



American Time Use: Who Spends How Long At What

CS 171 Process Book

Team Triple Treat

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I. Project Planning

1) Exploring Data of Interest

- We came across a few data sets and topics that we thought might be interesting:
 - We contacted Datamatch Team at Harvard to ask for permission to use their database because we think the topic is relevant to Harvard students and it would be quite fun to gain insights into what type of people get matched together and what the general demographics look like for people who participate in Datamatch
 - We also considered using a health database on Parkinson's disease. One of the tutors in Quincy has access to Parkinson's database. It has data on 600 subjects (400 PD and 200 controls). It contains a lot of variables and biomarkers of Parkinson's disease progression.
 - Upon researching on interesting visualizations, we came across American Time Use Database, which contains a huge set of variables and observations throughout the US in the past 10+ years.
- Final Decision:
 - We decided to pick American Time Use Database for various reasons:
 - Good for visualization purposes: This data set contains rich data over time, demographic data, and household data which we felt like could lead to interesting visualizations. This dataset contained a lot of dimensions that could lead to interesting questions. This dataset also felt more comprehensive because it was over the period of 10 years and survey data from hundreds of thousands of respondents.
 - Related to our interests: We also think it is interesting in general to see how Americans use their time and how American time usage has changed over time. As students, we are conscientious about time management; this topic is relevant to that.
- How the database looks like:
 - ATUS 2003-2014 Respondent file (zip) (11 MB) The Respondent file contains information about ATUS respondents, including their labor force status and earnings.
 - ATUS 2003-2014 Roster file (zip) (2.1 MB) The Roster file contains information about household members and non household children

(under 18) of ATUS respondents. It includes information such as age and sex.

- ATUS 2003-2014 Activity file (zip) (53 MB) The Activity file contains information about how ATUS respondents spent their diary day. It includes information such as activity codes, activity start and stop times, and locations. Because Activity codes have changed somewhat between 2003 and 2014, this file uses activity codes that appear in the 2003-2014 ATUS Coding Lexicon (PDF).
- ATUS 2003-2014 Activity summary file (zip) (10.2 MB) The Activity summary file contains information about the total time each ATUS respondent spent doing each activity on the diary day. Because Activity codes have changed somewhat between 2003 and 2014, this file uses activity codes that appear in the 2003-2014 ATUS Coding Lexicon (PDF)
- ATUS 2003-2014 Who file (zip) (13.3 MB) The Who file includes codes that indicate who was present during each activity.
- BLS Unemployment Data:
<http://data.bls.gov/pdq/SurveyOutputServlet>

2) Building Project Proposal

● Explore Related Work:

- <http://www.amazon.com/American-Time-Use-Spends-Long/dp/1935114859>

■ We found a book written on American Time Use, which inspires us to believe that there are lots of possible insights to derive from the data set.

● Helpful Resources:

- <http://www.datavizcatalogue.com/>

■ This is a database of different visualizations we can make with data. Lots of interesting ideas to consider for our project

- <http://1stwebdesigner.com/css-effects/>

■ Lots of relevant animation effects to do with HTML and CSS that we can incorporate into our front page design

● Exploring data sets and building up questions of interest:

- There were a lot of interesting variables and observations to look at and use for our project
- We initially decided to use a time-series data across 10 years from 2004-2014. It would be interesting to see changes over time, esp to examine whether and how people spend time differently after the recession

- We thought that exploring how time use differs across gender, income levels, employment status, education would be interesting
- We were also interested in work-life balance

3) Initial Project Proposal

- After brainstorming with the group about the relevant questions of interest, the insights we want to get out of the data, and the scope of data that we would like to use, we developed the initial project proposal as seen below:

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INITIAL PROJECT PROPOSAL

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Basic Info

- Project title: American Time Use,
- Team Members: Yuqi Hou, Maria Lai, Tuongvan Le
- Emails: hou@college.harvard.edu , lai01@college.harvard.edu , tle@college.harvard.edu
- UIDs: 90834738 (Yuqi), 20906863 (Maria), 30907019 (Tuongvan)
- Project URL: ustimetuse.github.io

Background and Motivation

Discuss your motivations and reasons for choosing this project, especially any background or research interests that may have influenced your decision.

We choose this dataset because it contained data over time, demographic data, and household data which we felt like could lead to interesting visualizations. This dataset contained a lot of dimensions that could lead to interesting questions. This dataset also felt more comprehensive because it was over the period of 10 years and survey data from hundreds of thousands of respondents.

We also think it is interesting in general to see how Americans use their time and how American time usage has changed over time. As students, we are conscientious about time management; this topic is relevant to that.

Related Work.

Book: <http://www.amazon.com/AmericanTimeUseSpendsLong/dp/1935114859>

Project Objectives and Goals.

With the growing dominance of social media, technology, and rising sources of distractions, keeping complete focus becomes even more challenging. Simultaneously, people generally become busier at work and at school due to rising expectations. Students have to study harder and longer to be comparable to their peers. Employees have to work longer and longer hours to complete longer list of tasks assigned by their companies. Having the ability to focus and be productive is a golden skill to have. Yet, multiple distractions can ruin our time management and diminish productivity. Tracking time use can give us a great metric to measure and improve our level of productivity. We were lucky to come across a database tracking time use of average Americans.

Given the availability of data showcasing time use of different groups of Americans based on age, gender, employment, income level, spread among different activities (such as sleeping, studying, eat & drink, etc), we come up with a few questions that we are interested in exploring the answer to:

A few questions that we would like to answer include:

How does a typical American spend his or her day?’

How do factors like income, education, age, and gender affect the leisure/work time distribution?

How has people’s use of time changed during and after the recession?

Which activities take the most time in a person's day?

These questions will help us gain insights into the interesting circumstances and conditions that might affect each person’s daily routine and time use. These insights can help us discover possible ways to improve future time use or derive interesting research topics for further studies (such as proof gender inequality through time use, influence of recession on people’s use of time and priorities)

Data.

● ATUS 20032014 Respondent file (zip) (11 MB) The Respondent file contains information about ATUS respondents, including their labor force status and earnings.

● ATUS 20032014 Roster file (zip) (2.1 MB) The Roster file contains information about household members and non household children (under 18) of ATUS respondents. It includes information such as age and sex.

● ATUS 20032014 Activity file (zip) (53 MB) The Activity file contains information about how ATUS respondents spent their diary day. It includes information such as activity codes, activity start and stop times, and locations. Because Activity codes have changed somewhat between 2003 and 2014, this file uses activity codes that appear in the 20032014 ATUS Coding Lexicon (PDF) .

- ATUS 20032014 Activity summary file (zip) (10.2 MB) The Activity summary file contains information about the total time each ATUS respondent spent doing each activity on the diary day. Because Activity codes have changed somewhat between 2003 and 2014, this file uses activity codes that appear in the 20032014 ATUS Coding Lexicon (PDF)
- ATUS 20032014 Who file (zip) (13.3 MB) The Who file includes codes that indicate who was present during each activity.
- **BLS Unemployment Data:** <http://data.bls.gov/pdq/SurveyOutputServlet>

Data Processing. Do you expect to do substantial data cleanup? What quantities do you plan to derive from your data? How will data processing be implemented? Yes, some data cleanup will be required since there are several questions that respondents did not answer, so they show up as “blank.” It will be necessary to recode the data so that blank responses show up as NaNs instead. Since we are working with multiple datasets, it will be necessary to join the datasets based on the respondent IDs. Data processing will be implemented in Javascript. Two of the members of the team are familiar with R and Python, so if joining the datasets takes too long using Javascript, they will use Python or R to join the datasets. One of our datasets already contains summary data about total time each survey respondent spent on each activity subcategory, so that is not something that we will need to derive. The datasets that we have chosen are very comprehensive in that they contain all the data that we need; the only challenge will be to connect all the datasets together via the respondent ID.

Visualization Design.

Must Have Features. *List the features without which you would consider your project to be a failure.*

- Ability to filter on certain variables (year, gender, employment status, age)
- Ability to select and zoom in on specific categories to see subcategories of time use
- Use Grouping to show different categories of time use
- Create selects so that user can view more details for a certain category
- Create coordinate views by connecting time and movement between activities
- Examples: Sketches 1, 4, 5

Optional Features. *List the features which you consider to be nice to have, but not critical.*

- Saturation gradient to indicate the proportion of people in each location
 - Show movement between activity locations
 - Examples: Sketches 2, 3
- Project Schedule.** Make sure that you plan your work so that you can avoid a big rush right before the final project deadline, and delegate different modules and responsibilities among your team members.

Write your schedule in terms of weekly deadlines.

- 3/28 Draft features/types of visualizations, organization and design of website
- 4/4 Begin exploratory analysis + basic visualizations
- 4/11 Finish exploratory analysis + basic visualization
- 4/18 Implement more interactive visualizations
- 4/25 Begin website + clean up process book
- 5/2 Final touches + turn in project

4) Team Expectations Agreement:

- We understand that it's important to layout expectations to facilitate and get the most out of group work
- Hence we meet as a group to discuss what we expect from each other as a team member. Below is our Team Expectations Agreement.

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TEAM EXPECTATIONS AGREEMENT

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Team Triple Treat Agreement

Yuqi Hou, Maria Lai, Tuongvan Le
B10

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Team roles:

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- Everyone: Data extraction, Data Cleaning
- Maria / Yuqi: Design Overall Website, Aesthetics
- Le: Statistical Analysis, Lay Out Possible Graphs, Storytelling
- All: Create Visualizations

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Communications:

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- Email, Texting
- In-person meeting Monday, Friday, Saturday (3 times a week) in Quincy dhall
- Respond within 12 hrs

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Collaboration:

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- Evenly split up work, each person will work on 1 component/graph
- Everyone gives feedback on each other's work and contribute ideas as we make progress
- Beginning of meeting: decide on tasks, split tasks, divide and conquer
- During meeting: ask questions, ask each other for input/feedback/help
- End of meeting: assign to-do tasks outside of meeting, determine deadlines, summarize progress

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Non-performing members:

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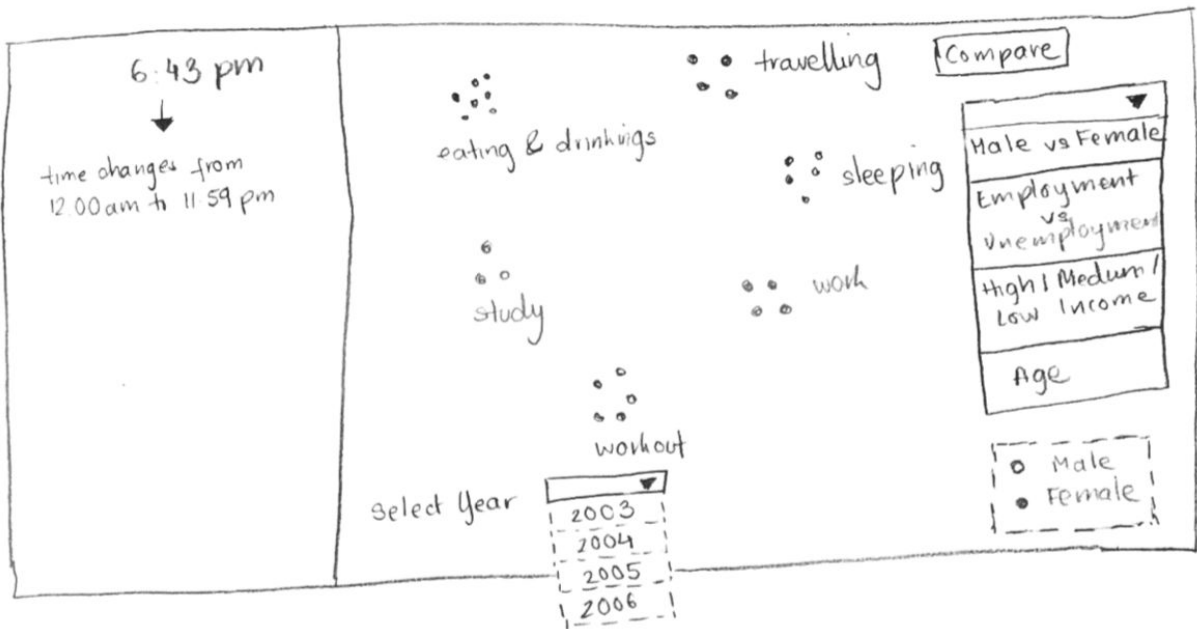
- Follow up emails/texting/in-person talks
- Figure out appropriate work distribution to fit everyone's interests and availability while balancing the workload evenly among team members

5) First Sketches

- Changing Scope of Data:
 - We decided that our data is way too big and it's hard to load all the data
 - Hence we decided to focus only on 1 year and picked the most recent year available, which was 2014
 - We also realized that there were way too many variables and data available and we need to pick out only those that we are interested in, which include age, gender, sex, family income, race, working time, educational time, personal care time, leisure time, household time, starting time and ending time of each of 1000 individuals.
- With the new scope of data, we came up with a few sketches as seen below:
- Sketch 1:

Question: How do average Americans spend their time throughout the day? How do different groups of different categories compare?

①



- ★ ● represents a fixed # of people
- ★ the dots move throughout the day as time changes to show shift
- ... people spend their time on,

○ Descriptions:

- This visualization describes the flow and concentration of people spending time in each category of time use throughout a 24 hour day
- Each dot represents a fixed # of people
- The dots move throughout the day as time changes
- Users can also select different groups (female vs male, employment vs unemployment, different levels of income, age) to see the dots changing to a certain color code and compare dots with different colors representing different categories

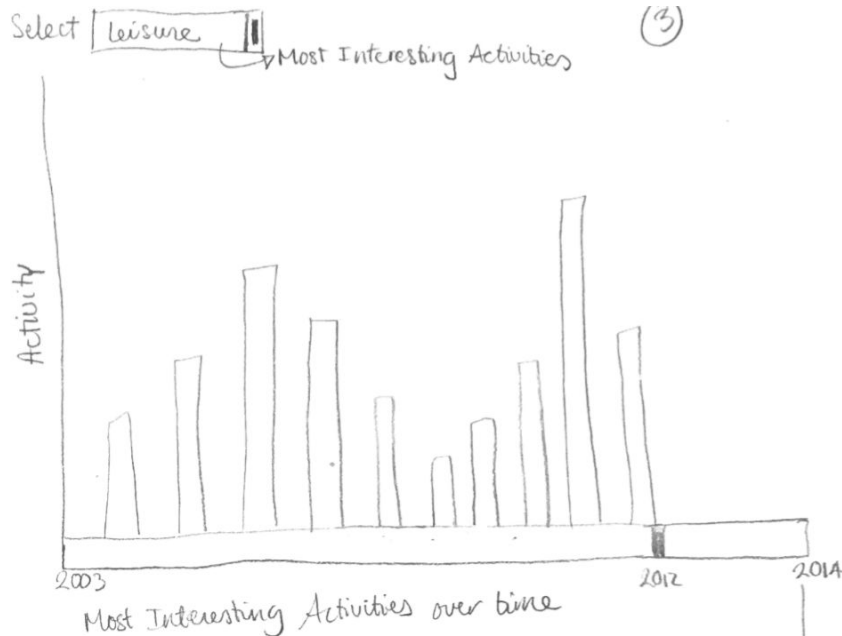
● Sketch 2:



○ Descriptions:

- This visualization will require us to make assumptions around where people are at each different activity (choose among categories such as home, work, on the road) and map out the changing locations of people throughout the day

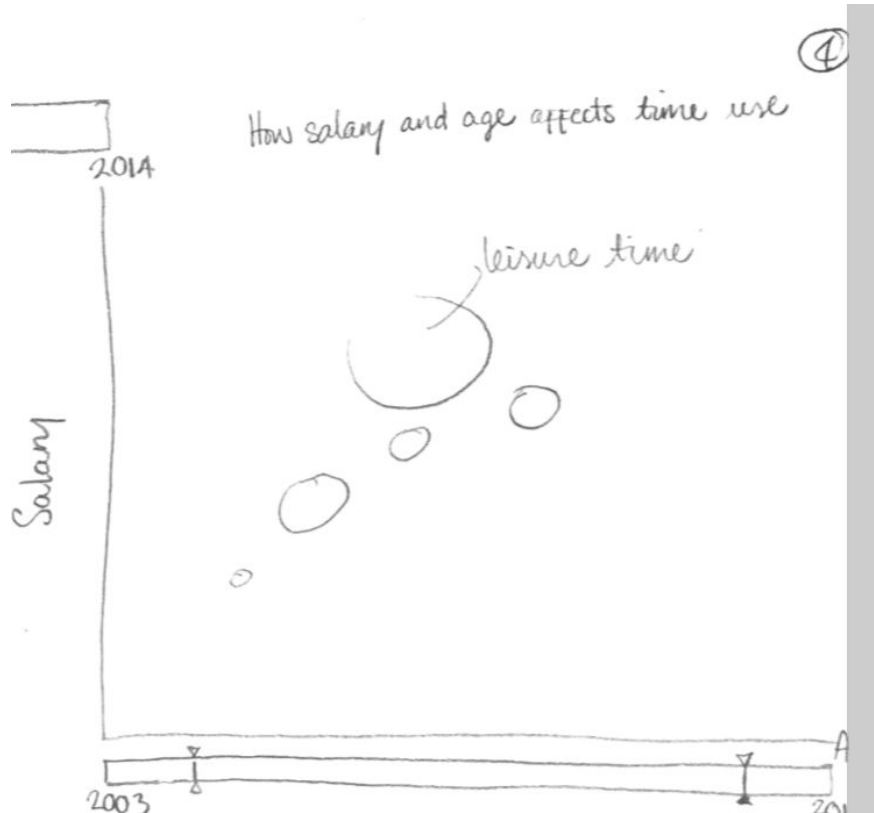
● Sketch 3:



○ Descriptions

- This bar graph allows up to map out changes over time, on how the length of time people spend on each category of activities change over time from 2003 to 2014

● Sketch 4:



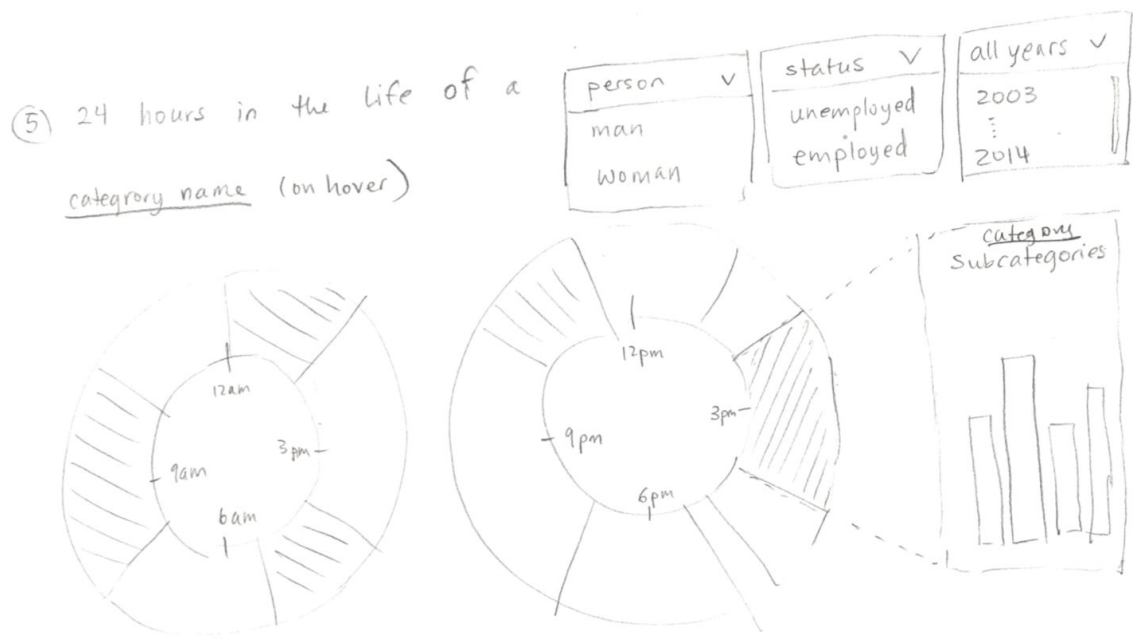
○ Descriptions:

- This visualization allows us to map the relationship between how salary and leisure time relates to each other over a period of time from 2003-2014

● Sketch 5:

○ Descriptions:

- This visualization below allows us to see the distribution of time that people spend throughout the day. We map out the duration people spend on each activity in a circle, with each major category of activity taking up a certain percentage of the 24 hour day
- Users can also select the person they would like to visualize by certain demographic characteristics such as gender, employment status, and year



- Brief descriptions of different functionalities we will need to implement

Tasks

- **Data manipulation** - merge datasets by user id, create averages within data
- Create **filters** for year, gender, employment status, age, and salary range
- Create **coordinate views** by connecting time and movement between activities
- Use **Grouping** to show different categories of time use
- **Saturation gradient** - to indicate the proportion of people in each location
- Create **selects** so that user can view more details for a certain category

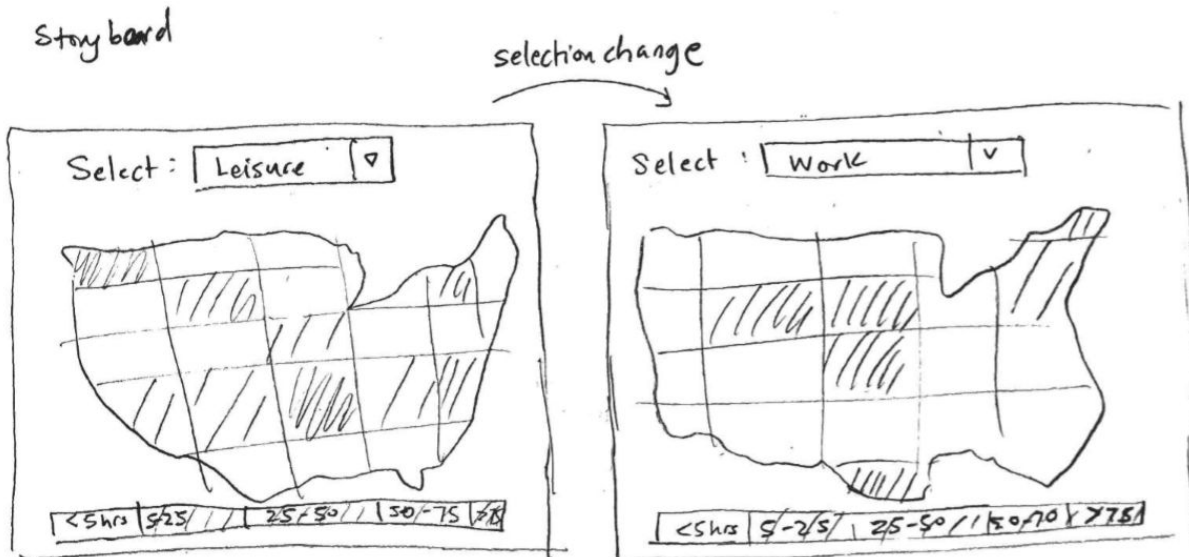
6) Sketch Re-design I

- As expected in class, we were asked to scratch what we drew earlier in the previous week to remap completely different set of designs with a fresh look at the data.
- Critical decision:
 - We got together as a group and made some important decisions on what scope of data we would like to use and whether we are still interested in showing change over time.

- We decided that perhaps mapping out time series will require us extensive efforts to connect disparate data and hence decided to stick with 1 year as a final decision and re-sketches our data to reveal this major change.

- Our sketches are below

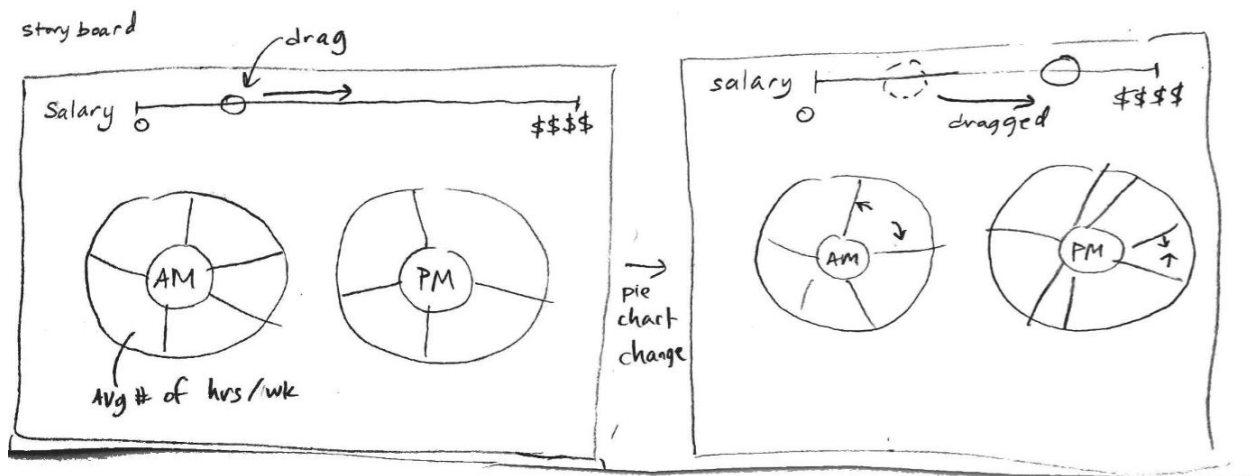
- Sketch 1:



- Descriptions:

- This visualization incorporates side-by-side choropleths to allow users to compare the distributions of duration people spend on different categories of time use across the US

- Sketch 2:

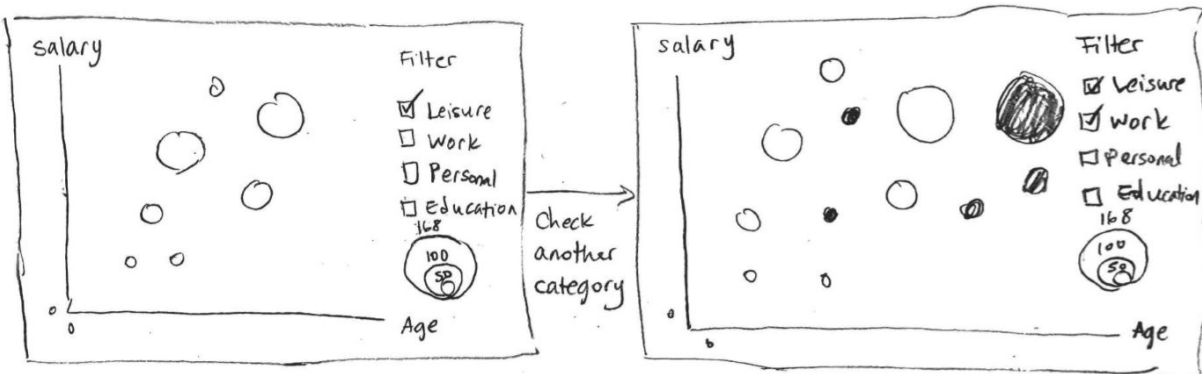


- Descriptions:

- This visualization allows users to select how people who earn different amount in salaries spend time differently

- Sketch 3:

Storyboard

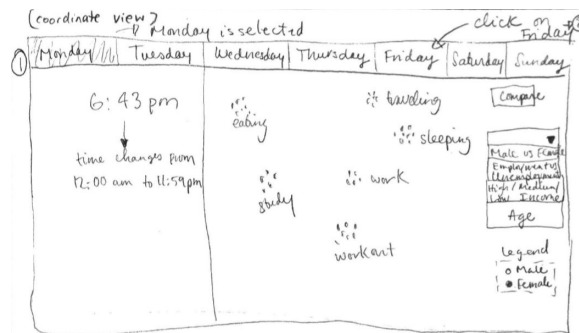


Note: circles are calculated by size, not radius

○ Descriptions:

- This visualization allows us to view the relationship among salary, age, and duration of time the people at certain age and salary spend on each category of time use such as leisure, work, personal care, education

● Sketch 4:



- represents one person
- ★ the dots move throughout the day as time changes to show shift in activities that people spend their time on.



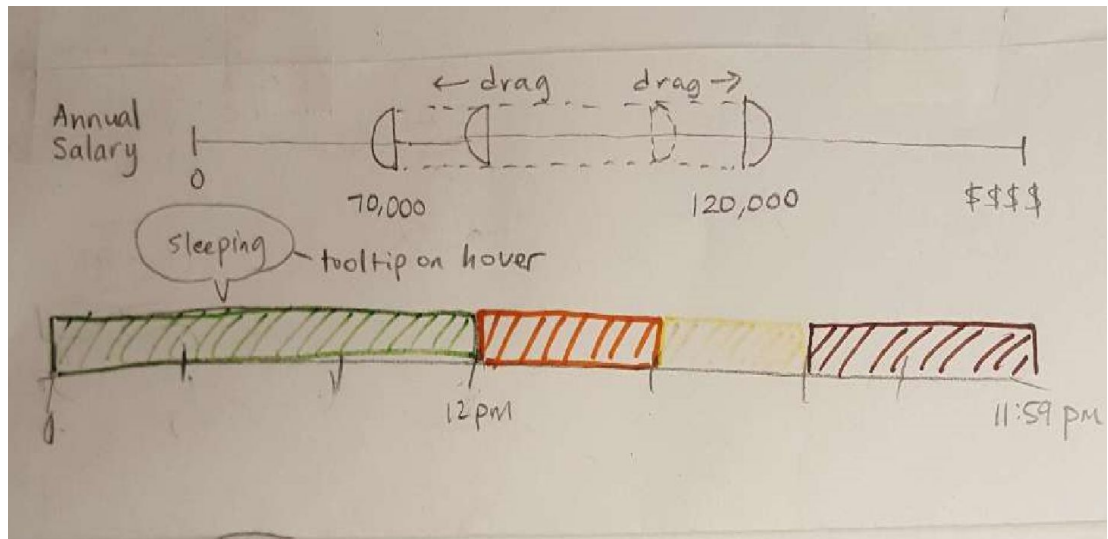
○ Descriptions:

- This visualization incorporates coordinate views
- This visualization describes the flow and concentration of people spending time in each category of time use throughout a 24 hour day

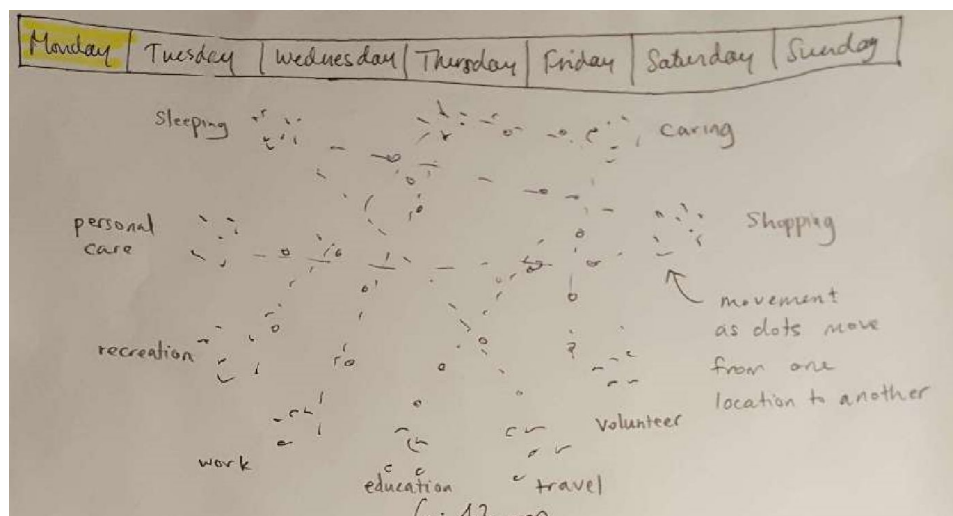
- Each dot represents a fixed # of people
- The dots move throughout the day as time changes
- Users can also select different groups (female vs male, employment vs unemployment, different levels of income, age) to see the dots changing to a certain color code and compare dots with different colors representing different categories
- While the dots move, the bar chart will update the # of people currently engaging in each category of activity

7) Sketch Re-design II

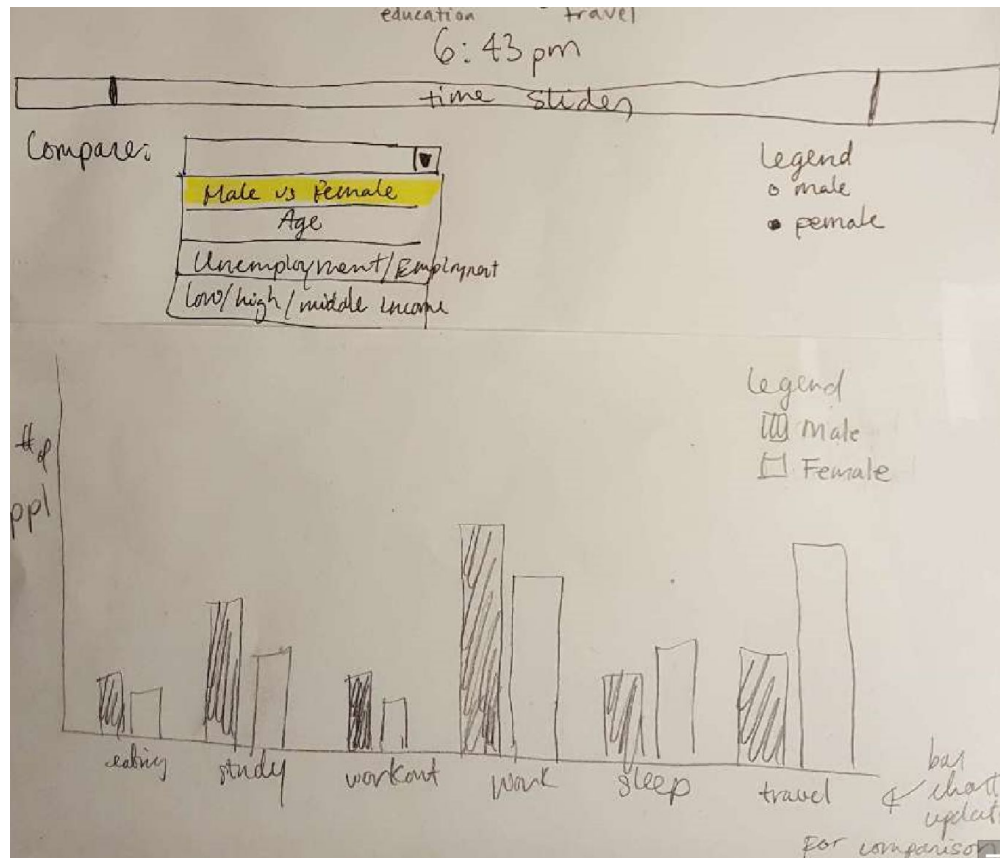
- Based on recommendations and feedback from our TF and classmates, we re-designed our sketch once more time before we start writing code for the visualizations:
- Sketch 1:



- Sketch 2:



● Sketch 3:



- We reviewed another group's project and gave evaluations.
- After receiving feedback from the other group, we decided to make some changes to our sketches:

TASK 1:

- o People were confused about what x and y meant so we removed the borders so it doesn't look like there are axes. We place things spatially in a circle to avoid making it look like there should be axes.
- o We made a time slider so that the user has control over because user was initially confused on how the graph relates to time.

TASK 2:

- o We added a brush slider so that user can now look at how things change when they are looking at a range of salaries
- o We change a pie graph to a timeline for more accuracy and easy comparison

- Later, as we discuss again after peer feedback, we made the following changes to our visualization sketches:

VISUALIZATION 1:

- We made a force graph to visualize time uses of 1000 Americans throughout one day.
- We based our code for the dots moving from [Nathan Yau](#)'s simulation.
- We added a coordinate view, which is a bar chart that visualizes the spread of time use at any time.

VISUALIZATION 2:

- We made a choropleth map to map out the amount of time spent on leisure and work across different states in the US.

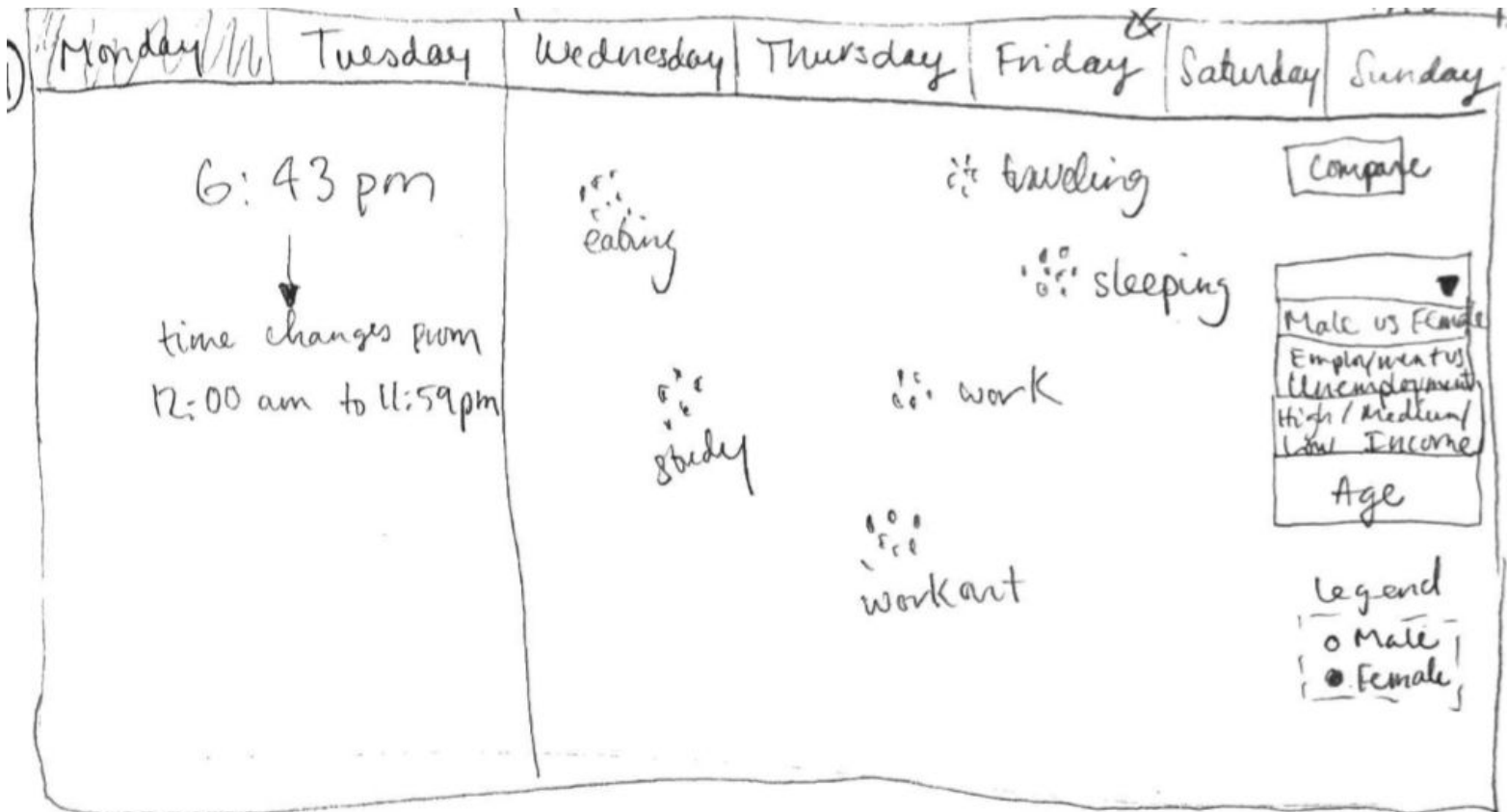
VISUALIZATION 3:

- We originally intended to create a bubble chart, but after realizing that encoding area using radius could be misleading, we chose to use color to encode the third dimension of our data (income range).
- The scatter plot changes based on the category that the user wants to see (work or leisure)

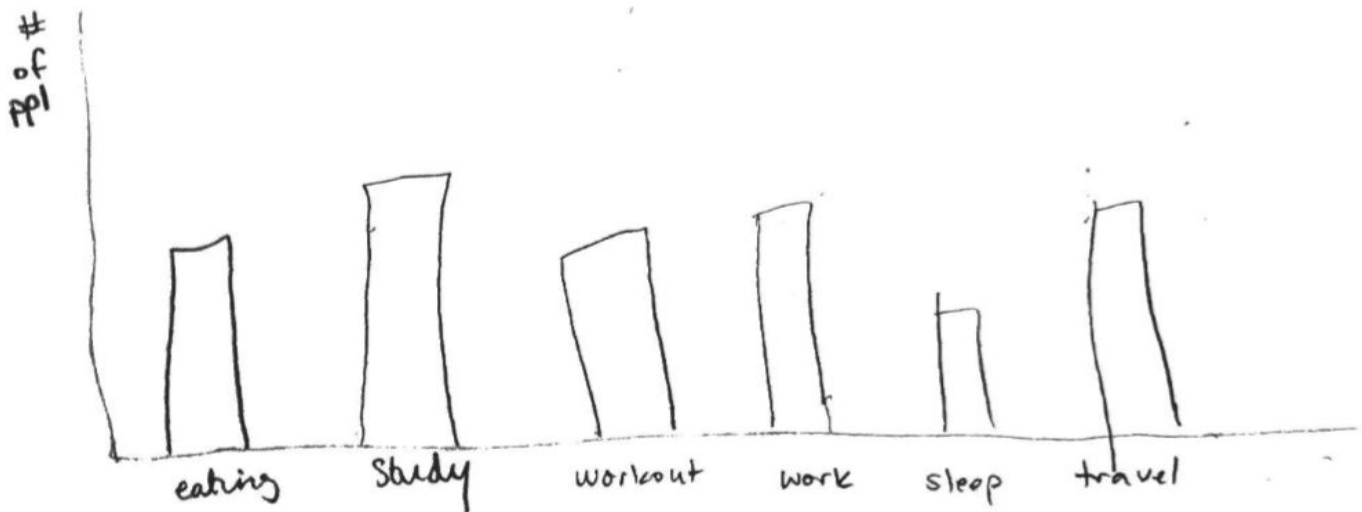
8) Peer Feedback

- At studio we got some feedback from our peers while showing them our sketches. We incorporated these feedback to revise our sketch re-design I and to take into consideration while developing our final visualizations.
- Below is the feedback we got from our peers

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PEER HEURISTIC EVALUATION
=====



- ★ • represents one person
- ★ the dots move throughout the day as time changes to show shift in activities that people spend their time on.



Task 1: How would you find out how unemployed people spend their days, vs how employed people spend their days on Tuesday specifically?

I first try to understand what the dots mean and what the x and y coordinates represent. I don't fully understand what the x and y coordinates mean, but I notice that as the dots move, the clusters remain in the same position. I also notice that there is a timer on the left that constantly ticks up in time. I notice I can't change or control the timer to see what happens at a specific time of day. Following the task, I change the comparison from Male vs Female to Employed vs Unemployed. I also change the day of the week to Tuesday. I have completed the task.

Recommendations:

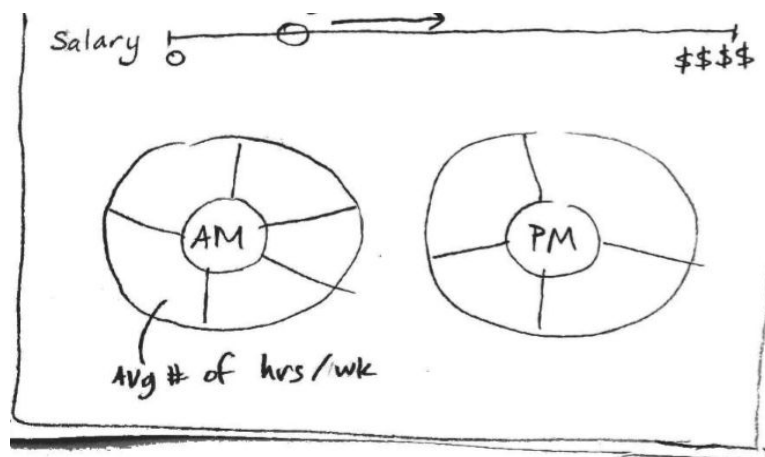
- 1) Encoding data in clusters isn't intuitive. It is not a visualization that I'm familiar with. Why is there a x and y coordinate when they don't encode anything? The bar chart below is clearer. I can intuitively understand what it means. I don't like the encoding of x and y coordinates and clusters.
- 2) There should be a horizontal time slider, that's a more intuitive way of encoding time. If you display a ticking clock, I can't control what time I want to view.

Task 2: How do you find out how extremely wealthy people spend their days?

I intuitively drag the horizontal slider to the right to increase the salary. I notice that the visualization has changed and I can see a summary of how wealthy person spends their time.

Recommendations:

1. Is there a better way of encoding time spent rather than pie charts?
2. The team should implement a slider where you can control the left bound and right bound? Then we can visualize the average data of a range of incomes.



III. Project Implementation

1) Setting Up

- All team members now have access to the group's [repository](#) where all code will go. Created a landing page containing information about the motivation, goals, and dataset for the project. Vendor files and stylesheets were added. Data is loaded in the console.

2) Cleaning Data using R

- We cleaned up the data with R primarily to take out subjects with any NIU (not in universe) values, simplify the data by categories, and perform needed calculations to map out our visualizations later:
 - We split up the data frame by gender, race, family income, employment status and calculate the average working time, regroup social and sports into leisure time, calculate the average household activities, personal care, and travelling time for the parallel coordinates
 - We also restructure the data by building a new frame of database split up by state with the average working time, leisure time, personal care, and education for the histogram and choropleth
 - We restructure the data by categories to calculate the demographic composition and count the number of subjects in different demographic groups for the donut chart

3) Revise Visualization Ideas

- We only had 1 coordinated visualizations when we began, which was bar chart coordinated with a moving dots graph. Later, when we added a histogram, we coordinated that with the choropleth map that we had originally planned on having. A donut chart was added at a later stage, and we added a parallel coordinates graph to coordinate with the donut chart. We also had a stacked area chart and a scatter plot that we scrapped because they did not show any interesting insights and because they didn't look aesthetically appealing. We changed our ideas based on feedback from studio and also based on what we felt made sense for our story.

4) Revise Questions of Interest

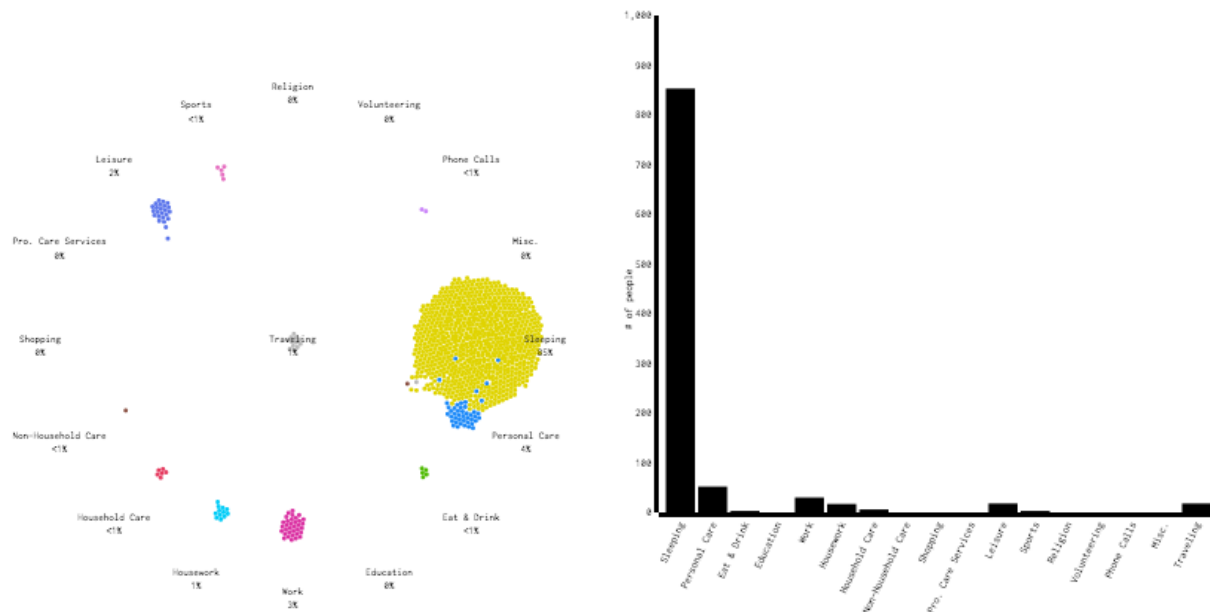
- We had originally wanted to explore work/life balance in Americans by exploring how much time Americans spent on work vs. leisure. However, when we made our moving dots visualization, we realized we could expand the scope of our story to explore how Americans spend their time across different states, across different demographic and socioeconomic groups, and in a simulation of a single day. We

realized just focusing on Work and Leisure was not as interesting as taking a holistic look at American time use.

5) Stage I of Visualizations: Prototype V1

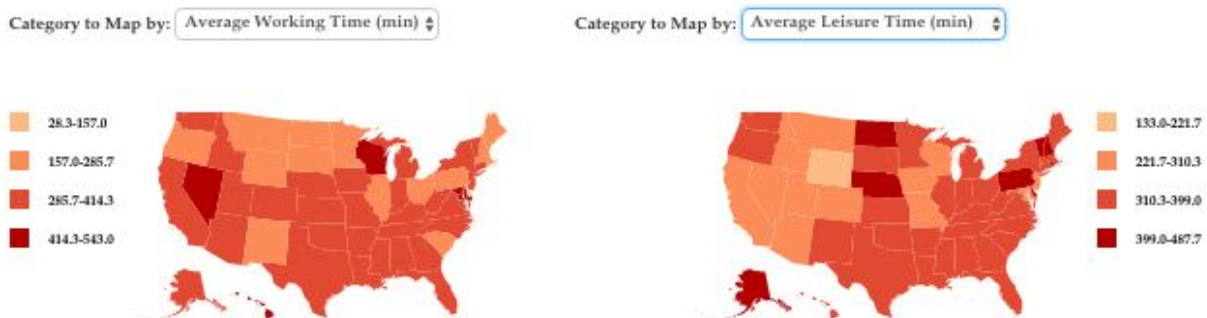
Visualization I: A Day in The Life

- We're interested in showing how Americans spend time in an average day. To do this, we visualized 1000 people as dots and showed how each dot moves from one activity to another. We coordinated a bar chart in real time with the dots visualization. The bar chart shows the concentration of people in each activity.



Visualization II: Across the US

- There were originally two choropleth maps side by side to make comparison between categories easier. However, we received feedback from our TF that it would be easier if we only had one, larger map. We also decided to add more activity categories to compare between.

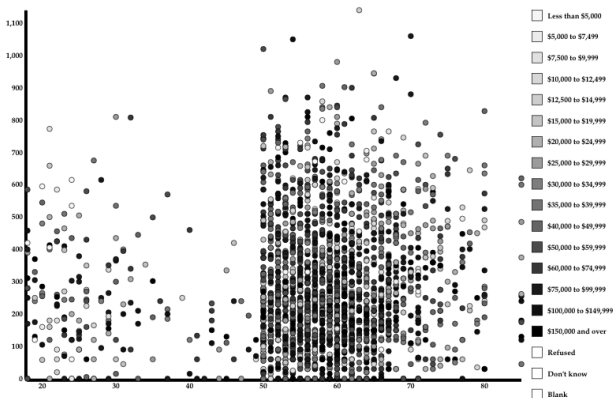


Visualization III: Group Differences

Originally the scatterplot had time use on the y axis and age on the x axis. We chose to scrap the scatter plot because we did not see any kind of meaningful relationship between age and time use. There was also no way for us to graph income on the x axis since we had

ordinal data for income. Even condensing the income groups did not reveal any meaningful patterns, so we decided to explore this same question with a different visualization later.

Time spent in Leisure ⚡ (in average mins/day) by Age



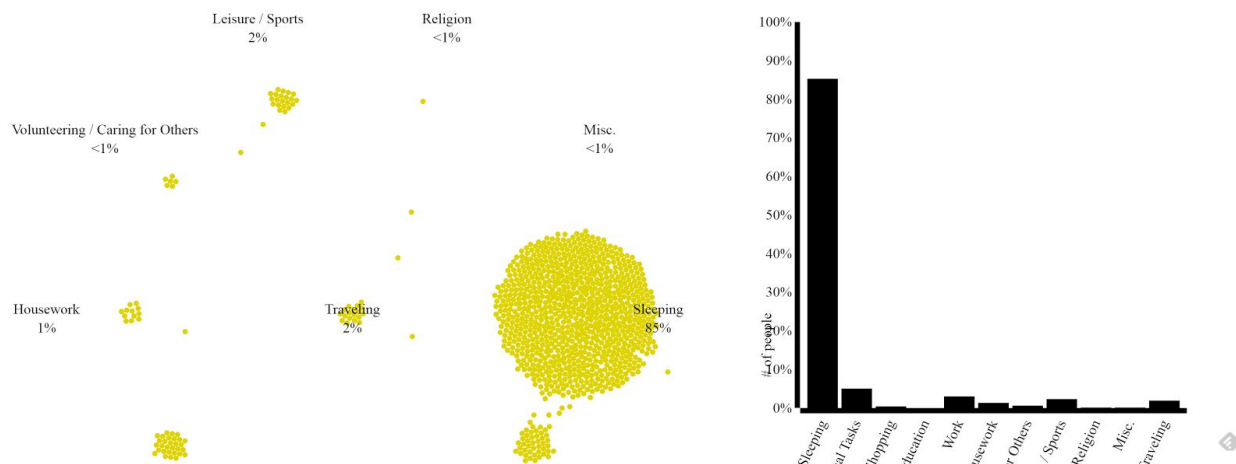
6) Stage 2 of Visualizations: Prototype V2

Visualization I: A Day in The Life:

We used the feedback we received from studio to improve the visualization. We made the y-axis of the bar chart to be in percentage instead of count. We rearranged the layout so that the time and speed control are centered. We combined several categories together to reduce cognitive load since we originally had 17 categories. Now it's 11 categories. We implemented a rough version of a pause button.

4:19am

SLOW PAUSE FAST



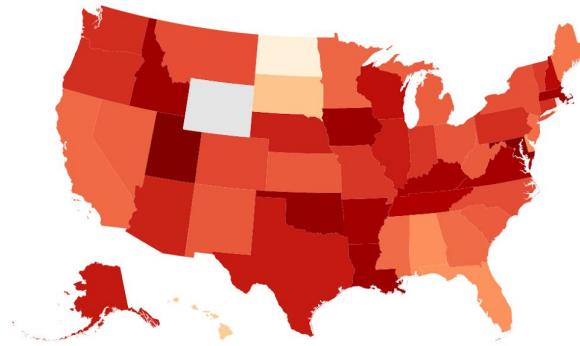
Visualization II: Across the US

We made the choropleth map larger and added more selectable categories. The ranges were originally in minutes, which we decided to convert to hours to make the data more readable. We also moved the legend to make the visualization fit on a smaller space.

Time Use Across the US

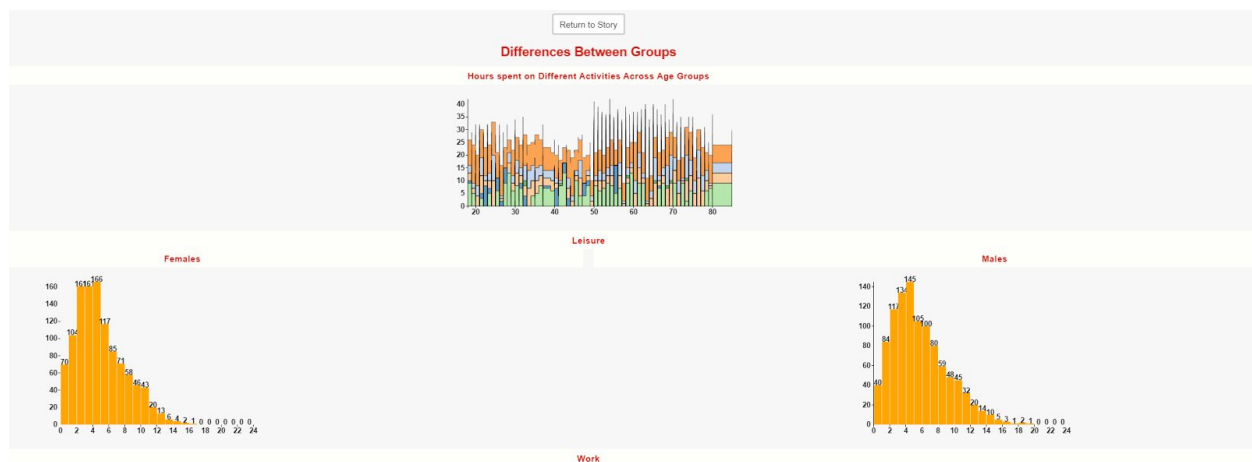
Category to Map by:

Work includes...



Visualization III: Group Differences

We originally had a stacked area chart that had age on the x axis and amount of time spent on a selectable activity on the y axis. We scrapped this visualization because it was misleading and not intuitive to understand. The histograms were also difficult to compare side by side, so we layered the histograms on top of each other. Since we scrapped the stacked area chart, we moved the layered histograms to be on the same page as the choropleth map, and after feedback from our TF, we decided to coordinate the layered histogram with the choropleth map.



7) Stage 3 of Visualizations: Final Visualizations

- We met up with our TF to get some final feedback on our visualizations

Priorities

- Make sure all viz's work (fully functional)

- Aesthetically pleasing website (spacing, fonts, etc)
- Story

One Day Coordinate

- Make graphs smaller to fit on story page
- Color the bars
- Make dots either #00cdc0 or #ff775c to make color scheme
- Add a reset button

Choropleth Map

- Fix the map alignment so that it's more towards the side
- Change the legend so it displays hours instead of minutes
- Have the tool tip text appear on the side instead of over the state

Histogram

- Add labels to histogram for x and y axis and legend
- Add text that shows the values and the difference between the values
- Have the histogram appear on the side or below the map
- Convert y axis labels to frequency percentage

Parallel Coordinates

- Get rid of sports and education or combine them into other category or replace the category

Donut

- Consider converting to rectangular area because pie charts distort data (low priority, fine as is)

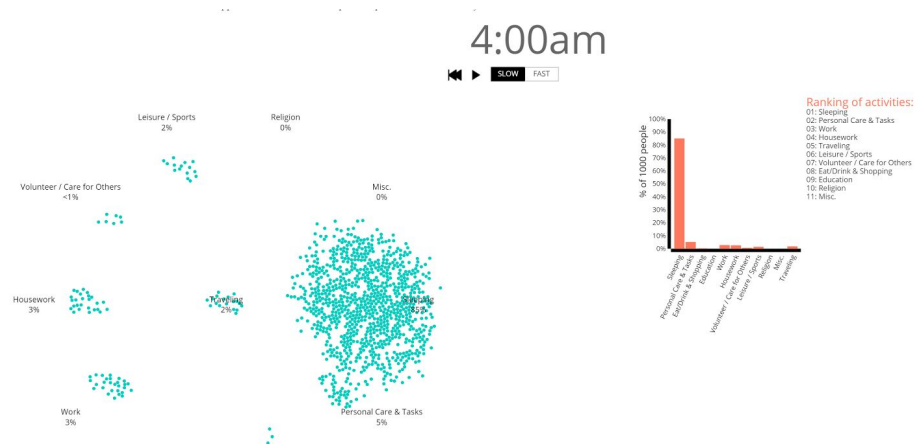
Website

- Add a summary at the end with a few sentences on insights that surprised us or that we found interesting

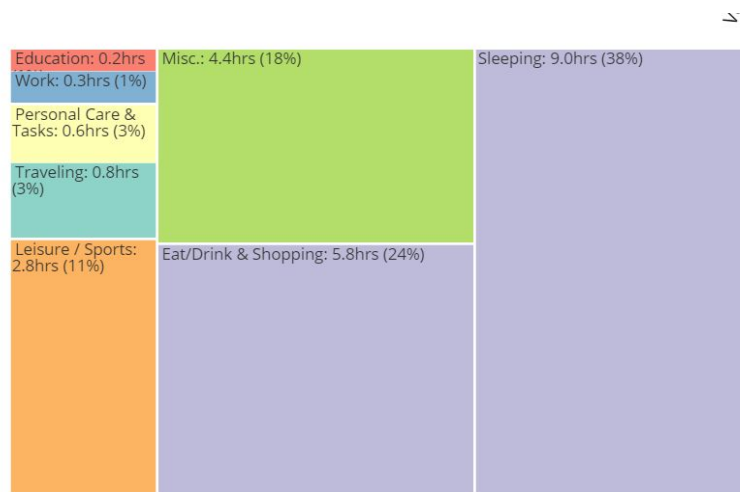
Visualization I: A Day in The Life

- Based on the feedback we received from class presentation and our TF, we added a real-time ranking of activities, made the bar chart smaller, changed the color of the dots and bars, improve the implementation of the play/pause button, added a reset button. One innovative improvement we made on our own: make the dots clickable (we made the dot highlights yellow on hover and the cursor

changed into a hand to make this intuitive); on click, a treemap

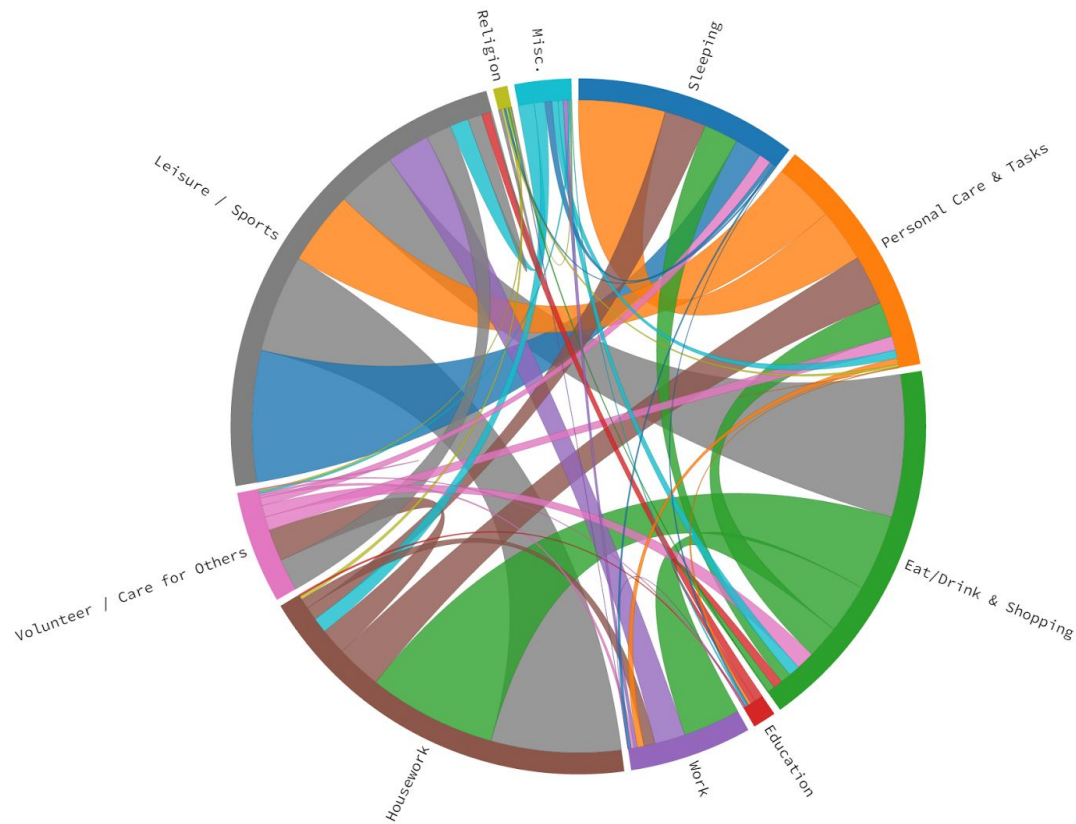


appears and shows the person's 24-hr schedule.



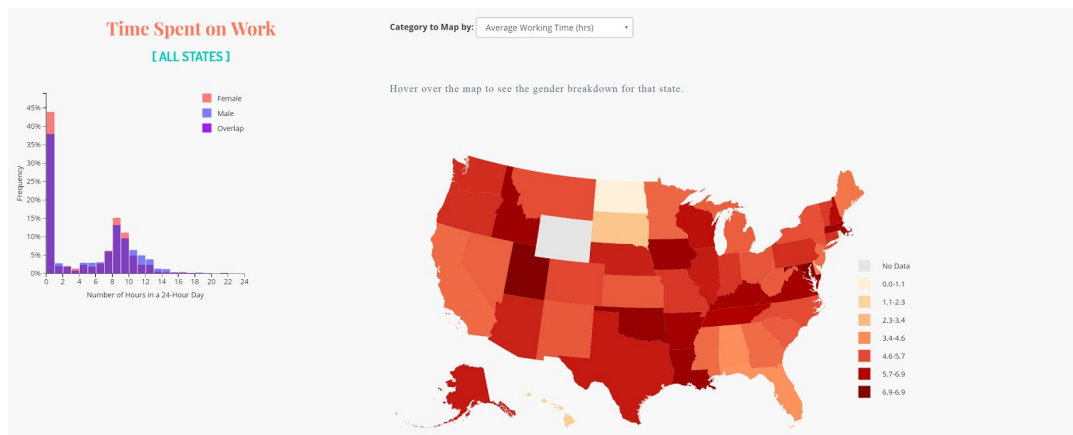
Visualization II: A Day in Transition

- Based on our work with visualization 1, we used the same dataset to make a chord diagram that visualizes how 1000 people choose the next activity given they're already doing a certain activity. We used javascript to construct a 11x11 matrix of next-activity occurrences. We constructed a csv file from this javascript matrix and made a chord diagram using this csv.



Visualization III: Across the US

- We added in coordinate view for the map by adding a histogram portraying the distributions of time use of females and males within each state for each activity category. We added a legend, a help button, and change the data from min to hrs since it makes more sense for users to visualize time in hours.



Visualization IV: Group Differences

- We decide to use parallel coordinates and donut chart to depict group differences and composition of our data in terms of demographics for more thorough understanding of whose time uses we are analyzing. We cleaned up data in R to build the data structure for the parallel coordinates and visualized the parallel coordinates based on the categories reflected in the donut chart.

Insights & Observations



Higher income people spend more time on average on personal care.

Asians tended to spend less time on average on personal care and more time working than people in other racial categories.

Women spend more time on average on household activities and more on personal care



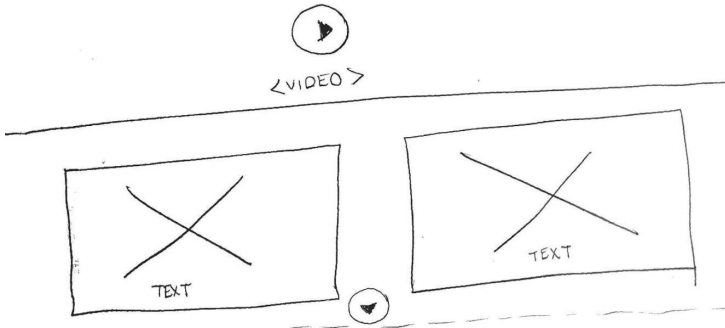
8) Website Layout Development

- INITIAL DEVELOPMENT:
 - We brainstormed as a team to quickly sketch out the structure of our website

1 American Time Use

ABOUT | EXPLORE | INVESTIGATE | INTERACT | INSIGHTS | OUR TEAM

I. BACKGROUND & MOTIVATION



II. EXPLORE

1) SCOPE (ABOUT DATA)

2) QUESTIONS OF INTEREST

1) ~~~~~

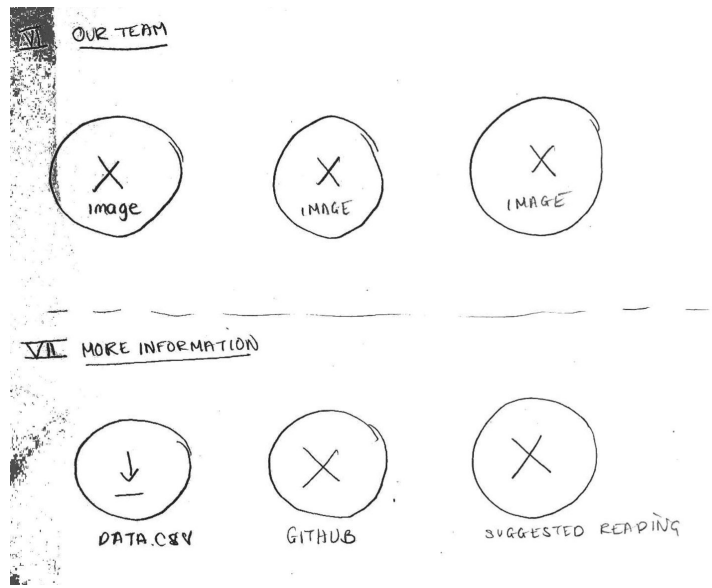
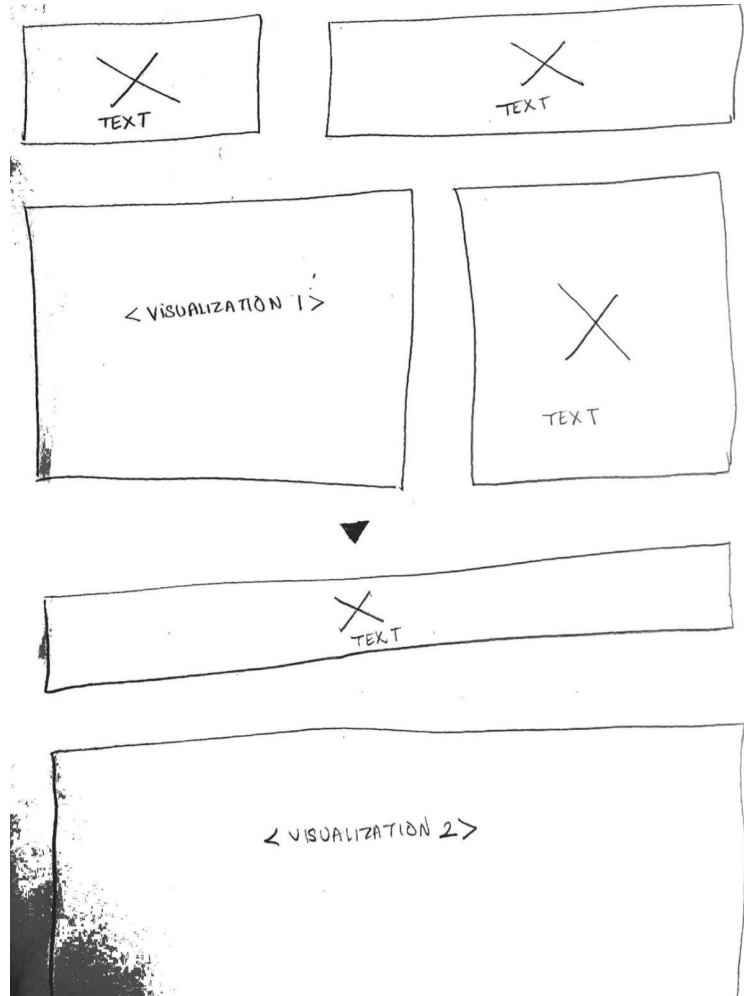
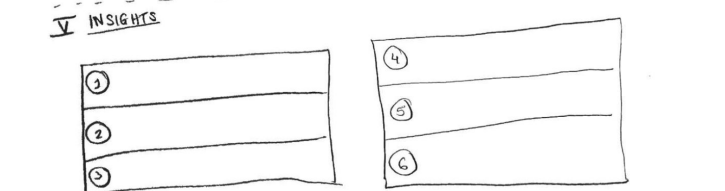
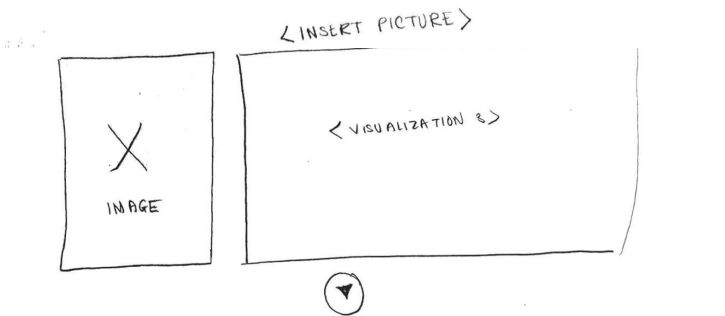
2) ~~~~~

3) ~~~~~

1) ?

2) ?

3) ?



- **NEW DEVELOPMENT**

- We decided to create fun animated HTML CSS graphics on our website such as a moving hourglass and a clock to make our website more lively
- We decided to keep the visualizations on separate pages to avoid crowdedness and develop stories as a sequence of questions going from broad to specific topics
- We unified our fonts use and reformat the layout of information to produce a smooth flow of information to tell a story
- The current web page reflects the new changes to our front page development

9) Storytelling Development

- We built our website story around the following main questions of interest:
 - How typical Americans spend their days, how long do they spend on each activity, what activity are they engaged in, and what's the distribution of population across various activities
 - The story of how different demographic groups (based on gender, family income, employment status, races) spend time differently on various categories of activities such as working time, leisure time, personal care, education, travelling, household activities
 - The story of how different demographic groups spend time differently across the US
- We built our visualizations around these questions and derived Insights & Observations from our visualizations, which we included on our website

Insights & Observations

Differences between gender were not as vast between categories as expected. There was a surprisingly large amount of overlap between genders across all states.

Unemployment among women was higher than for men, as indicated by the greater frequency of women who work less than 1 hour a day.

People in North Dakota spent more time in their day doing leisure activities than people in any other state.

Time spent on education tends to be greater for women than for men across all states.

10) Implementing Some Help Functions

- We add in some help functions to explain how our visualizations work to users for easy comprehension and user-friendly interface

- Upon hovering, we will show explanations of how different visualizations work, what question it is trying to answer, and how to play with our visualization.

Policy Implications



Understanding a nation's time use allows policy makers, economists, sociologists, demographers, and individuals to better serve the nation and better understand people's behaviors.

11) Final Polishing

- We made the screencast
- Edit some minor details on our website
- Proofread info on our website
- Edit font and add in buttons to produce a logical flow
- Finish writing the process book and README file

III. Final Product

1) Website

- Link to our website: <http://ustimeuse.github.io/>

2) References

- Below is the list of websites, references that have provided us with the help code and inspiration for our data visualizations and web design
 - Site based on Start Bootstrap. Start Bootstrap was created by and is maintained by **[David Miller]**(<http://davidmiller.io/>), Owner of [Blackrock Digital](<http://blackrockdigital.io/>).
 - Codepen.io for inspirations and source code for animated clock and hourglass on the front page
 - Libraries/Source Code used: Underscore Library, JQuery, Bootstrap, Jekyll, Google Fonts, D3
 - [Sundar](#)'s visualization
 - Mike Bostock's [visualization](#)
 - [Nathan Yau](#)'s visualization

3) R file

- We used R extensively to restructure our data set, clean up data, eliminate missing value, and help us review and learn about the data set. Our R files can be found on Github in [this link](#).

4) Special Thanks

- Special Thanks to our wonderful TF Mirhee for the delicious Korean snacks (we love them) and the useful feedback and guidance on our project <3
- Special Thanks to CS 171 TFs and Professor for really great and clear instructions for labs and homework and for helping us learn the essential skills for us to complete this project