Process book: Wildlife Trade Project

Overview and Motivation

Recently, the world's last male northern white rhino has died leaving only two females left to save the subspecies from extinction. It is again alarming us what a severe situation wildlife animals or plants is facing. Worldwide, one in every three **s**pecies of amphibian is endangered, 39 species have gone extinct in the last 500 years and another 130 species are suspected to have gone extinct in recent decades.

Lots of factors have caused fast extinction of wildlife. For this project, we want to investigate the impact of wildlife trade, which is one of the factors that is controversial and also has the greatest impact on wildlife. We won't talk about illegal wildlife trade as its harm is quite obvious. We are going to examine the scale, transaction frequency, change over the years and the impact of legal wildlife trade. Wildlife trade has been a controversial topic for a long time especially in recent years. Lots of wildlife trade are actually legal and used for good reasons like education and medicine. However, as the number of wildlife is decreasing rapidly, is the current status of wildlife trade sustainable? What is the trend or pattern of wildlife trade? If the number of wildlife trade is growing constantly, how fast is it increasing? Is current amount of trade overexploiting wildlife resources? Are there any potential harm these legal wildlife trade? There are the questions that we want to explore.

Key Questions to Answer

- Build up an overview of the current wildlife trade all over the world (in the year of 2017)
- Investigate the distribution among different countries and continents.
  which country contributes the most in import/export wildlifes?
- Find out the main classes of species of the trade
- Identify the main purposes of the wildlifes being traded.

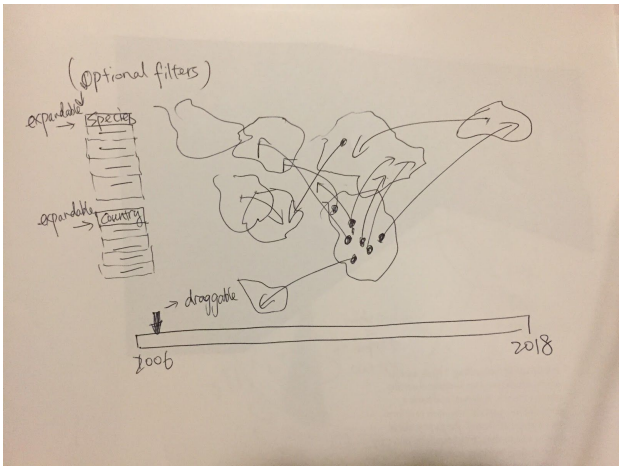
Data

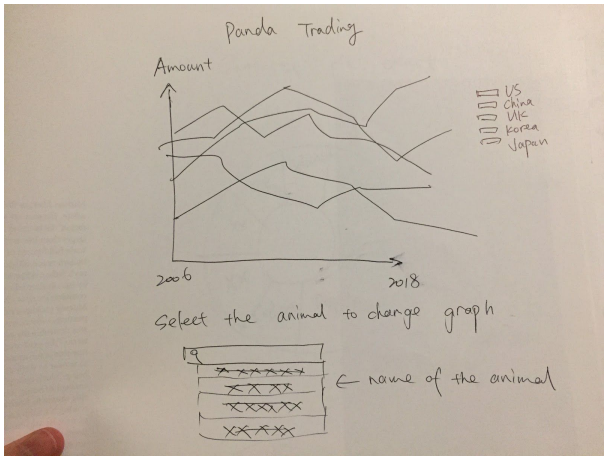
- Source:
  - **https://trade.cites.org/en/cites_trade/**
  - **http://www.iucnredlist.org**
- Clean up:
  - Open Refine and Excel to clean up data with blank columns and duplicate names

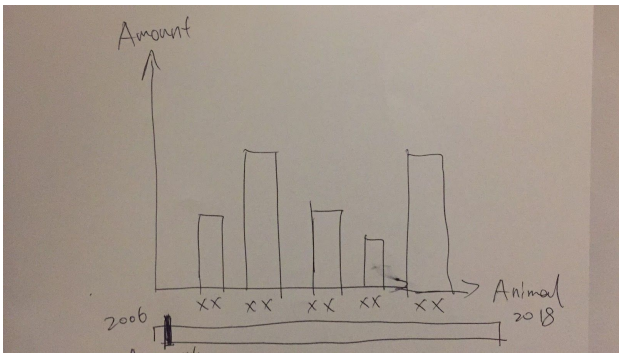
- Add another country+corresponding abbreviation dataset to map the country abbrev in the wildlife trade dataset to actual countries to draw the map

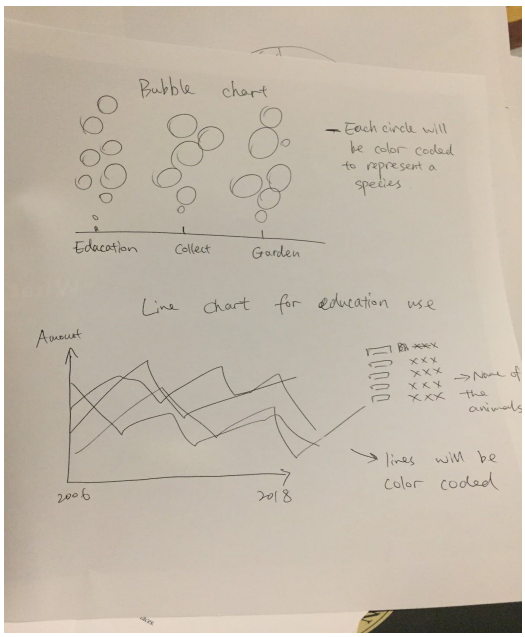
Initial Design

1. To identify the trend of international wildlife trade, we decided to use **world map with flying dots that represent the trade**. The dot is going to fly from the export country to import country. The speed of the flying dot will be adjusted based on the amount of wildlife traded. The advantage of this design is that it gives a clear presentation of the frequency of the trading and it is easy for users to identify potential changes and patterns over the years. If we add the optional features of filters, uses will be able to focus on pattern of wildlife trade of one area or for one specific species easily.
    a. Potential alternative design: line chart.
        i. Line chart is good at showing the specific statistics and the trend, but it does not give the big picture or show the whole network of wildlife trade. We could miss patterns if we use it.
        ii. Chord diagram. It can show the whole network and visualize the amount. We rejected because it can't show the change over the years.
        iii. Animated bar graph for amount of traded animals over the years. It is good for comparing trade of different countries and but is inefficient at giving trend. If we want to investigate import and export countries, we will need to create a new one for each of them.
2. To look at the big picture of wildlife trade and identify potential anomalies, we will look at **what wildlife and the respective amount used for different purposes.** (See sketches for details). The sunburst pie chart is intuitive and totally fit our goal. Alternative designs could be:
    a. Bubble chart: hard to control the circle size and can't make sure that everyone translates the size difference into quantity difference accurately.
    b. Line chart: good for identifying proportion difference but is not interactive enough for users to see proportion of wildlife for different purposes
3. Line chart that shows amount of wildlife traded. Alternative design: bar chart. It makes sense but we are focusing more on the trend and the bars are just distracting. (Not adding sketches because they are too intuitive)
4. Pie chart that shows amount of traded animals vs remaining animals. Alternative design: circle packing. Not using it for the same reason as the bubble chart: hard to translate the size difference.


(Optional filters)
expandable
species
expandable
country
dragable
2006
2018


Panda Trading
Amount
US
china
UK
korea
Japan
2006
2018
Select the animal to change graph
← name of the animal

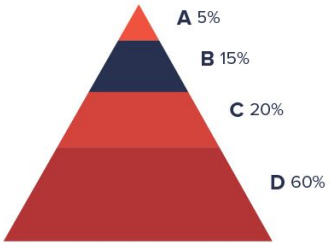

Amount
Animal
2006
2018
xx xx xx xx xx


Bubble chart
Each circle will be color coded to represent a species
Education
Collect
Garden
Line chart for education use
Amount
2006
2018
lines will be color coded

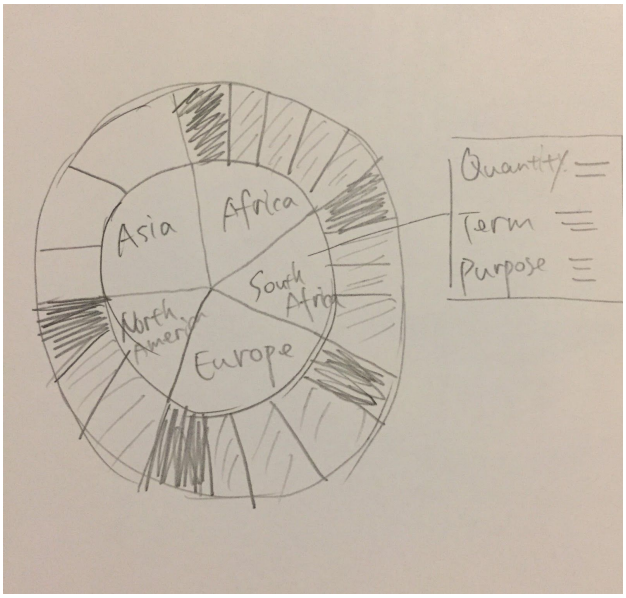
Design Evolution

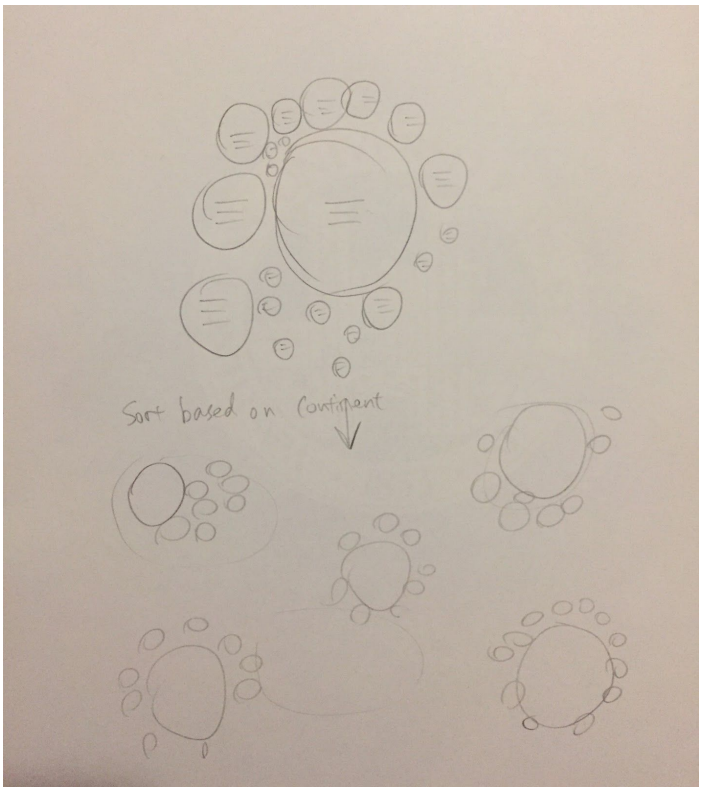
Refinement 1: Adding visualization for detailed analysis of the pattern of international wildlife trade

- After having implemented the map visualization, we found that the pattern is not that clear in terms of which countries or continents are the major exporters or importers of wildlife. The map can only show the number of trades but not the overall quantity of the trade. Therefore we need to add more visualization to complement the map visualization
    - Target 1: showing top importers and exporters of wildlife
        - Design 1: Sorted Histogram that shows the quantity of wildlife exported by each country (top 10 countries)
        - Design 2: Pyramid chart -- rejected because the quantity difference is too big and eventually it's impossible to see the other countries



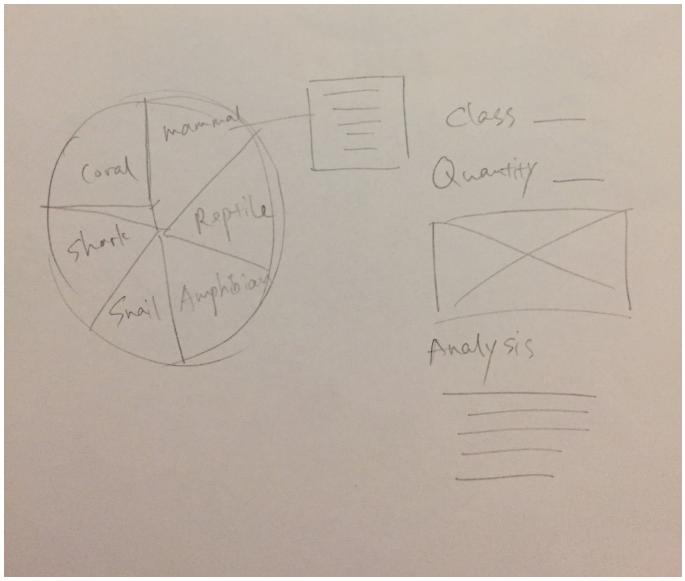
        -
    - Target 2: showing the patterns of the trade
        - Design I: Sunburst pie chart with continent being the inner circle and countries being the circle outside



- Design 2: Bubble chart where each circle represents for a country and the size of the circle depends on the total quantity of the trade in a year -- selected because it accurately shows the difference and they could be rearranged based on continents which can help identify patterns, and it's more interactive and clear than the sunburst pie chart
- 

Refinement 2: Adding visualization for proportion of different categories of animals in international wildlife trade

- When cleaning up the data, we found an interesting fact that the fish comprises of a big proportion of wildlife trade, which is surprising to us because we are expecting mammals or insects to be the major category of wildlife traded. Therefore, we decided to make a pie chart which includes the top 5 categories of class of animals traded, and create a stacked bar chart to show what are the purposes of the trade for each class of animal. Therefore, the initial design of the pie chart that solely comprises of distribution of purposes is deleted as it will be too redundant

- 

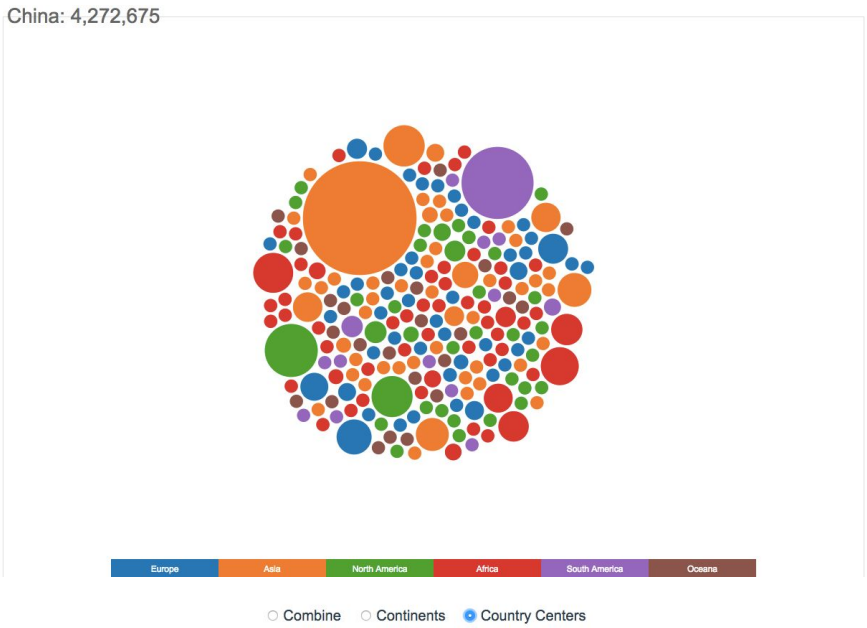
Refinement 3: Adding explanation

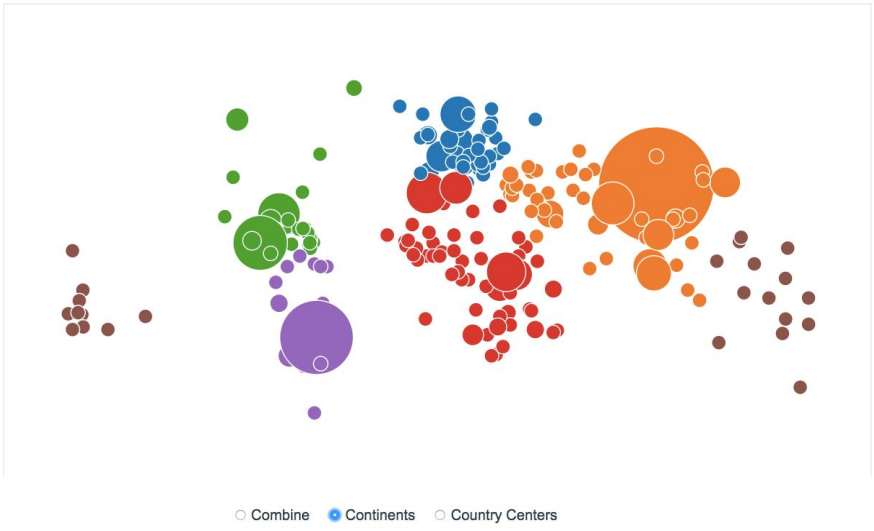
- After having implemented the stacked bar chart and the pie chart, we found some interesting insights like why some class of animals are traded more, which we think should be included in the visualization. Also the names of the class like Anthozoe could be confusing to users. Therefore we decided to add images and the insights we founded next to the pie chart.

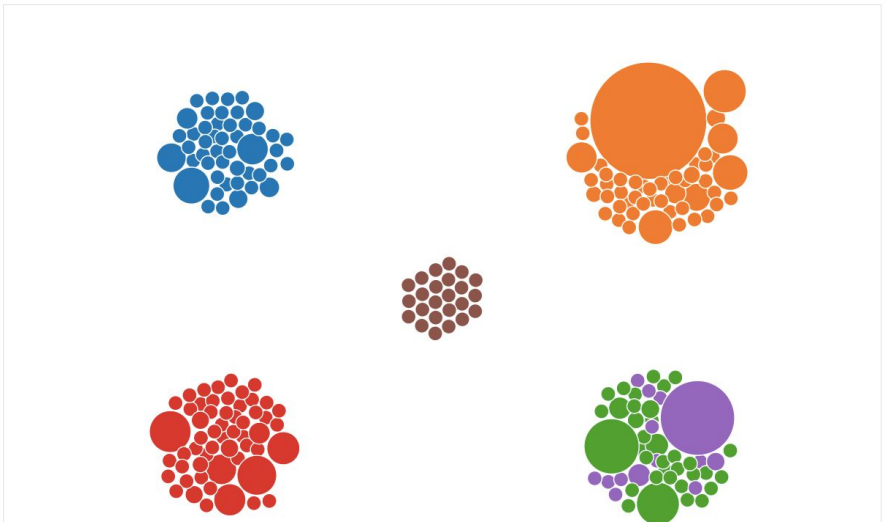
Implementation

- Map with flying airplanes
    - Purpose: to give an overview of global wildlife trade in 2017
    - Interaction
        - Each line represents for a trade. The airplane shows the direction of the trade, going from exporter to importer
        - Users can Hover on the line to get detailed information about the trade including importer, exporter, trade quantity and the species
    - Image

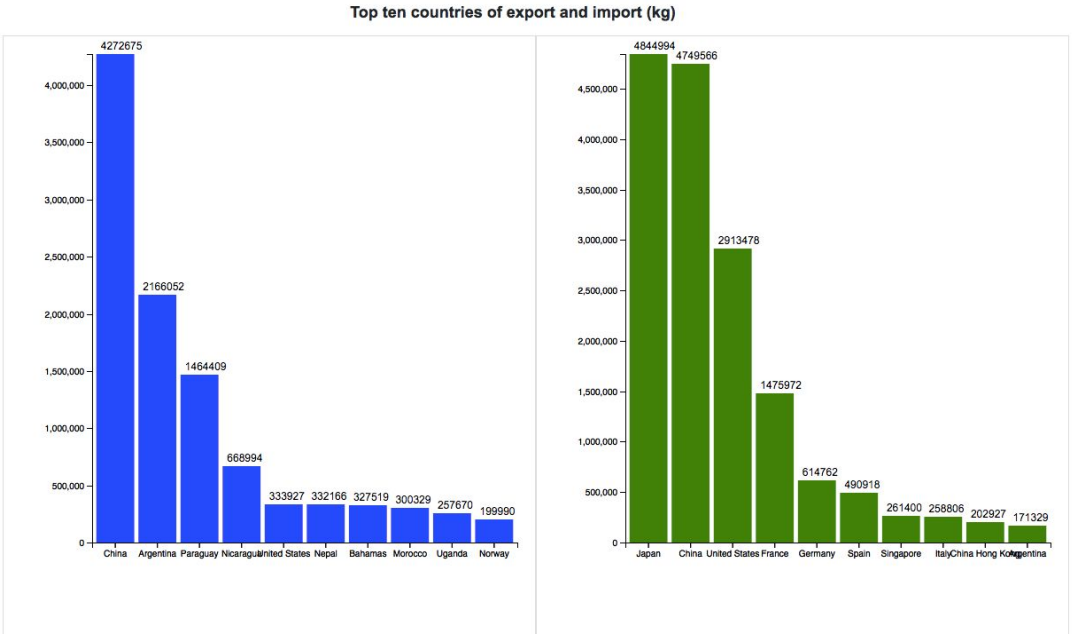
- Bubble chart
    - Purpose: to compare total quantity of wildlife trade among countries and continents
    - Interaction
        - Each circle represents for a country, and users can hover on the circle to see the country name and respective trade quantity.
        - Users can click “Continents” to see the distribution of wildlife trade among continents.
    - Image


China: 4,272,675
Europe
Asia
North America
Africa
South America
Oceana
Combine
Continents
Country Centers

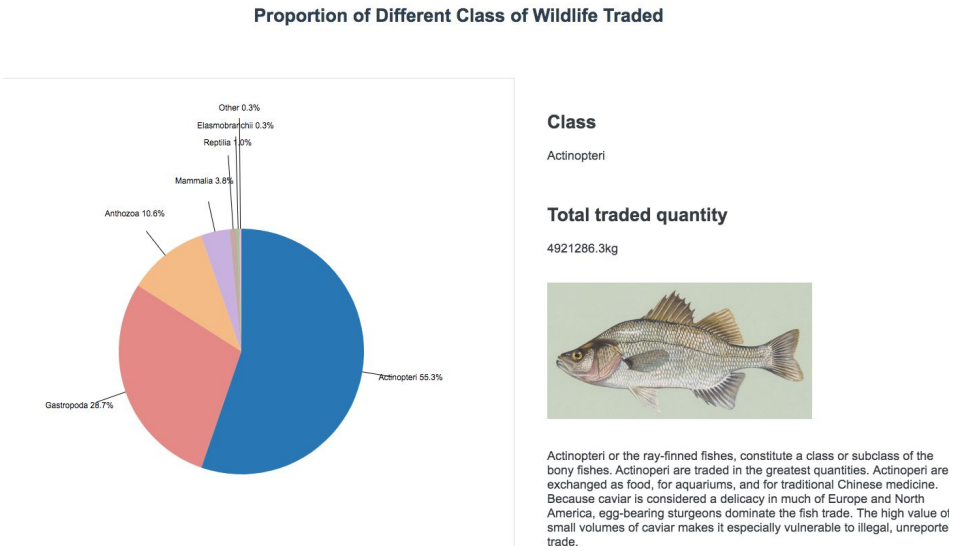

Combine
Continents
Country Centers



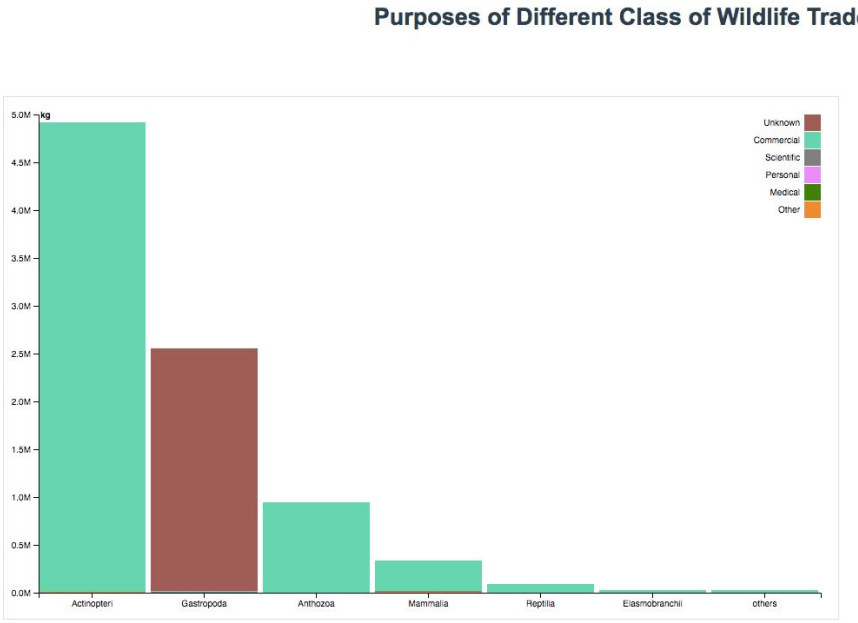
- Bar chart
    - Purpose: to show top 10 importers and exporters of wildlife trade
    - Interaction: no interaction included
    - Image



- Pie chart
    - Purpose: to show proportions of classes of animals in wildlife trade
    - Interaction: users can hover on the circle to see the class name, quantity and detailed analysis
    - Image



- Stacked bar chart
    - Purpose: to show the distribution of different purposes of the trade for each animal class
    - Interaction: no interaction included
    - Image



Evaluation

- Key learning
    - The Variety and amount of wildlife traded is huge.
    - Japan, China, and the United States are the biggest importers of wildlife.
    - From the visualization, we can see that most wildlife are exported from Asia, South Africa, and Africa. This fact raises our concern for the current status of wildlife in these continents. However, since the current data is not very complete, it's very hard to use it to study its relationship with the potential impact on biodiversity or the economy of these continents.
    - Major concerns about current regulation and data acquisition of international wildlife trade.

- Future Improvement
    - The current visualization provides a good overview and analysis of the current status of wildlife trade. However, we only focused on analyzing data for one year. For future improvement, we can add more filter and sort options like by year, class, family, species, and countries where users can analyze and compare data from more dimensions, which can certainly generate more meaningful insights.