Our project studies the impact of global warning on wildlife and their ecosystem. Understanding the impact of global warming and rapid climate changes on species can play a crucial role in predicting endangerment and extinction patterns. In our project, we want to answer

* Is the temperature really rising over time?
* Is the number of endangered and extinct species rising over time?
* Are the climate features such as discussed above really affecting the numbers of endangered and extinct species to go up?

In our project, we are studying weather data with various features such as temperatures and carbon dioxide emissions, together with number of species being extinct and endangered with their other details. We collected weather data from 1895 to 2018 via a public weather API and we used a web crawler to collect data for endangered species from 1967 to 2018. We collect about 4000 species.

Geolocation and time series information are two main factors. Thus, we mainly build a thematic map in which areas are shared in proportion to the count of the endangered species. The interactive map can also allow users to display on habitat information of one specific animal, such as, Indiana bat majorly lives in east of the U.S.

Line chart is built to show annually average temperature, CO2 emission and the count of newly listed endangered species. We use California as an example here.

In the line charts here, temperature and CO2 emission seem to have upward trends. In order to confirm our observation, we have performed time series analysis. Holt-Winters is used to run single/double/triple exponential smoothing. CUSUM (Cumulative Sum Control Chart) is used to detect changes.

The blue line indicates annually average temperature, the orange line shows the data after smoothing with factor as 0.6, and the red line signifies the change detection result. The red line lies on 2000 and if we refer to Fig. 4, we can find the peak is around 1998, which is close to 2000.

We run the above analysis for each state and do find about 60% of states have raising temperature and CO2 emission in the past several years. Among the 60% of states, there are about 34.5% of states indicating a matching period between the peak of listed endangered species and the upward trend of temperature or CO2 emission.

Most of other research focuses on a specific species but our analysis applies on more than 4000 species, which helps us have broader overview of entire ecosystem.