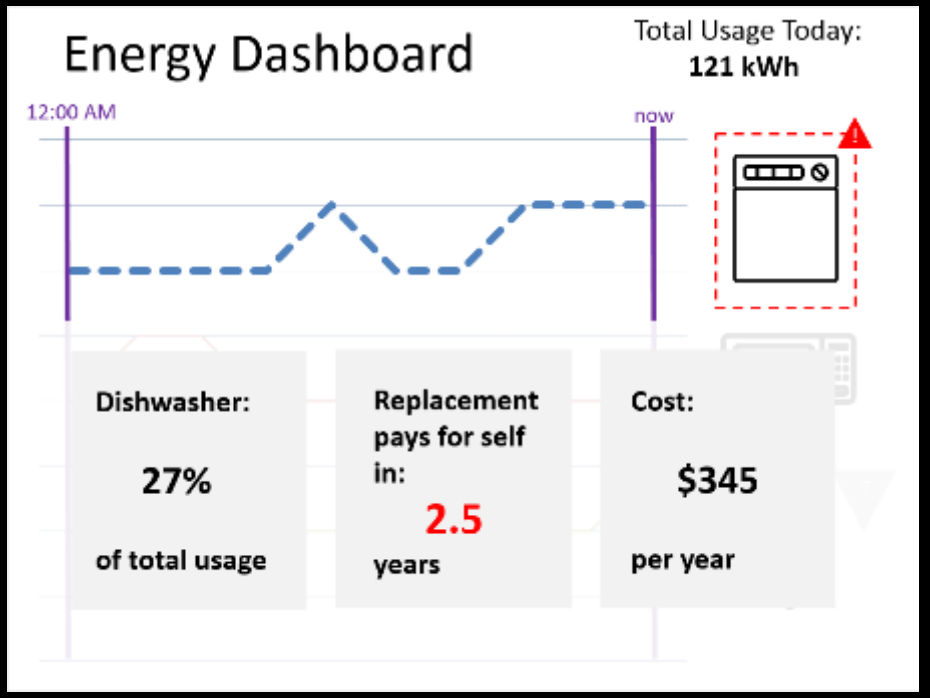
Cost:

$345

per year

Discussion





Eric Mullen
Md Tanvir Islam Aumi
Will Scott

Visualizing Data from a MOOC

Katelin Bailey, Jialin Li, Naveen Kr. Sharma

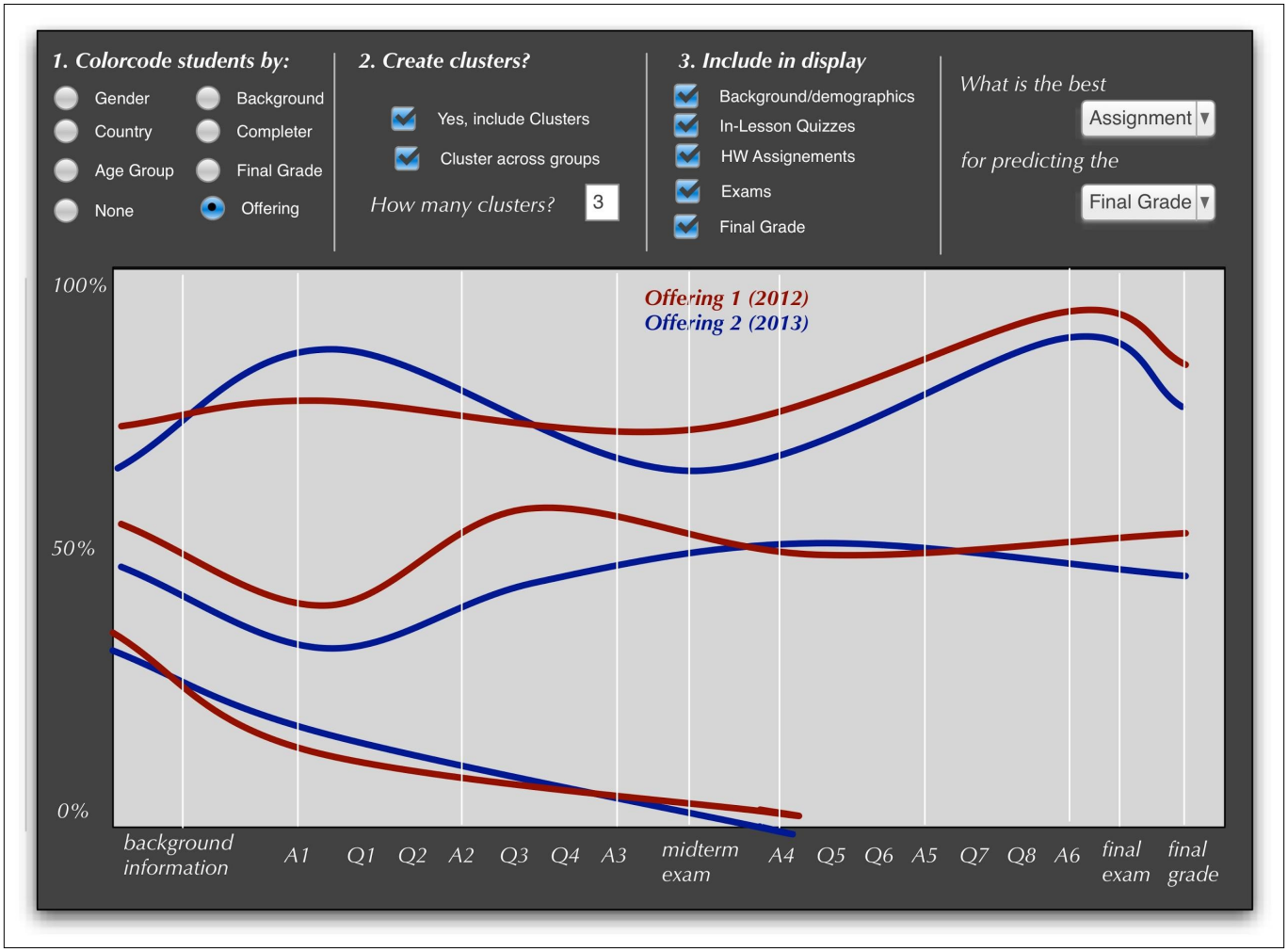
Data

- Data from 2 offerings of PL Coursera courses
  - Demographic information
    - Location, age, gender, nationality, background
  - Assignment results
  - Quizzes
  - Midterms, Finals
    - Scores for each problem
  - Final grades

Exploratory Questions

- Compare stats across 2 offerings
- Explore data instructors haven’t explored
  - Video watching
  - Forum participation
  - Quiz responses
- Correlations
  - Participation vs. scores?
  - Background vs. grades?
  - etc

Progress


1. Colorcode students by:
Gender
Country
Age Group
None
Background
Completer
Final Grade
Offering
2. Create clusters?
Yes, include Clusters
Cluster across groups
How many clusters?
3
3. Include in display
Background/demographics
In-Lesson Quizzes
HW Assignements
Exams
Final Grade
What is the best
Assignment
for predicting the
Final Grade
100%
50%
0%
Offering 1 (2012)
Offering 2 (2013)
background information
A1
Q1
Q2
A2
Q3
Q4
A3
midterm exam
A4
Q5
Q6
A5
Q7
Q8
A6
final exam
final grade

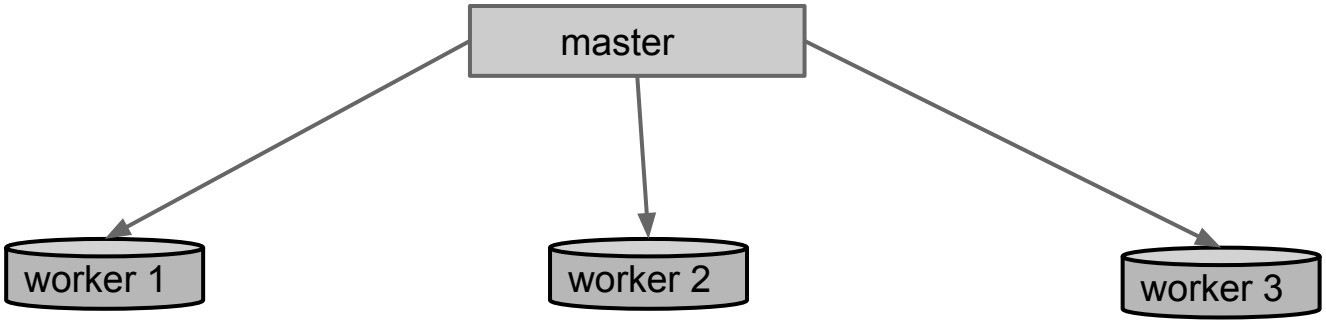
Questions for audience

- If you were the instructor, what do you like to learn from the data?
- What exploratory features you would like from the tool?
  - zooming in on specific questions?
  - stacking filters for more specific exploration?
  - map for geographical information?
  - correlation of time-submitted with grade?

Katelin Bailey, Jialin Li, Naveen Kr. Sharma

Visualizing Query Execution in a Distributed Database

Umar Javed, Thierry Moreau, Dominik Moritz, Adriana Szekeres

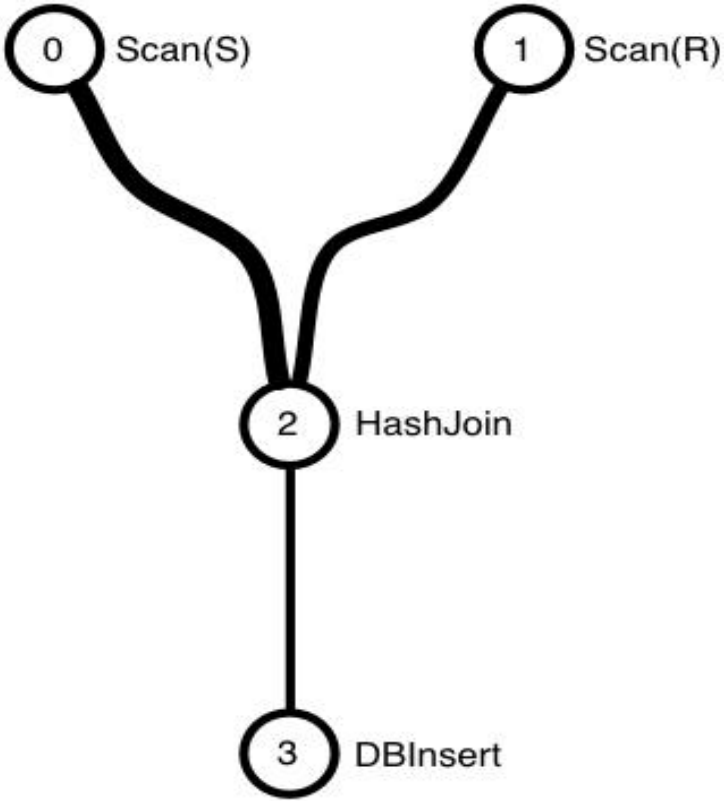


How can we make a **query** run **faster**?

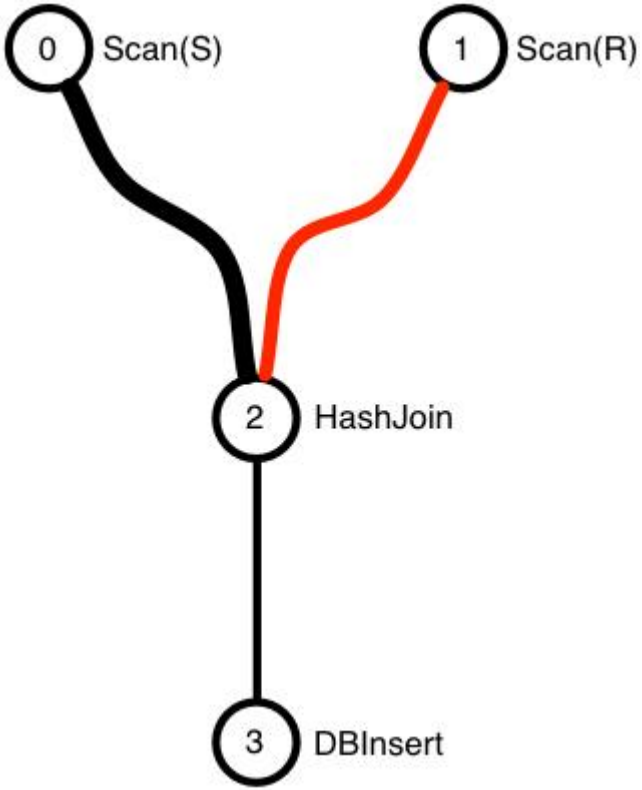
- Why is execution/data **skewed**?
- Which worker/node/operations is the **bottleneck**?
- How does **data flow**?

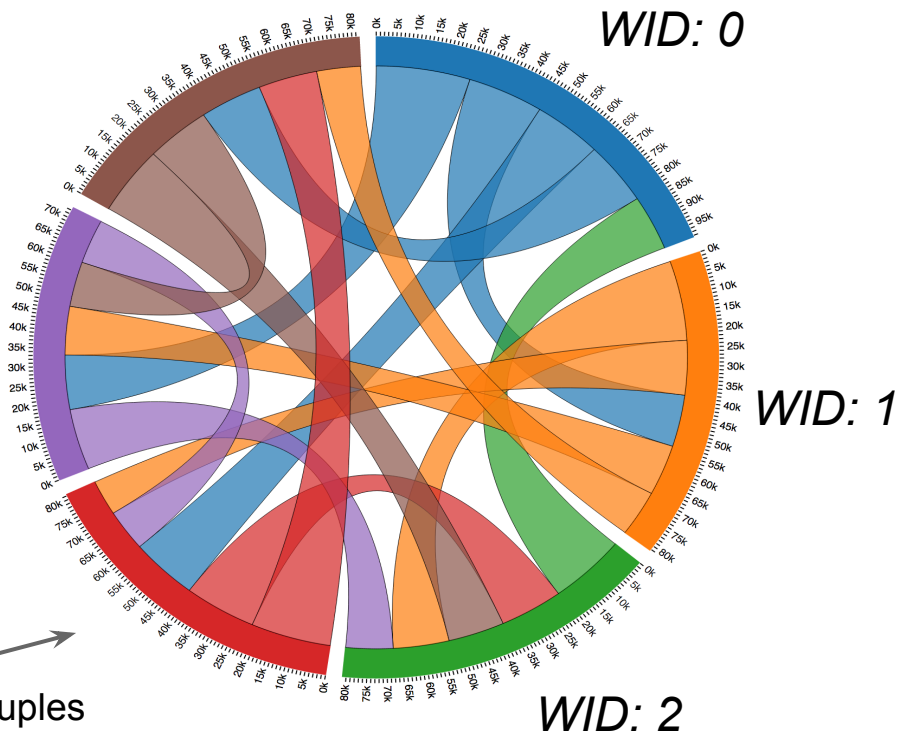
Query Plan

SELECT *
FROM S, R,
WHERE S.x = R.y

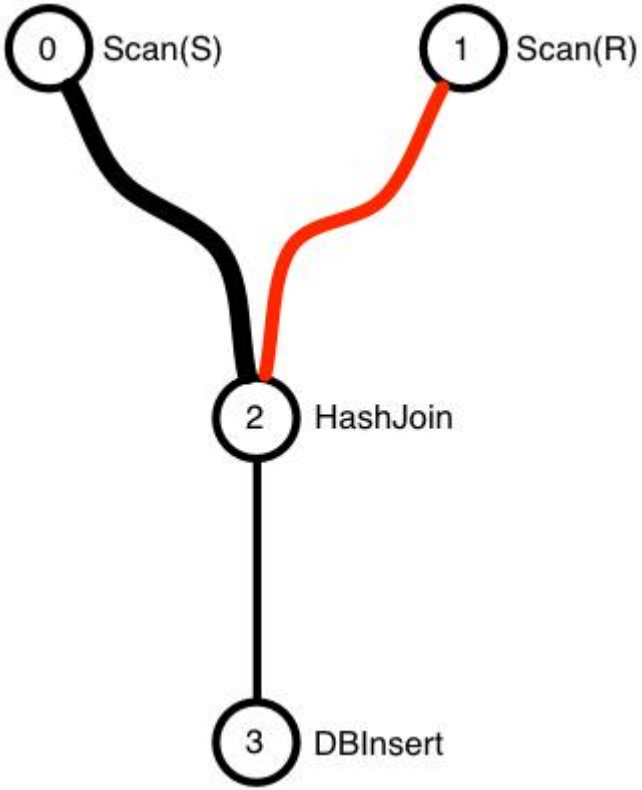


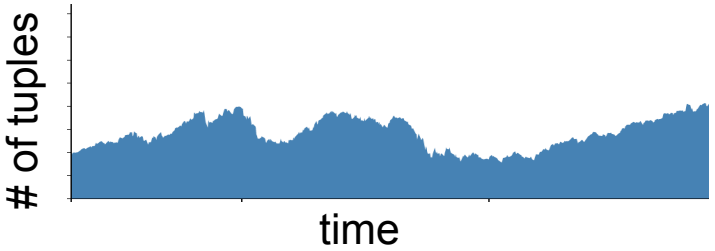
Data Flow Between Workers

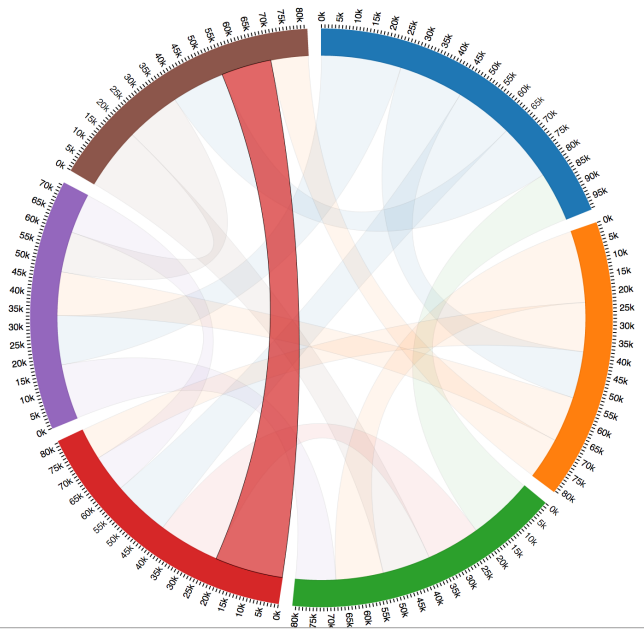




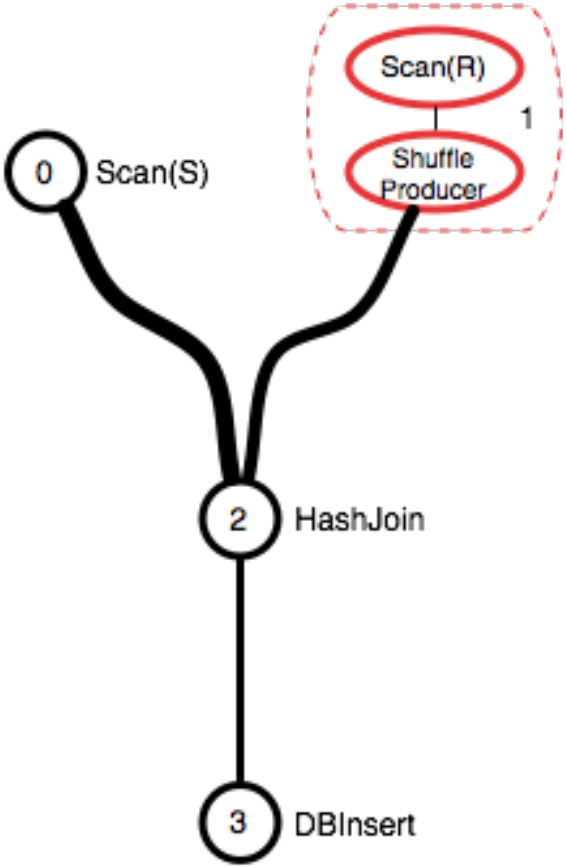
Data Flow Between a Pair of Workers

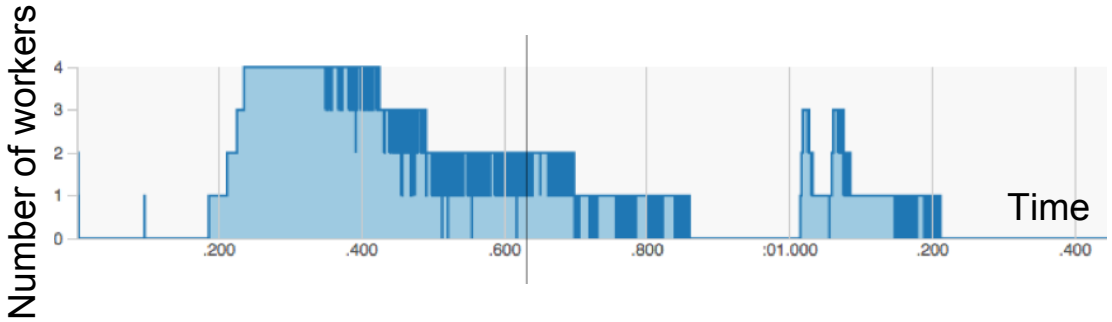




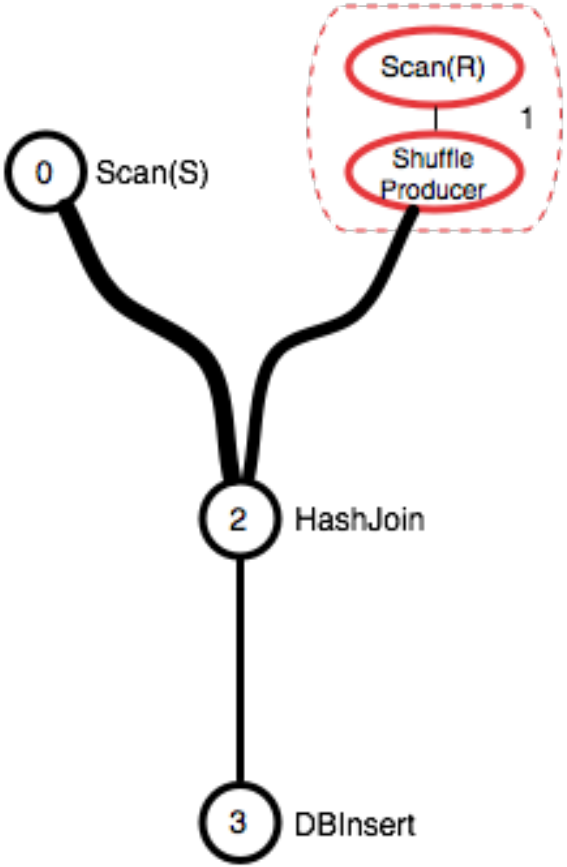


Computation at query segment





Computation at query segment



Feedback

Adriana Szekeres, Dominik Moritz,
Thierry Moreau, Umar Javed

- Did we address the questions?
- Are the chosen chart types effective?

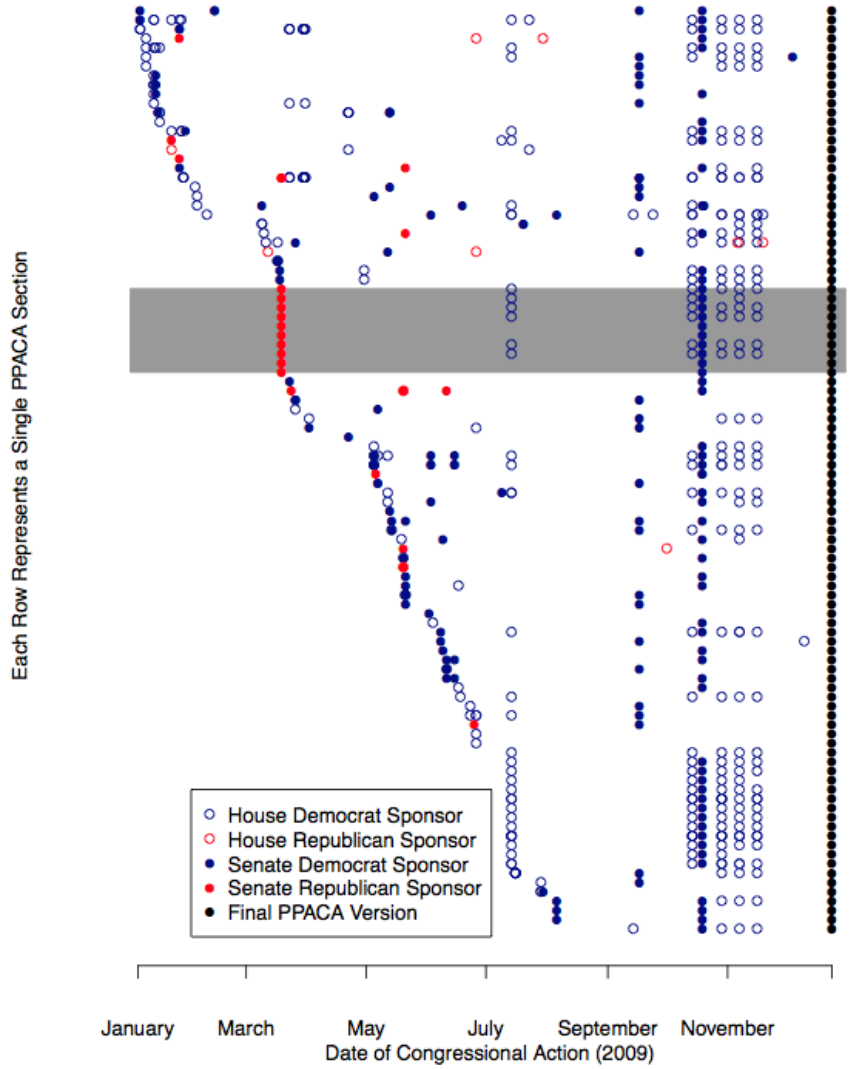
- Why is execution/data **skewed**?
- Which worker/node/operations is the **bottleneck**?
- How does **data flow**?

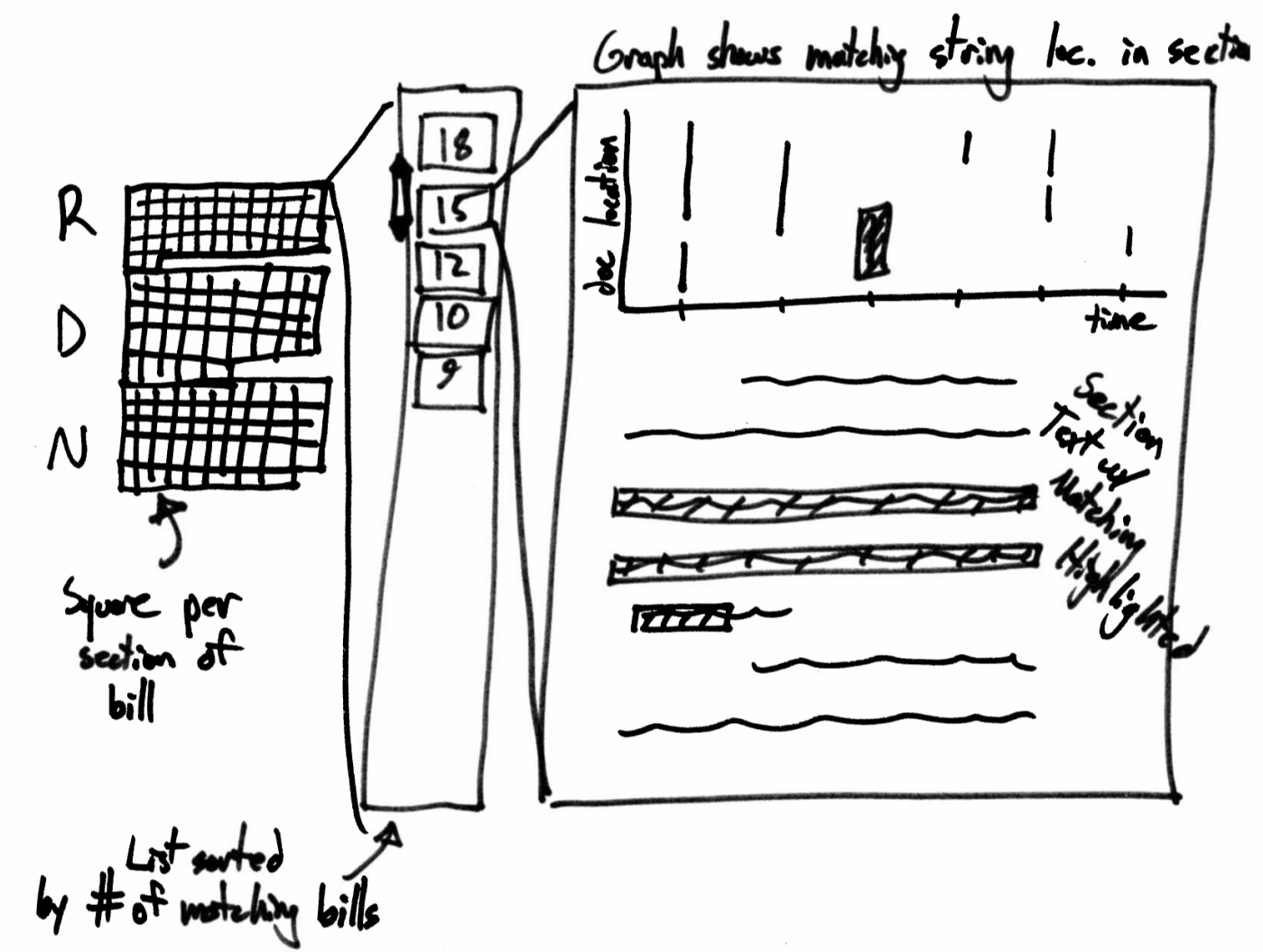
CSE 512
How A Bill Becomes A Law (HABBAL)

Rob Thompson
Lucy Williams
Sam Wilson

Project and Motivation

- How is federal bill text reused and adapted?
- Access to a large number of bill text comparison data
- Want to display comparisons between one bill (ObamaCare) and all others
- Communicate composition and history of one bill's text
  - A 'Democratic' bill may take text from many 'Republican' ones


Each Row Represents a Single PPACA Section
House Democrat Sponsor
House Republican Sponsor
Senate Democrat Sponsor
Senate Republican Sponsor
Final PPACA Version
January
March
May
July
September
November
Date of Congressional Action (2009)


Graph shows matching string loc. in section
R
D
N
18
15
12
10
9
doc location
time
Section Text w/ matching highlighted
Square per section of bill
List sorted by # of matching bills

Prior work

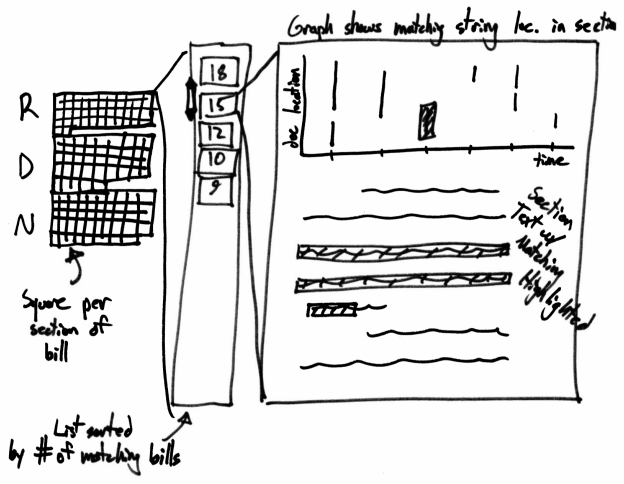
- John Wilkerson, David Smith and Nick Stramp. 2014. “Tracing the Flow of Policy Ideas in Legislatures: A Text Reuse Approach.”
- Smith, Temple F.; and Waterman, Michael S. (1981). "Identification of Common Molecular Subsequences". *Journal of Molecular Biology* **147**: 195–197.doi: 10.1016/0022-2836(81)90087-5. PMID 7265238.
- XKCD’s “Money” http://xkcd.com/980/

Questions

Is a long list sorted by importance acceptable?

How can text alignment data be shown/ explained effectively?

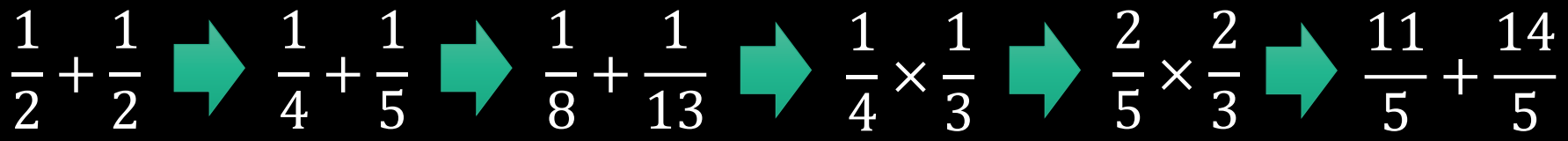
Is seeing section text interesting?

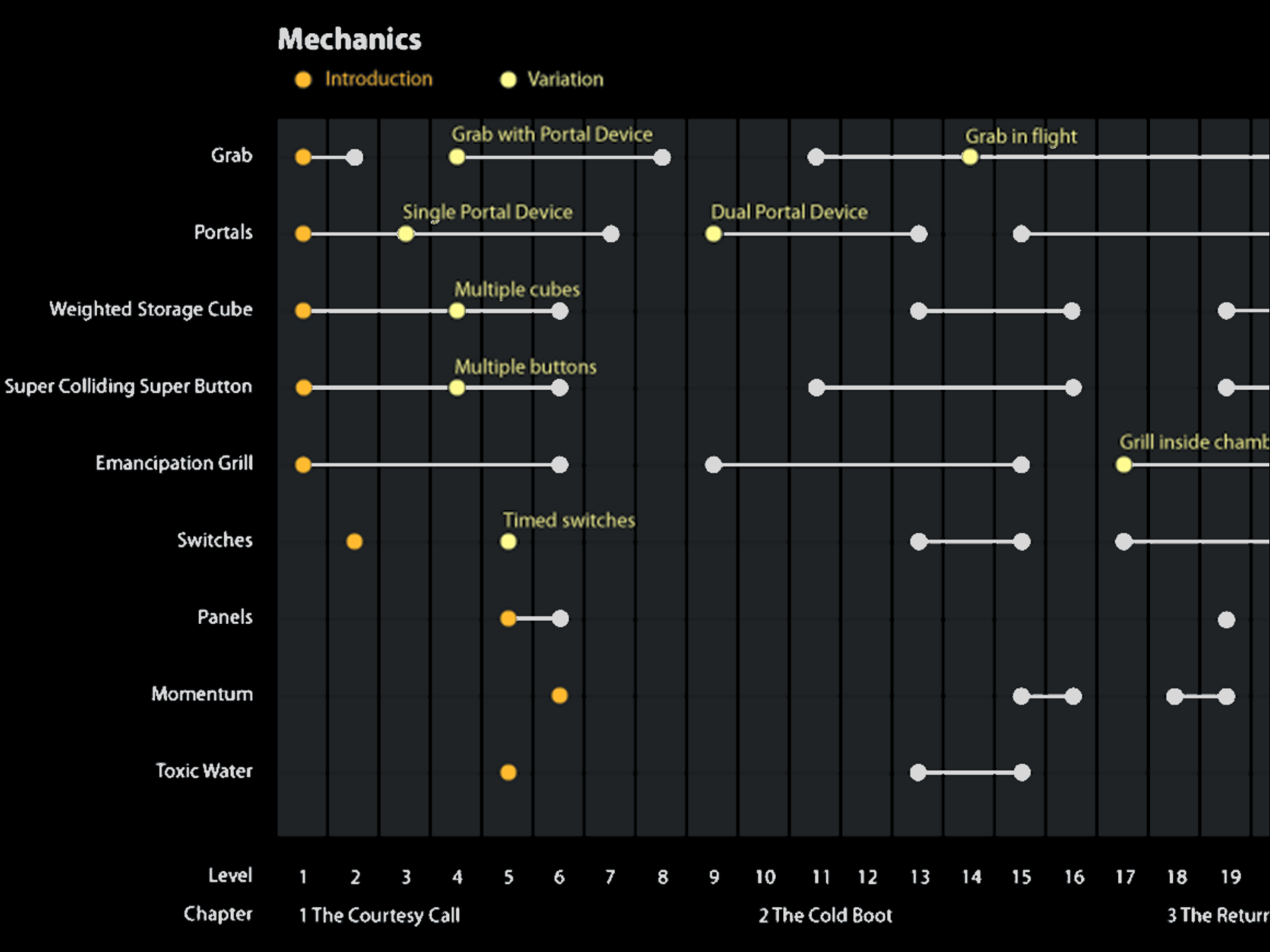


Rob Thompson, Lucia Williams, Sam Wilson

Visualizing Progression Plans for Education and Game Design

Eric Butler and Rahul Banerjee

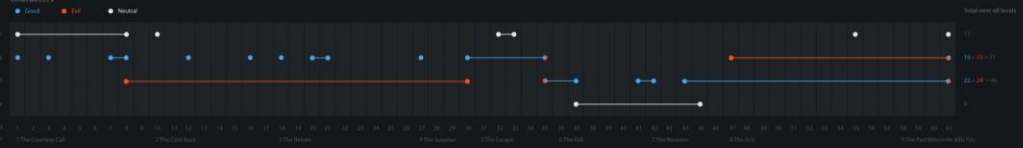

1/2 + 1/2
1/4 + 1/5
1/8 + 1/13
1/4 × 1/3
2/5 × 2/3
11/5 + 14/5


Mechanics
Introduction
Variation
Grab
Portals
Weighted Storage Cube
Super Colliding Super Button
Emancipation Grill
Switches
Panels
Momentum
Toxic Water
Grab with Portal Device
Grab in flight
Single Portal Device
Dual Portal Device
Multiple cubes
Multiple buttons
Grill inside chamb
Timed switches
Level
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Chapter
1 The Courtesy Call
2 The Cold Boot
3 The Return

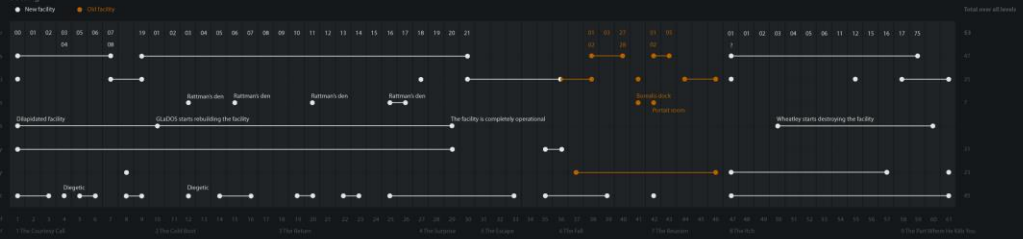
Portal 2 timelines

plainbugs.com/20120k/portal-2-timelines

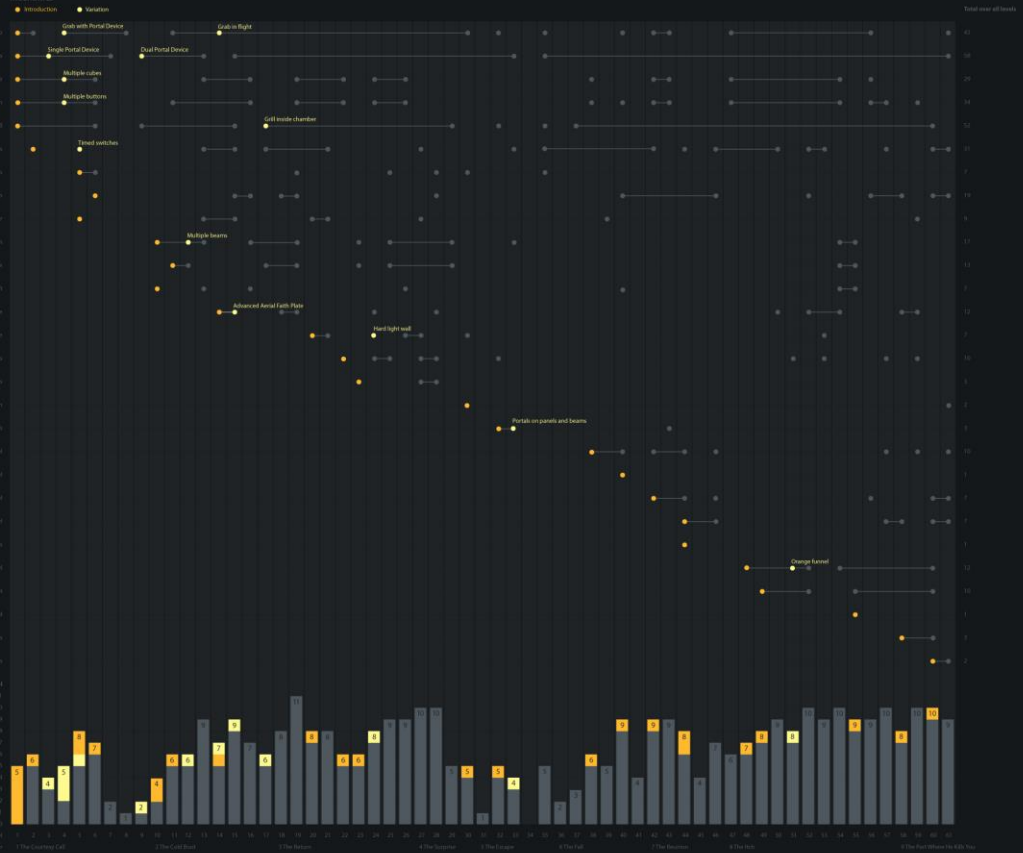
Characters



Setting

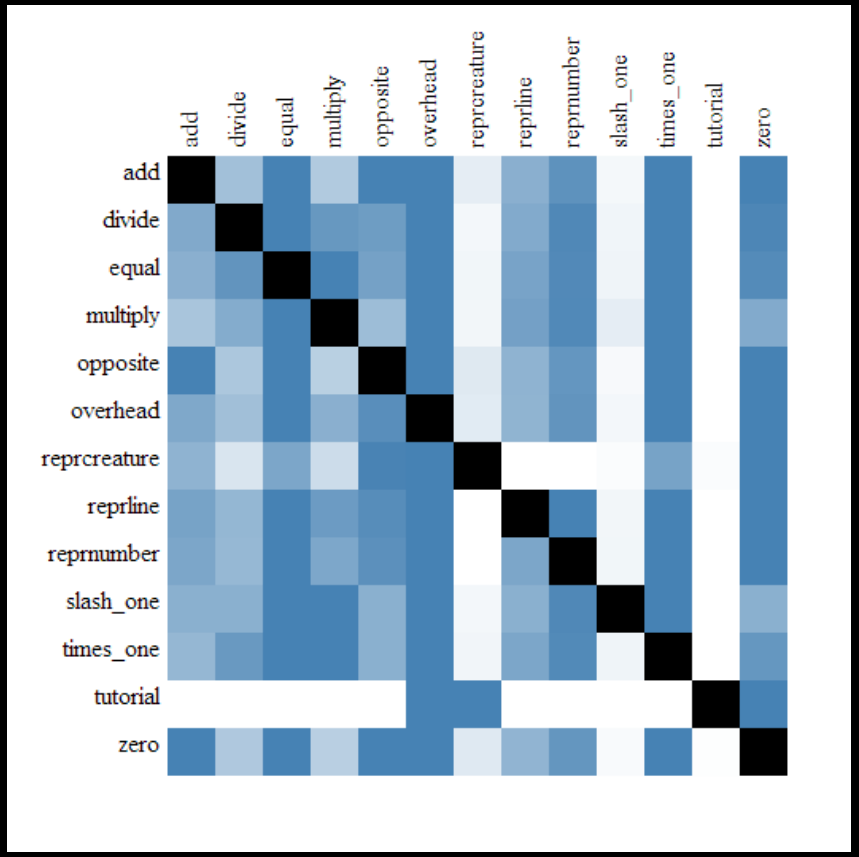


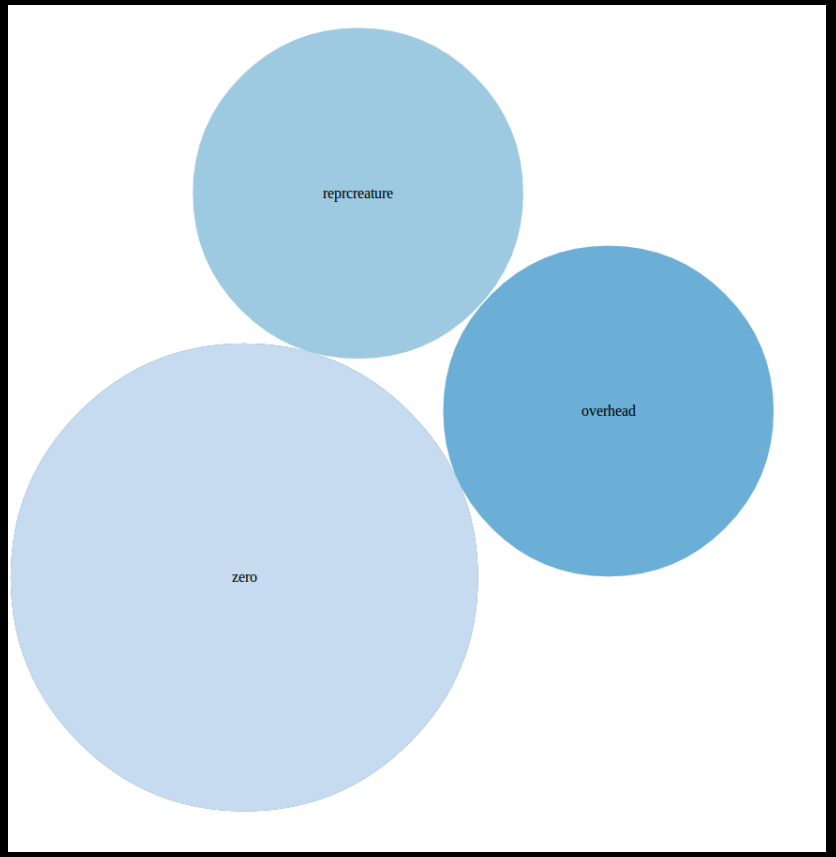
Mechanics



Designer Activities

- In what order are concepts introduced?
- Which concepts are used in combination?
- How does complexity change during the progression?
- How do two (possibly automatically generated) progressions differ?


add
divide
equal
multiply
opposite
overhead
reprcreature
reprline
reprnumber
slash_one
times_one
tutorial
zero


reprcreature
overhead
zero

Questions for Audience

- Techniques for visualizing plans?
  - Plans represented as sequence of feature vectors
  - Particularly interested in comparison.
- Related domains from which to draw inspiration?
- Potential interaction techniques?
- Potential aggregate summaries (e.g., combination matrix)?

Voice Interfaces for Visually Impaired and Low-Literate Communities in the Developing World

Aditya Vashistha Sam Sudar

Motivation

- **Graphical and textual interfaces leave billions of people behind**
- 258M visually impaired
  - 90% in developing countries
- High illiteracy
  - 26% of India
  - 20% of US is “functionally illiterate

Interactive Voice Response Systems

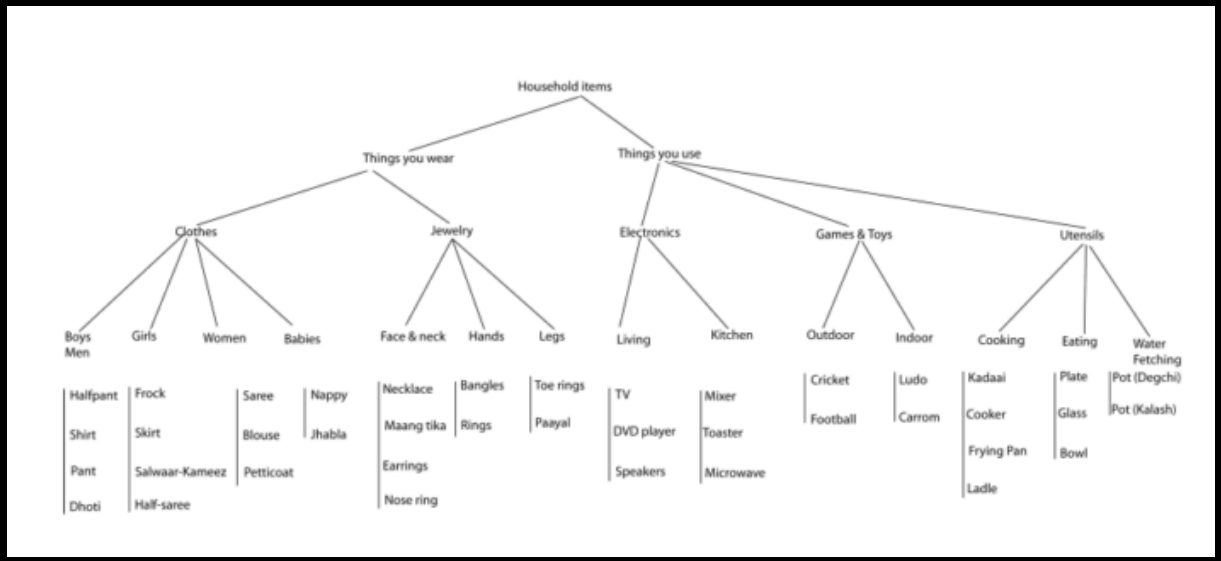
- Health
- Education
- Citizen Journalism
- Social Media

Image Credit: Jayanta Shaw/Reuters/

What is the most effective way to organize information on IVR?

Prior Work

- Desktop and mobile phones
  - Graphical UI
  - Hierarchies vs. List
- Impact of Education



Research Questions

- Hierarchy vs list
- Acceptable list length
- Hierarchy depth
- Effects of user abstraction capability

Currently Designing the Experiment and Evaluation Feedback Needed!

Aditya Vashistha, Sam Sudar

Visualization for Machine Learning

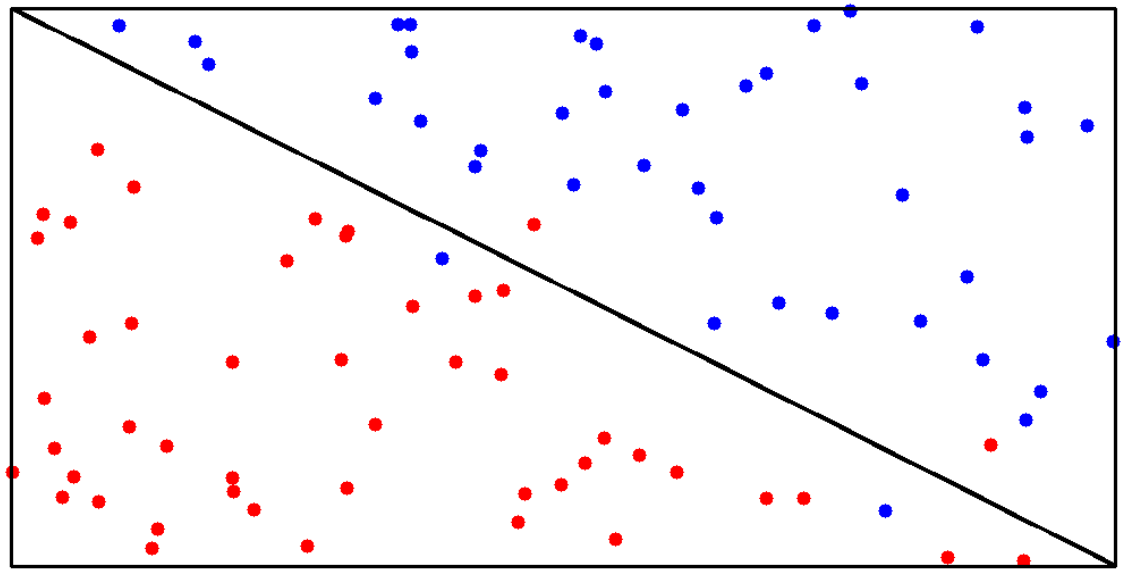
Alex Bykov, Stanley Wang

Motivating problem

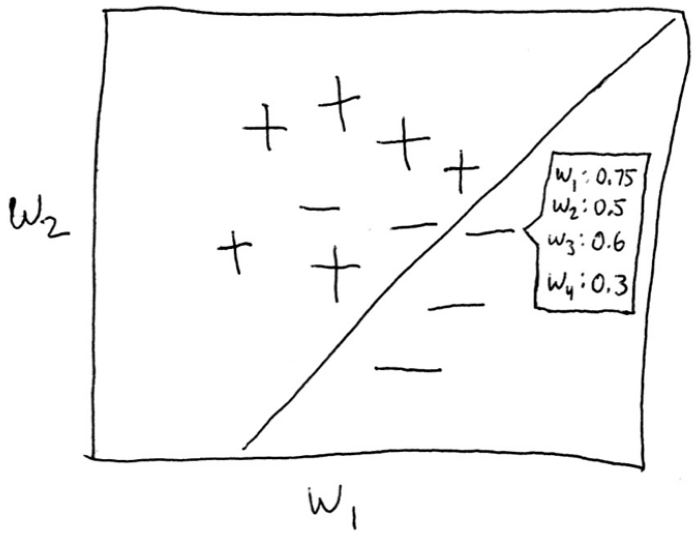
- Lack of useful visualizations for understanding how your machine learning algorithms are performing
- Want to go beyond just error rate and simple plotting of decision boundaries

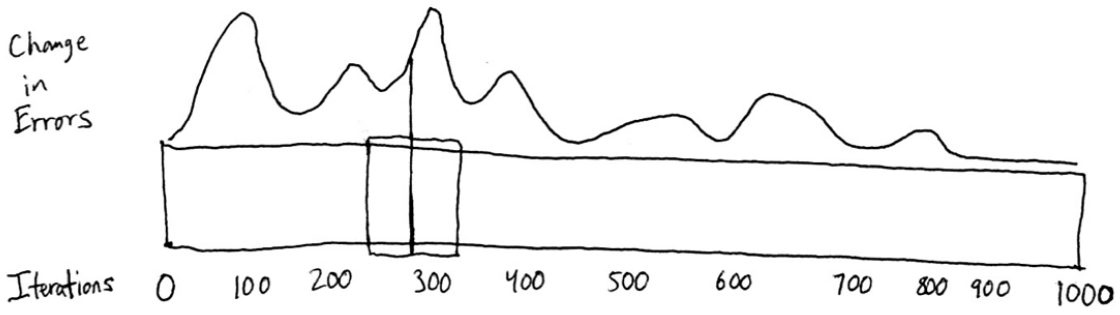
Prior work

- Visualizing the final classifier



The idea


w_2
w_1
$w_1: 0.75$
$w_2: 0.5$
$w_3: 0.6$
$w_4: 0.3$


Change in Errors
Iterations
0
100
200
300
400
500
600
700
800
900
1000

Questions for you

- Do you see this as being useful?
- Any ideas on visualizing the multiple dimensions of the data?
- What would be good info to plot against time? (e.g. accuracy, biggest change in errors)
- Additional encodings for graph?

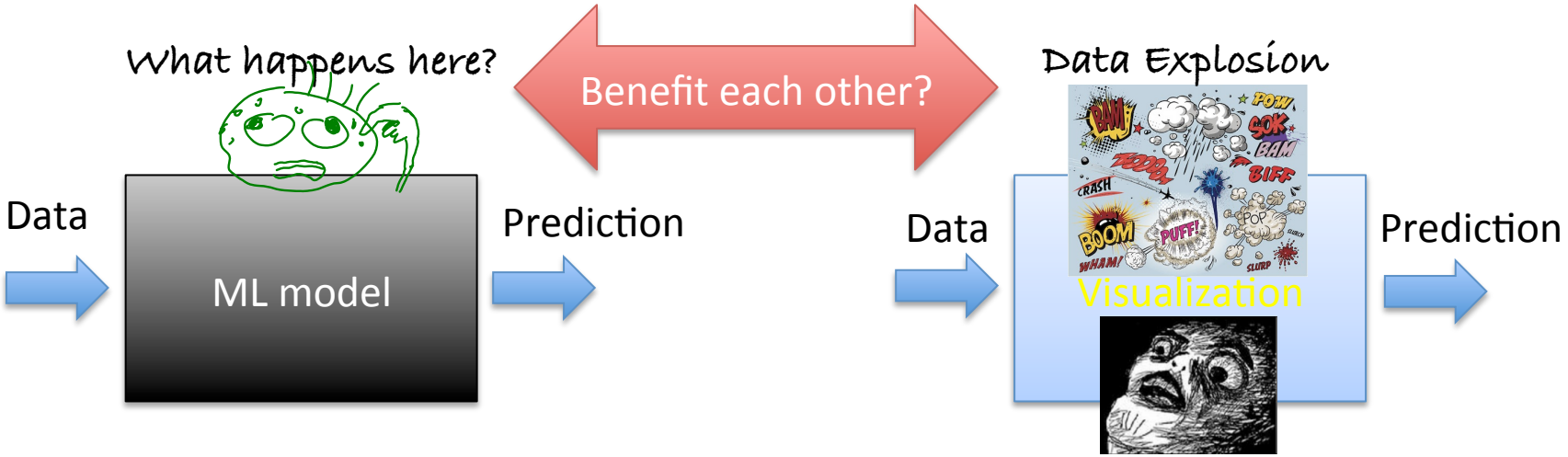
Alexandre Bykov, Stanley Wang

Transparent Boosting Tree Learning using Interactive Visualization

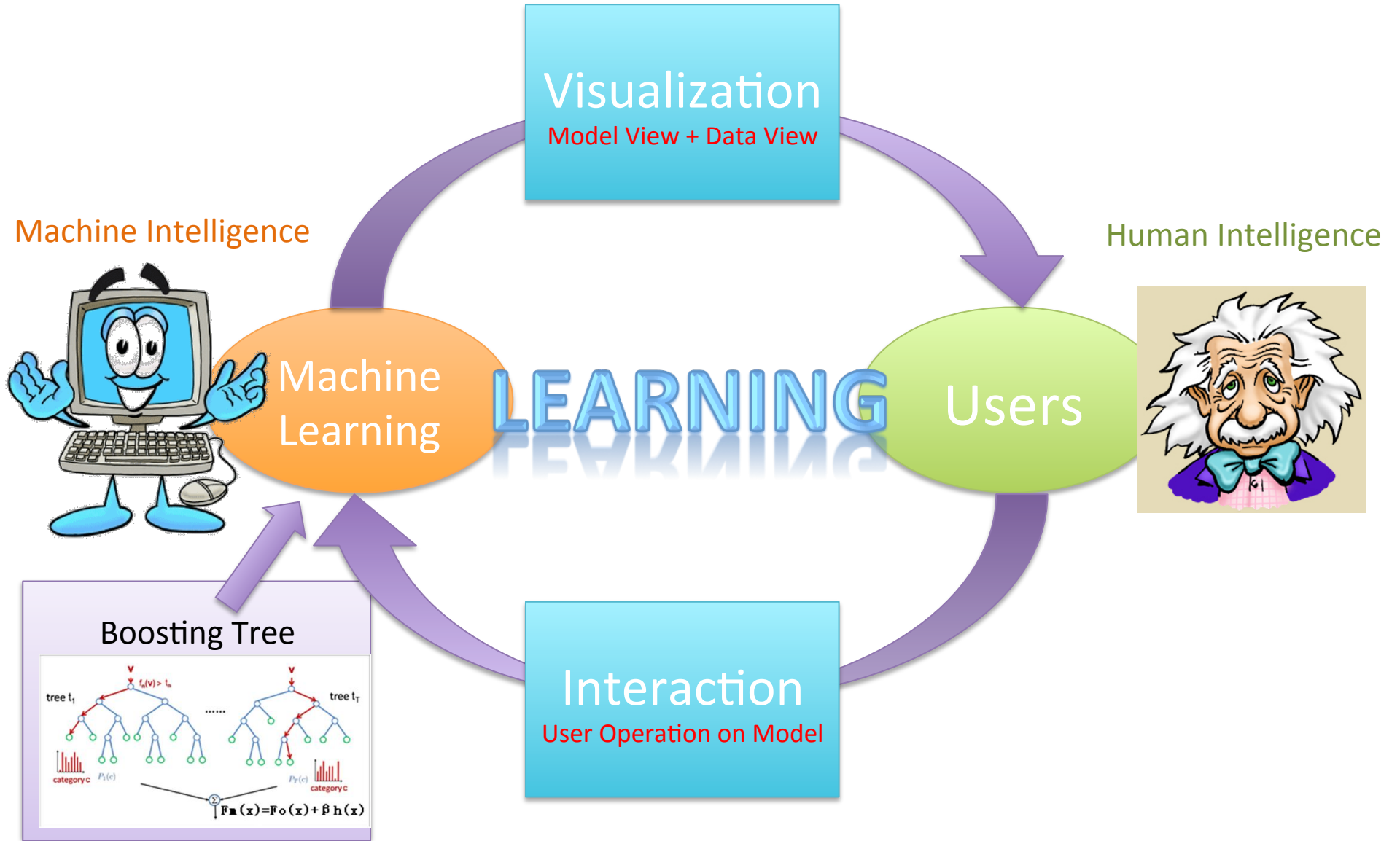
Tianyi Zhou, Tianqi Chen, Luheng He

Machine Learning meet Visualization

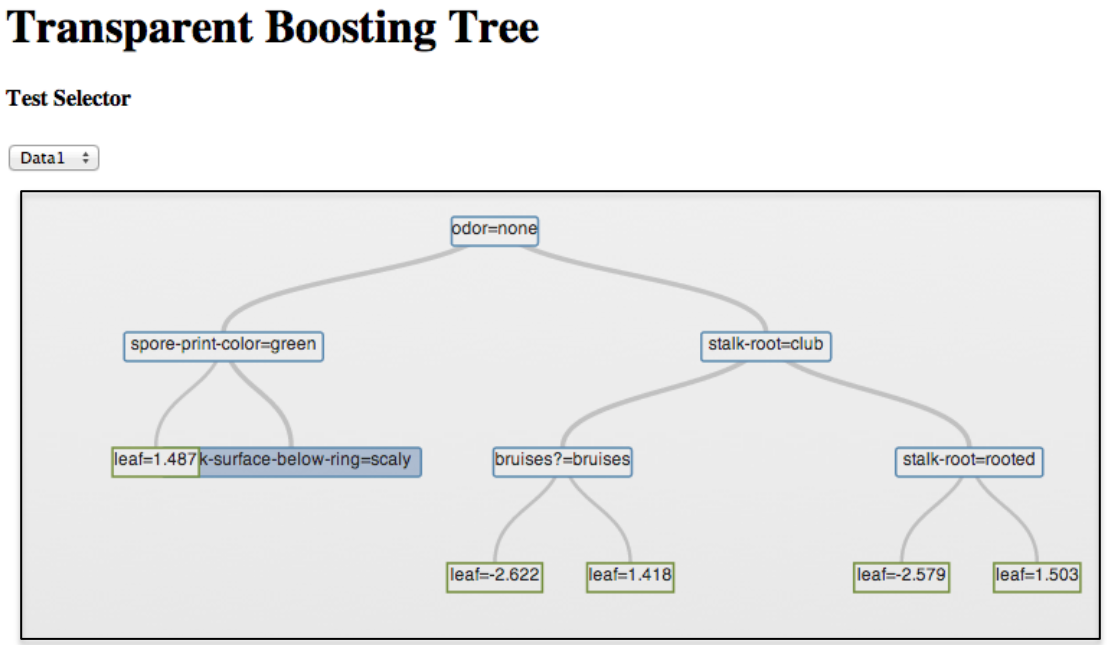
- Machine Learning:
  - A black box using machine Intelligence
  - ML is good, but hard to know why (not transparent)
- Visualization:
  - Explore data by using human intelligence
  - Effective on clean, small, low-dim data

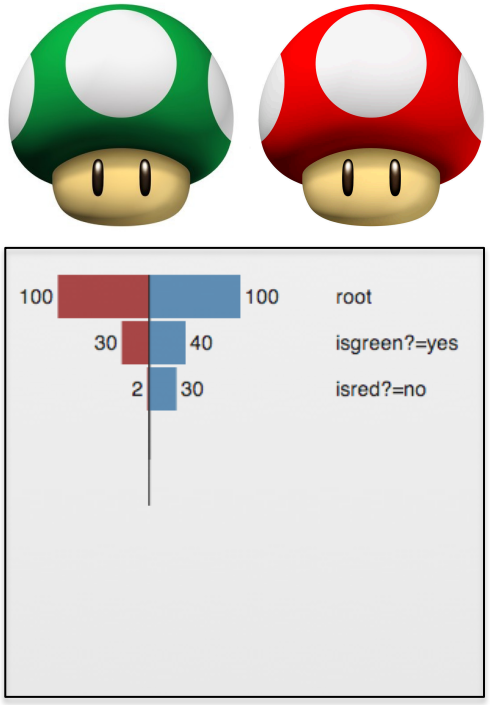


Our solution: ***Build a Loop via Interaction***



Current Progress: Can I eat this mushroom?





Model View
User can: Select Feature, Prune/Add Node/Path

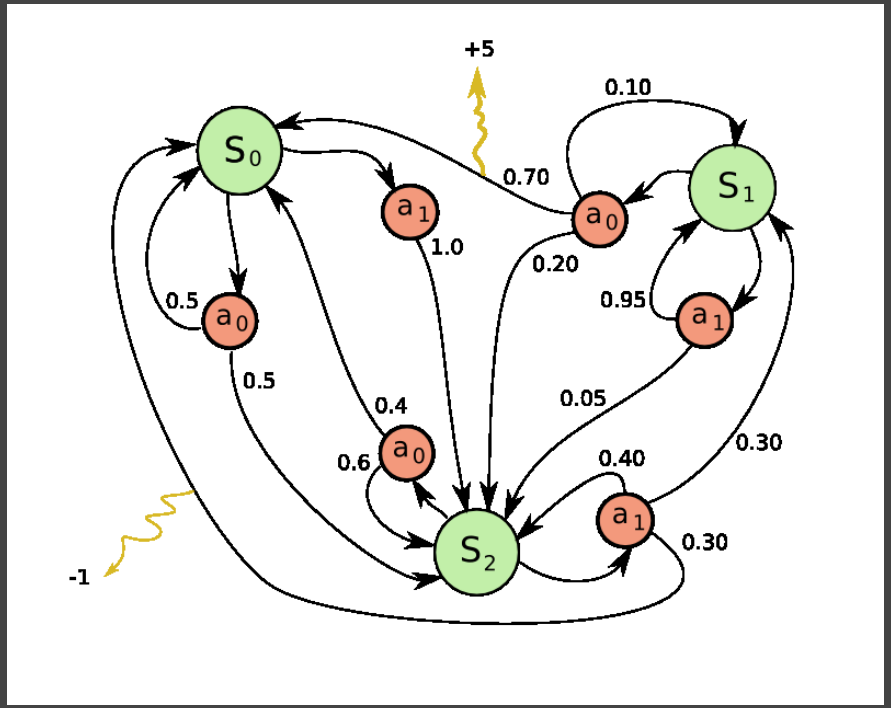
Data View
Prediction results of current model

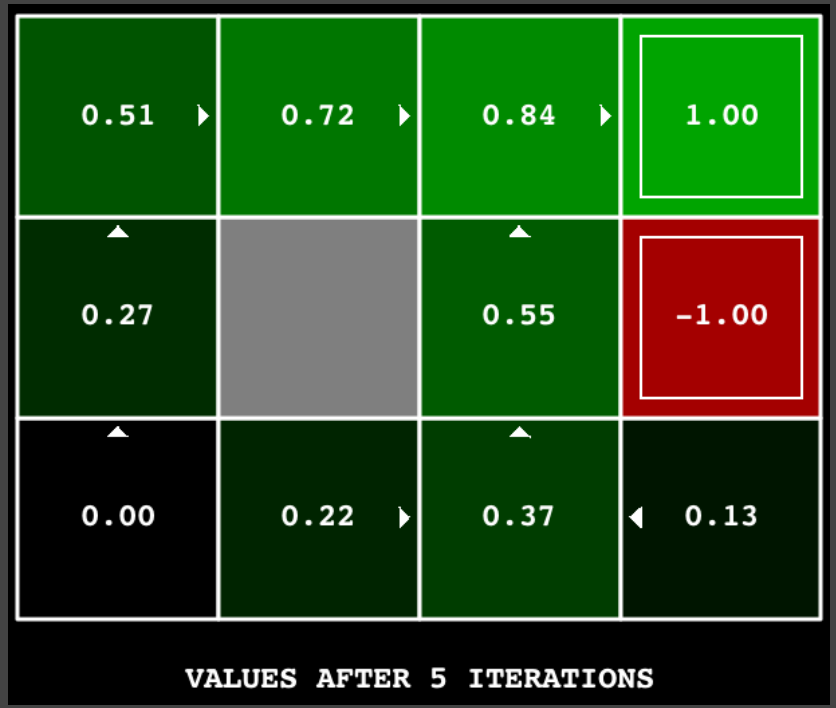
Comparing to existing tool like BigML, we allow instantaneous update of model caused by user feedback in learning process, and boosting tree is more powerful than decision tree.

Planning Visualizations

Christopher Lin
Jonathan Bragg

Markov Decision Processes



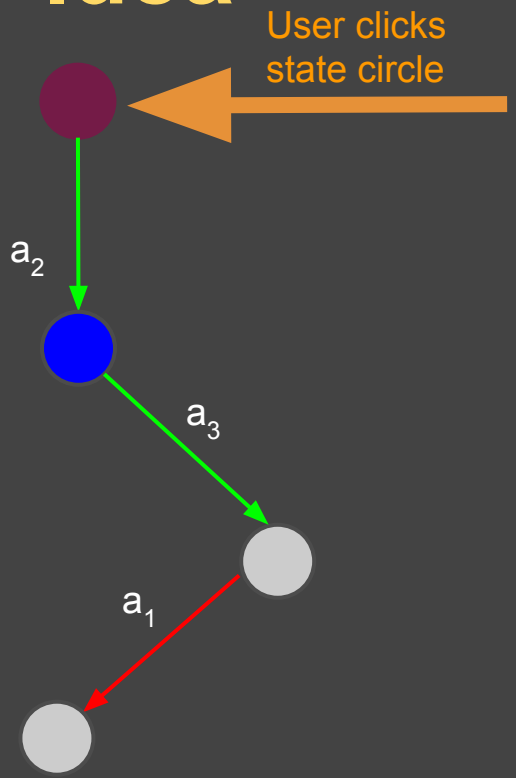


Questions About Plans

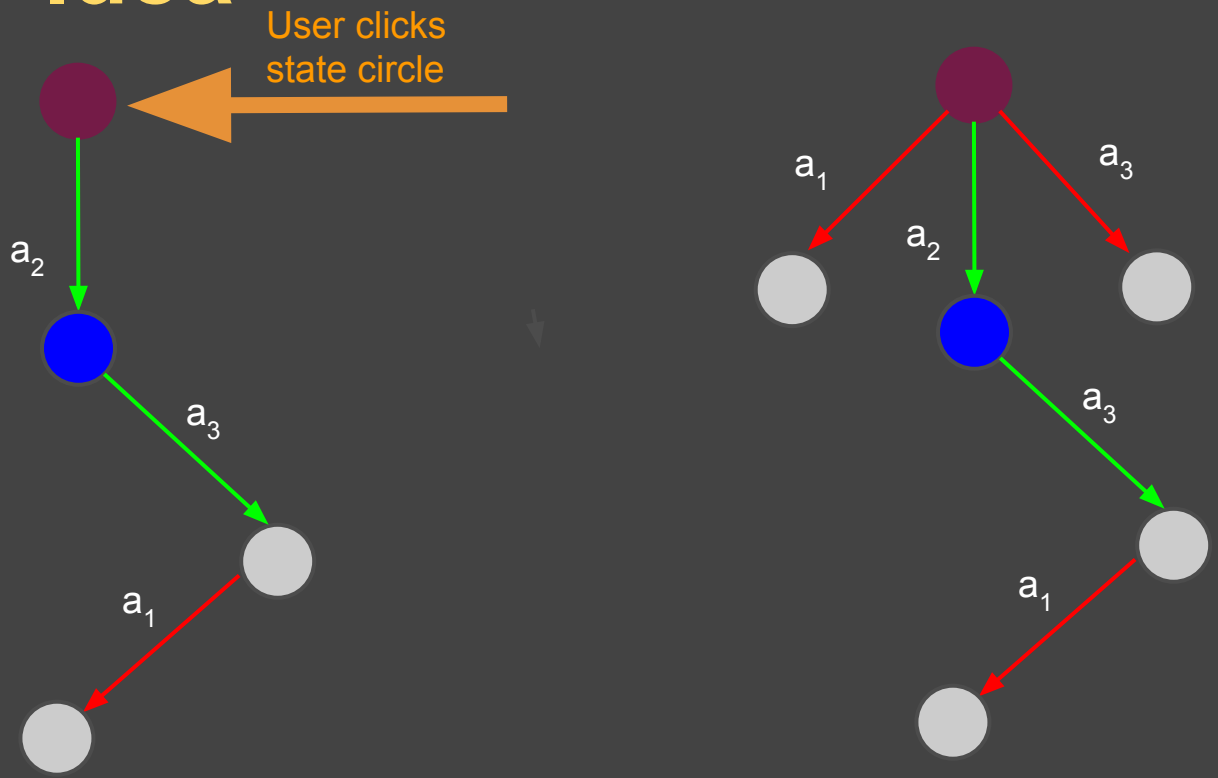
“Why did my policy choose this action instead of another one?”

“What are the probabilities (and values) of transitioning to other states?”

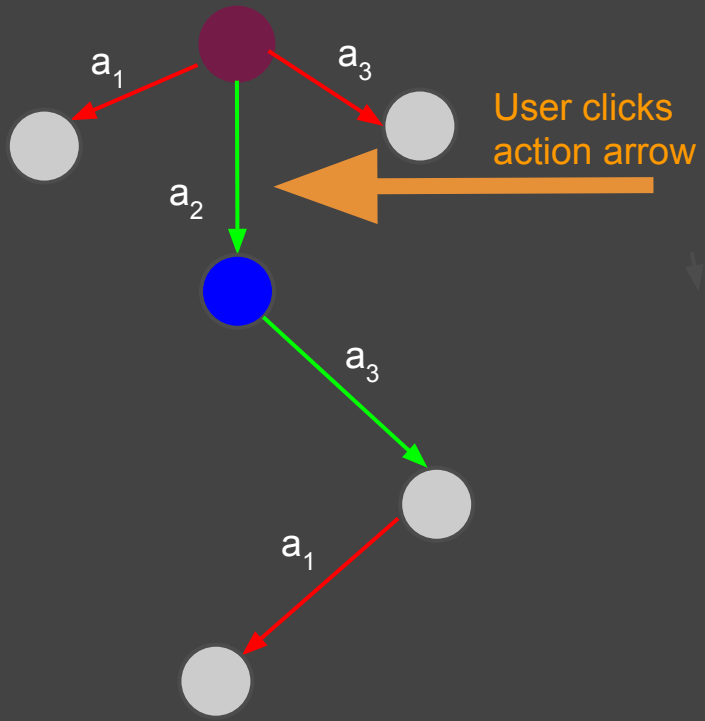
Our Idea



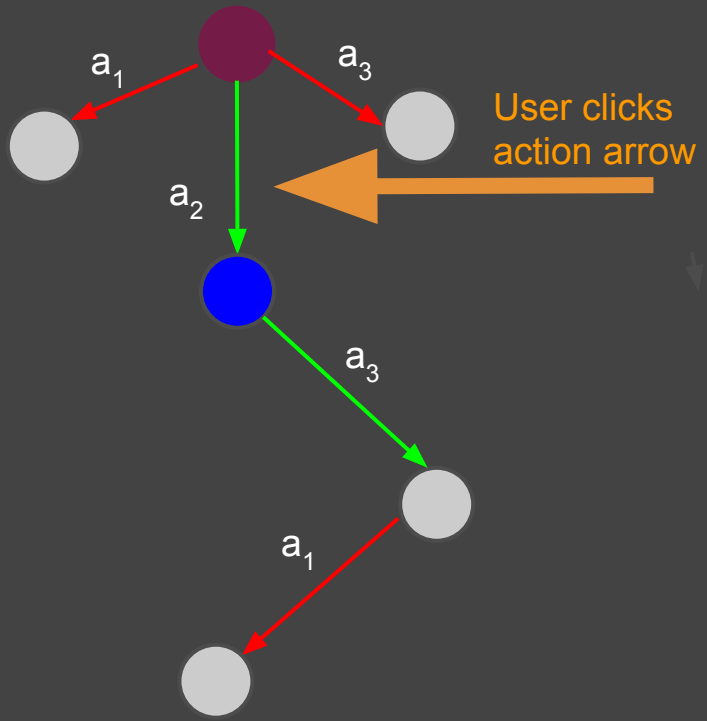
Our Idea



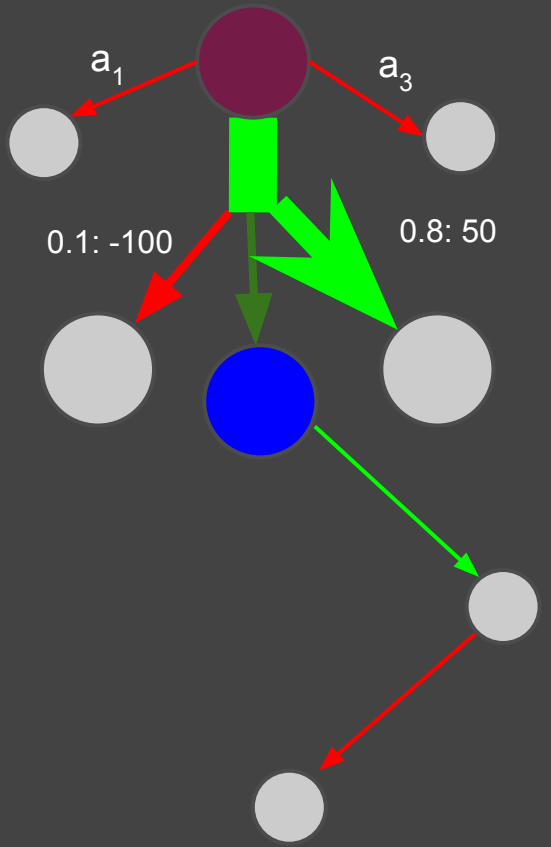
Our Idea



Our Idea



User clicks action arrow



Questions

1. In the domain-specific visualization of gridworld, it is extremely easy to tell how states are related to each other. In our general method, it is harder to see these relationships. How can we bring the power of a domain-specific visualization to a general encoding?
2. How do we deal with MDPs with an extremely large state space or an extremely large action space?
3. If we extend our method to deal with Partially Observable MDPs, where the states are unobservable, how do we encode distributions over states? How do we encode observations?
4. What is the best way to communicate that two states are the same? Displaying a graph? Using the same color for circles that represent the same two states?