Process Book

Climate Change: What's Effected?

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Project Repository: https://github.com/SonamChoudhary/dataviscourse-pr-climate_change

CONTENTS:

BACKGROUND, MOTIVATION, AND DESIGN

Climate change has become more and more alarming in the recent years. Research has shown how climate change is affecting the mountains and has further caused danger to the flora and fauna. With our project we aim to explore and present some of the effect of climate change particularly on ski resorts and we would also highlight an animal species affected by it. Surrounded by mountains which we enjoy so much, climate change, and its effects, have always been something we have wanted to investigate.

PROJECT OBJECTIVES:

Our objective is to provide an interactive visualization to explore the effects of climate change on ski towns by visualizing the change in temperature and the snow fall.
Our second objective is to provide an interactive visualization to explore the effects of the climate on an animal species by investigating the conditions that constitute the natural habitat for that species and the temperature range that the species can survive in.
While the user can investigate an animal independent of the ski resort and vice versa our visualization would also allow a user to view the impact in relation to each other, animal found around the selected ski area.

DESIGN :

Figure 1: Design 3

Our third design has 7 components. Each component helps show the effect climate changes have on Ski Mountains and an animal that inhabits them.

Components:

1. The first component is a map of the United States of America. On the map will be indicators of the location of each ski resort.

2. The second component is a graphic highlighting the animal living in the area. There will be a brief description of how climate change affects that animal.

3. The third element will highlight resort facts of the ski area including skiable acres, restaurants, terrain statistics. It will also provide a terrain map of the ski area.

4. The fourth visualization highlights the effect climate change has on this client. If the animal is affected by temperature it will show the amount of days the temp is above or below the tolerance of that animal. If another climate change factor is causing the animal to leave the area we will use this area to highlight that element.

5. The fifth component is a graph of temperature data for all 365 days of the year. It will contain three lines one showing min temperatures, one showing max temperatures and one showing freezing. The Y axis will be temperature and the X axis will be days of the year.

6. The sixth component highlights snowfall data and snowfall probabilities through out the year.

7. The final component is a slider that the user will be able to use to change the average temperature for each day of the year. As they move the slider to the right the min max temperatures will increase/decrease. The snowfall and snowfall probabilities will increase/decrease. Finally, the temperature tolerances will update for the animal showing that the animal will no longer be able to occupy the Ski Area.

FINAL DESIGN

We have decided to implement design 3. We have chosen this design as it encodes the most information the most efficiently amongst all 3 designs. We also feel that it encodes our visualizations message in an impactful manner.

The map, which will act as one of the user's controls, is displayed front and center making it easy for the user to interact with the visualization. To the sides of the map there are reference materials describing the affected animal and ski area. These three components will allow the user to easily identify the purpose of the visualization as well as orient to the geospatial location of the highlighted area.

Directly below the map and visual aids we have the data driven graphs. These can be manipulated through the temperature slider. Each of the graphs lends itself to the purpose of the visualization describing climate change affects on the highlighted animal, the amount of winter days in a region, as well as the affect on snowfall, and snowfall predictions.

MUST HAVE FEATURES:

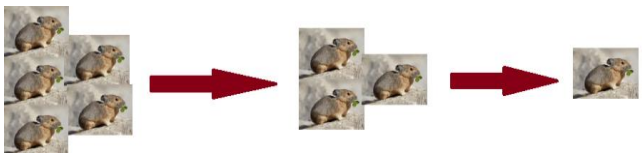
1. Graph showing the Average Daily Temperature. Specifically showing the Min and Max categorized as freezing days and thawing days.
2. Picture of animal and a table of days that are above or below animal tolerance/

3. From the data able to map the ski resort on the map.
4. Based on the ski resort selected the corresponding snow levels are displayed in a graph.
5. Select the animal from the drop-down list. Have the information about the animal displayed in the info box.
6. Have the locations marked on the map with the animal population.

OPTIONAL FEATURES:

1. Filter ski areas based on regions.
   The East: (New England, Mid Atlantic, Southeast, Canada East), **Midwest**, **West**: (Colorado Rockies, Central Rockies ,Canada West ,Pacific Northwest ,Sierra Mountains ,Southwest) as shown below.

2. Including ratings for these ski resorts could also be added as a feature which we might want to add.
3. Have a graph showing the decrease in the animal population. Not the exact figures but just a representation of the decrease in the population.



DATASET:

The primary source of data is NOAA's climate data online climate search platform. We will be specifically using NOAAs normalized data to minimize the need for further Data Processing.
The Data comes in the form of csv files. We will be receiving one file for each location that we want to include in the visualization. Within the file we will be using temperature, snow fall total, and snow fall probability data. We will also be using latitude and longitude data which is also included in the file.
The other data we will be temperature tolerances for each animal that we use in our visualization.

DATA PROCESSING:

We have three data processing tasks that will need to take place:

- First, because each CSV file will be downloaded separately we will need to load the files in to our visualization depending on the location (ski resort) the user chooses.
- Next, we will need to manually collect the temperature tolerances for each animal and key them into a database to be used in the visualization.

Finally, in the visualization the user will have the choice to interact through a temperature control. They will see in real time the affect climate change has on each mountain and animal

IMPLEMENTATION:

After the initial planning phase, we started in on the process of building our visualization. The structure of our viz and how it would be implemented would consist of basic agile techniques. Where we would use GitHub project interface to visually describe each issue we are facing, and the steps taken to finish. This way ownership would be defined, and nothing would be forgotten. As new issues cropped up we added them to the project space to work through. Slowly moving open issues to completed issues.

PROJECT SCHEDULE:

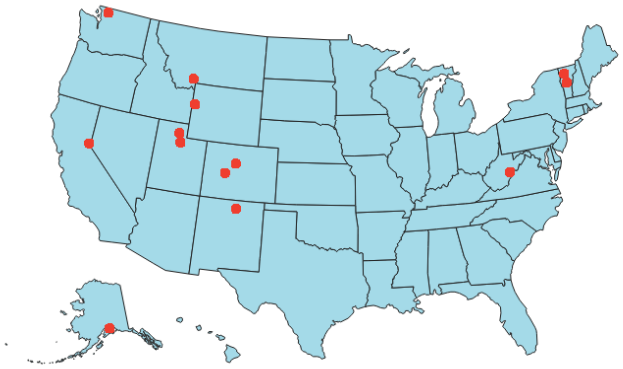
WEEK	OBJECTIVE
10/27/17	FINISH PROJECT PROPOSAL
11/3/17	COMPLETE DATA ACQUISITION
11/10/17	COMPLETED PROTOTYPE AND MILESTONE
11/17/17	MUST HAVES COMPLETED
11/24/17	PROCESS BOOK UPDATE - OPTIONAL FEATURES COMPLETED
11/30/17	SITE RUNNING - SCREENCAST COMPLETED
12/1/17	FINAL PROJECT DUE - EVERYTHING

EXPLORATORY DATA ANALYSIS

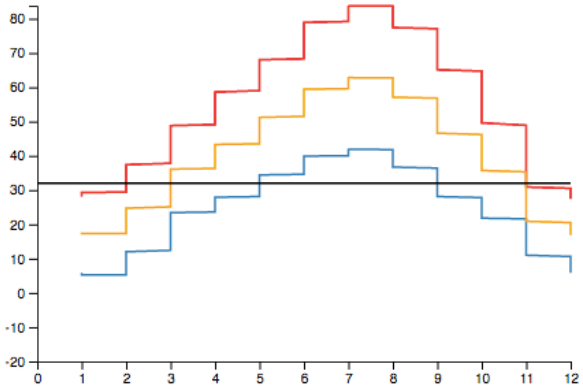
We separated the work at first by elements and datasets knowing that further refinement would be needed while keeping current objectives in mind. The major/minor elements are listed below with screenshots of the initial visualizations created to provide an idea of what the space would look like with a viz as well as do exploratory data analysis so that we would know if our data and viz was meaningful.

Major Elements:

- Map – Primary controller for visualization



- Temperature Chart – Primary Chart of visualization



- Snow Chart- Secondary Chart of visualization
- Animal Chart – Secondary Chart of visualization

Minor Elements

- Animal Picture – Reference data for visualization
- Ski Area Picture - Reference data for visualization
- Animal Stats - Reference data for visualization
- Ski Area Stats - Reference data for visualization

Major Data

- NOAA Weather Data - Temp/Snow/Map
- Animal Data – Animal Chart/Animal Stats

Minor Data

- Ski Area JPEGS – Ski Area Pics
- Animal JPEGS – Animal Pics
- Ski Area Data – Ski are Stats

DESIGN EVOLUTION

As our design is still in evolution we are keeping detailed notes to consolidate as our project solidifies as well.

❖ 11/3/17 - Project update

Data Acquisition

Since the proposal we have covered a few milestones. We have satisfied our primary object and have completed our most important data acquisition which is the weather data that will be driving most of our charts. We have also gotten leads on good animal data that we can incorporate into our viz. We will have this data before our 11/10 milestone is due.

Critique

We finished our critique on Thursday 11/2/17 and received great feedback from our reviewers. After listening to our proposal, they came back with the following ideas for our design:

1. Include statistics about each mountain when the visualization loads. They emphasized that our audience will enjoy that as we are already including statistics about snow and a map of the ski area.
2. Another piece of feedback was to include a way to compare the ski areas. Our primary objective is to show the effect that temperature change will have on skiing. Particularly focusing on days that freeze versus days that thaw. Their feedback was that they were curious to know how different mountains would be affected by climate change and that we should have a way to show that.
3. Another piece of feedback concerns our lack of animal data. At the time of the critique we were limiting the number of resorts that we could show due to the fact we didn't have a reliable source for data on the animals we wanted to highlight. There feedback was that we could repeat animals and not to limit the number of ski areas we show in the viz to the number of animals we have data for.
4. They were very interested in our temperature graph. I brought up that the graph could get very cramped due to the number of data points that we have. They gave the idea of using brushing to center the graph on the area that the user finds most interesting.

After the critique we decided to incorporate the most constructive pieces of feedback.

We are going to include mountain information where we can find it. We are treating this as a nice to have, at the moment, as this will require either manual entering of the data or a new data source which includes mountain information. We also liked this idea for our animals and will be using this idea for our animal piece

Regarding the third piece of feedback we were able to find a reliable source for animal data therefore, we shouldn't be limited when searching and uploading ski data.

❖ 11/5 Update

We have uploaded data to our GitHub page and have started creating project goals for the end of this week. The goals are listed below and outlined here.

Goals

- Animal Graph
- Animal Data
- Snowfall Graph
- Temperature Graph
- Map of USA with Ski Area Markers
- Snow/Temp Data
- HTML Structure
- Animal Data

❖ 11/7 Update

We have started working on the goals listed above and divided the work.

Open

- Animal Graph
- Animal Data

In Progress

- Snowfall Graph - Taylor
- Temperature Graph - Taylor
- Map of USA with Ski Area Markers - Sonam
- HTML Structure - Sonam

Finished

- Snow/Temp Data - Taylor

❖ 11/9 Update

Open

In Progress

- Snowfall Graph - Taylor
- Animal Graph

Finished

- Snow/Temp Data - Taylor
- Map of USA with Ski Area Markers - Sonam
- HTML Structure - Sonam
- Temperature Graph - Taylor
- Animal Data - Taylor
- Snow/Temp Data Processing – Sonam

Learning and Changes

We have learned a lot during this day. We coded separate HTML files for each of our elements which was duplication of effort. Sonam solved this with our HTML structure strategy. While creating the HTML strategy we also learned that we should solidify our data strategy as well. This led to the creation of another goal, Snow/Temp Data Processing, that needed to be finished before Friday. Our data set changes with a on click event this data then has to be fed into other elements. Sonam solved this so that going forward we have easy dataset to access and use. She also identified the key within our data that ties the weather to each location. We will use this same key with our animal data as well.

❖ 11/10 Update

Open

In Progress

Finished

- Snow/Temp Data - Taylor
- Map of USA with Ski Area Markers - Sonam
- HTML Structure - Sonam
- Temperature Graph - Taylor
- Animal Data - Taylor
- Snow/Temp Data Processing – Sonam
- Snowfall Graph - Taylor
- Animal Graph

REFERENCE:

- https://www.doi.gov/blog/9-animals-are-feeling-impacts-climate-change/
- https://catalog.data.gov/dataset?tags=mammals/
- https://www.fs.fed.us/database/feis/animals/mammal/alam/all.html#PreferredHabitat/