Project 2 Final Report

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Kenzie Zou:

- Conducted research on dataset
- Met with teammates to brainstormed on the ideas of the interactive visualization
- Created storyboards for the dataset and the interactivities
- Mined data and prepared dataset of extinct animals in Oceania and Europe since 1500
- Re-organized datasets for animal extinction and world map
- Designed and wrote code for interactive map:
    - Choropleth map of population density (by continent and by country) according to time input from the slider
    - Mapping extinction to countries according to time frame / animal class
    - Found usable code for slider
    - Extinct animals list on-click for each circle
- Styled wholed design

Yue Xu:

- Conducted research on dataset
- Met with teammates to brainstormed on the ideas of the interactive visualization
- Created storyboards for the dataset and the interactivities
- Mined data and prepared dataset of extinct animals in North America since 1500
- Researched on the implementation of the design and interactivities of the visualization
- Collected and combined data from IUCN Red List
- Researched code and created two donut charts to demonstrate the proportions of animals for each endangered categories
- Minded and prepared data sets of world population from different time period and the total number of extinct animals from different time period
- Coded two line graphs to show the correlation between the world population and the animal extinction as time progressed. We did not use the line graphs on the final visualization

Yuxiang Peng:

- Conducted research on dataset
- Met with teammates to brainstormed on the ideas of the interactive visualization
- Created storyboards for the dataset and the interactivities
- Mined data and prepared dataset of extinct animals in Asia, South America and Africa since 1500
- Found json file for map with continent information, wrote code for map by continent
- Found code for slider (d3 v3, didn't use)
- Helped clean up datasets for extinction

B. A description of the data.

We had several datasets: population data from 1500 to 1950 by continent (created from Wikipedia), population data from 1960 to 2010 by country (from Kaggle), animal extinction data by time and country (created from Wikipedia), coordinates for all countries (from https://developers.google.com/public-data/docs/canonical/countries_csv) , IUCN red list (from IUCN API), and json file for map with continent information (https://github.com/robereng/d3-map-zoom/find/gh-pages).

For population data from 1500 to 1950, as well as the animal extinction data, we had to create our own dataset by looking at information provided in wikipedia (mostly sourced from IUCN). For the extinction data, we needed extinction time and place to map them out, therefore we omitted data that didn't have that information. We also omitted the animal class of molluscs since many of them don't have enough information and are hard to pinpoint to a country. But even with these limitations, the dataset we created still provided meaningful information (more than 500 entries).

Depending on user input, we re-organized the data for animal extinction either by time or by animal class. We nested the data for the selected time frame according to countries to facilitate projecting them onto the map. We also added coordinates information to the each country. When circles are clicked, data is re-organized and shown according to animal classes.

As for population density, because there is little information collected by countries before 1960, we decided to color the map by continents, and set the interval by 100 years. As a result, we had to group each features in the json file by continent, then color the whole continent with color scale and continent population density information.

For population density after 1960, the original dataset had data for each year. We chose to map the information by an interval of ten years: 1960, 1970, 1980, 1990, 2000, and 2010.

To collect the data for the total number of animals at risk from different categories of the IUCN Red List, we went on their official API site and requested token to access the data. We have gathered the data for the categories of extinct, extinct in the wild, critically endangered, endangered, vulnerable, near threatened, and least concern. We then calculated the proportion of each category and used these data to create the donut charts.

C. A description of the mapping from data to visual elements.

We chose a double slider for users to interact with the data, we're showing the population density at the time of the right handle, and mapping all extinct species of the time frame within the left and right handles. User is able to not only slide each of the handle separately, but also move both handles together to compare data with the same length of time.

We didn't have to use log scale for the color of map because the population data is density (people/km^2) rather than total numbers. The size of the circles on each country was scaled from the number of extinct animal in that country. The position was projected from the coordinates information of that country.

When user selects a specific animal class, the map shows circles represent animals extinct in that class, colored the same as the animal class button. When user moves the time slider, the circles will visualize the total number of extinctions again. Filtering by class only happens when the corresponding icon is clicked.

On hover, each circle shows what country that circle is mapped to. When clicked, the list of extinct animals in that country (within selected time frame/selected class if applicable) will show on full screen. We specifically chose to present the list in this way in order to force user to really take a look at the list. The red background is to remind users that these species are gone forever. Clicking anywhere on the screen will close the fullscreen list.

We used one donut chart to indicate the proportion of animals at risk to the entire animal population to provide the user with a bigger picture. The second donut chart explores the proportion of six categories under the IUCN Red List of animals at risk in detail. We mapped the chosen colors to the corresponding category to represent the severity of species endangerment, and we used a color palette that matches the overall color scheme of the visualization. The hover of each category on the donut chart shows the definition of the category as well as the total number of animals under that category.

D. The story.

We want to examine the relationship between the growth of human population and the extinction of animals. After we mapped all the data on the world map and the time slider, we have found a strong correlation between the world population and the number of extinct animals. As the human population grew faster in the last few centuries, the extinct animals also grew much faster.

Two notable incidents are the dramatic changes that occurred from 1800 to 1900, and from 1900 to 1950. As we expand the time range from 1800 to 1900, there are many more red dots appearing on the map, which indicating there are many more extinct animals around the world. Our assumption for this phenomenon is that the industrial revolution took place from late 1700s to early 1800s. The advancement of technology may have exacerbated environmental pollution and accelerated the rate of animal extinction.

The other noticeable incident occurred when we slide from 1900 to 1950. The number of extinct animals in several countries become observably larger. We also noticed that the population of some countries become much denser during the period of 1950 to 1960. Our assumption is that

penicillin was discovered in 1928. The prevalence of penicillin helped prevent millions of premature deaths, which resulted faster population growth.

After 1800, thousands of people started to immigrate to Australia, the United States and New Zealand. That may explain the rapid growth of animal extinction in the 19th century in those countries. Our assumption is that new immigrants may have introduced new bacteria and virus that led the death of many animals. Because most of the extinct animals in Australia are mammals and birds, our other assumption is that when the new immigrants first came to Australia, they hunted extensively and may have caused the extinction of those animals.

What surprised us was that extinction did not increase very noticeably since 1980s. One assumption is that humans increasingly realized the toll they are putting on nature, and therefore applied more efforts to conserve species; another is that a lot of species remain categorized “critically endangered” instead of “extinct” by IUCN because of the lack of information in recent years. In actuality, a lot of them might have been already extinct, just not confirmed by officials.

Other than human population, a lot of other changes in environment such as global warming, could also be used to explain the accelerated (almost mass) extinction of species. Because most of them are human induced, we feel like our selections of data is a powerful representation of the relationship.