Animal Population Dynamics

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Abstract

These days population of threatened species decreasing day by day. If this situation continues then forthcoming generations will be unable to see these beautiful creatures of nature. Our web application Animal Population Dynamics will provide statistics related to endangered species in graphical format, common threats and also solutions to recover from these threats. We are comparing these endangered species population country wise so we can predict which part of world got affected most. According to these results we can implement different solution strategies to help these endangered species.

KeyWords: Endangered species, population analysis.

1. Introduction

Animal Population Dynamics is a web application aimed towards the conservation of endangered species. Main goal of this application is to provide statistical analysis of endangered species. We implemented this feature through various graphical representations and provided generalized solutions to overcome this problem.

We have analyzed data and provided detailed information about threatened species. We also provided Info graphics, which is pictorial representation of data. This paper will give you detailed description about various functionalities that we have implemented in this application.

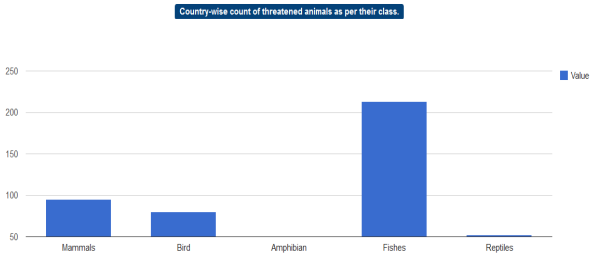
2. Analysis

We have gone through many sites which displays information about endangered species. Most of them showed data about individual animals like what are the threats to them and what can be the solution for preventing their endangerment. Another kind of sites which collects the information about these animals had lot of unstructured data from 1998 till 2013 which contained lot of information. Such data can be used for making predictions about the most endangered species and some action can be taken to save them but since this data is very hard to read it is not of much use. We decided to analyze this data and present it to the user in some graphical format for e.g column chart, pie chart, world map etc.

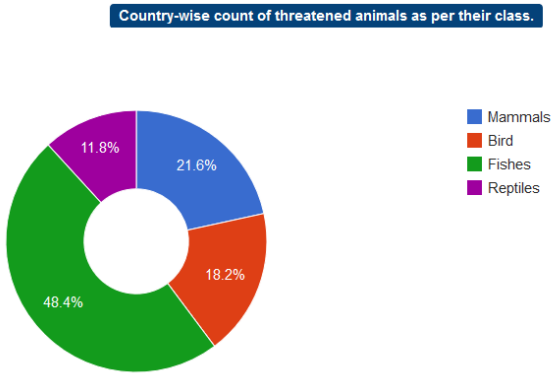
For our project we have divided statistical data into few categories :

A. Country wise threatened species count

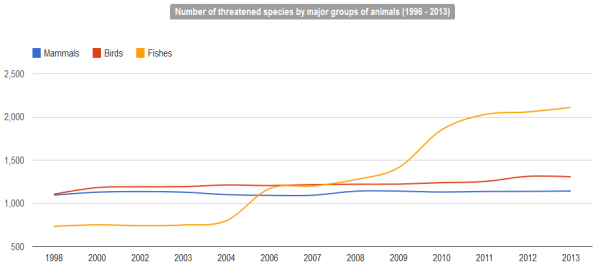
We gathered data from various government and other websites which provide datasets on some absolute values on animals populations, their trend in population across a period of time and much more. We extracted this data and perform some ETL operations to get the data in some structured format. Now we are able to show the total count of different animal class (mammals, birds, reptiles etc) and as per their conservation status(extinct, critically endangered etc) with respect to countries. This data is displayed using different charts like column chart, donut charts and pie charts.



Country-wise count of threatened animals as per their class : Column Chart



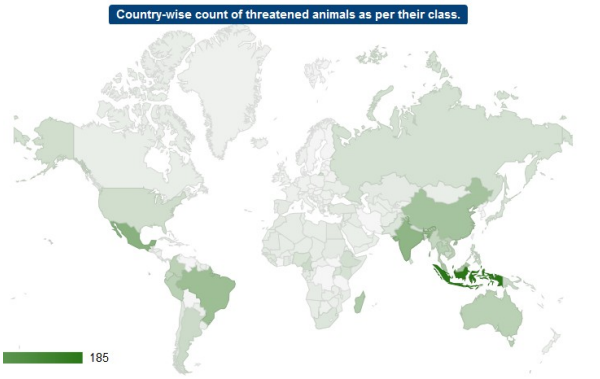
Country-wise count of threatened animals as per their class : Donut Chart



Number of threatened species by their animal class (1998 – 2013) : Line Chart

B. World wide

We used the same data extracted from category 'A' for showing it on world wide. Again we can visualize this data as per their animal class or by their conservation status. The intensity of the color showing each country represents the count of the different animal species across that country. Higher intensity of color means more number of animal species are in threatened state in that country.



Country-wise count of threatened animals as per their class : World map

C. Detailed species information

We also recognized some of the species which are majorly under threat and are on the verge of extinction. More information about such animals can be found under explore section of our application which also points out towards few of the major threats to these animals and what solutions can be applied towards prevention of these animals species from extinction.

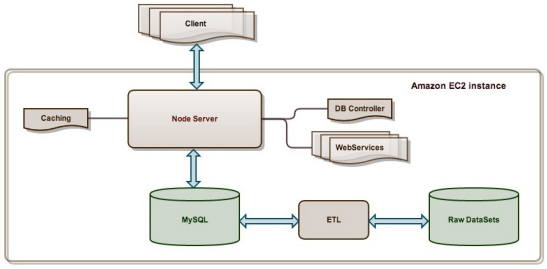
D. Infographics

We tried to collect some info-graphics from various sources which gives information about a specific animal or about a species of animals.

E. Solutions

Most of the website which works for this cause tried to give generalized solution on these problems and show them as paragraphs. Going out of this traditional approach we tried to break down these solutions into sub-categories like Site/Area Protection, Resource and Habitat protection, Trade Management etc and then gave detailed solutions on each of these sub-categories, giving the user more specific information on the solutions.

3. ARCHITECTURE



A. Datasets and Database :-

We got datasets for endangered animals from different sources. These datasets were in unstructured format. By using different **ETL** (extract,transform and load) techniques, datasets are transformed into structured form. We have used java programs to transform different datasets into required format for analysis. Once data is transformed, it is loaded into RDBMS (**MySQL**) for further processing of data.

B. Server implementation

Server is providing various web services to consume for clients. Server is implemented in **NodeJS** which is asynchronous and provides non-blocking I/O to get optimal performance. Server uses DB-controller module to communicate with database for exchanging data. Data objects are cached in server for performance improvement. Clients applications directly communicates with node server by invoking required web services.

C. Application Deployment

Complete application is configured and deployed on **Amazon EC2 linux instance**. Amazon EC2 is configured with elastic IP, which can be used from anywhere to connect to the application. Application can be scaled up to handle client's requests as per requirement.

4. Future Enhancement

More ways to present data in graphical format will be including more type of graphs/charts. Analysis of animal specific data for e.g the decrease in count of a specific animal across a period of time etc. Better statistical analysis to give exact threats and solutions for conservation of threatened animal species.

We are looking forward to contact with NGO's who are currently helping for conservation of threatened animal species and trying to provide some funds to them through our application.

We are trying to take this application on large scale to increase overall awareness about this problem and provide solutions for betterment of endangered species.

5. Conclusion

We analyzed endangered species in various ways and provided statistical analysis to create awareness of this serious problem. We compared this problem on country wise basis, and tried to highlight the areas in which this problem become severe. We also provided some general solutions for their survival in future.

6. Contributions

Amit Borude : Student in MS Software Engineering at SJSU. Contributed in database design and UI part of web application to make it user friendly experience.

Amol Pujari : Student in MS Software Engineering at SJSU. Contributed in statistical analysis part of web application and provided graphical UI for better understanding of this endangered species problem.

Jayesh Pandhe : Student in MS Software Engineering at SJSU. Contributed to describe detailed information about endangered species. By which we can plan for some generalized solutions.

Mahesh Bingi : Student in MS Software Engineering at SJSU. Contributed to provide solutions for betterment of endangered animal species and also worked on AWS to make web application hosted on cloud.

Prasad Bidwai : Student in MS Software Engineering at SJSU. Contributed in database design and AWS to make web application hosted on cloud.

7. References

- World Wide Fund for nature (WWF) http://worldwildlife.org
- International Union For Conservation of Nature (IUCN) Red List http://www.iucnredlist.org
- US government website, http://www.fws.gov
- Google charts for showing charts and world map.