Web Application: finding endangered species on a map

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1 SUMMARY

This project's purpose is to display occurrences of endangered species on a map and see if there are similar places these species could habitat. The data used in this project includes information about the whereabouts of the species and where it has been found. This data is provided by IUCN RedList and the GBIF. The environmental data that is used includes the locations of weather stations all around the world. All environmental data is provided by NCEI. The occurrences of species and the locations of weather stations are shown on a map using the ArcGIS software. An added feature is a search option were information about any species can be requested.

2 INTRODUCTION

2.1 Goal

The aim of this research is to build a research web application. With the use of APIs and applying dynamic web techniques a web application is build. In this research the topic of the web application is endangered species and environmental factors in their habitat. This projects uses information from external websites that give the information to build the web application.

2.2 Theory

The International Union for Conservation of Nature's Red List of Threatened Species has evolved to become the world's most comprehensive information source on the global extinction risk status of animal, fungus and plant species. [1]. With this information on which species have a global extinction risk, more information can be found on the Global Biodiversity Information Facility (GBIF). GBIF is an international network and data infrastructure funded by the world's governments and aimed at providing anyone, anywhere, open access to data about all types of life on Earth [2]. Information about the environmental are found at the National Centers for Environmental Information, who manage one of the largest archives of atmospheric, coastal, geophysical, and oceanic research in the world [3].

3 MATERIALS AND METHODS

3.1 Materials

To create a web application the software IntelliJ IDEA Ultimate 2021.2 was used. IntelliJ IDEA is an integrated development environment (IDE) written in Java for developing computer software. The programming languages: HyperText Markup Language (html), Java and JavaScript, were used to build the application. Cascading Style Sheets (CSS) was applied to style the application. The web application was run on a local server through the software Apache Tomcat. Which is an opensourse-webcontainer that executes servlets and JavaServer-pages. The main software to build the content of the application is ArcGIS. Geographic Information System (GIS) is an information system by which information about geographic objects can be saved, edited and presented. ArcGIS is an mapping and location analytics system, supplied by Esri.

3.2 Methods

The main method in this web application is the map which is build with ArcGIS a map with locations species can be found and the weather station data. The map is build by with the MapView method which is given by Esri. To the empty map multiple feature layers are displayed. The 'StationFeatureLayer' is the layer with points, each representing a weather station. The name is given as label for each weather station. The 'SpeciesFeatureLayer' consist of clusterpoints, each cluster representing points where species have occurred. To get those points a latitude and longitude has to be given. These coordinates are in the json files, every specie has a json file and the weather stations are in one file. The coordinates are given to the FeatureLayer method to create a feature layer, which are added on top off each other on the map. Javascript eventlisteners are added to give the right information when option are clicked on.

4 RESULTS

In this research, a research web application was created. A map was created with points to represent occurrences of species and weather stations.

4.1 Home page

The home page is a general page to send users to the page where the map is, as can be seen in figure 1. A feature we added to our web application is the option to get some general information about species on the home page. In the auto-complete text box any species can be filled in, and by sending it, a text box under will appear with some information about the species the user send in, shown in figure 2.

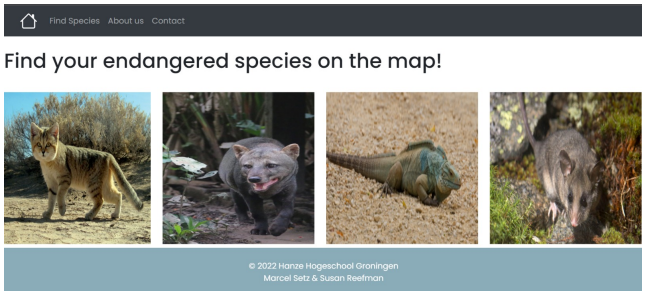

Figure 1: Home page

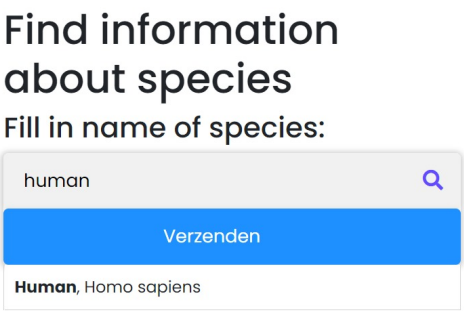

Figure 2: Form to get information about species

4.2 Find species page

The map is visible on the find species page. As can be seen in figure 3 the map is empty when no option is selected. By clicking in the option menu different species can be selected, shown in figure 4. To make the occurrences visible, the user can click on one of the species in the menu. Automatically the points will become visible on the map. To add the weather stations the button "Add Stations" can be used. The points and labels of weather stations become visible and the clusters of occurrences of species are displayed on the map, this can be seen in figure 5.

Figure 3: Empty map with no points

4.3 About Us and Contact page

In the About us page some more information on the web application can be found. And for requesting more information or state problems users can in contact with the contact form that is in the web application.

5 DISCUSSION AND CONCLUSION

5.1 Conclusion and discussion

To conclude, the research web application that is built in this project shows a map with occurrences of species and weather stations.

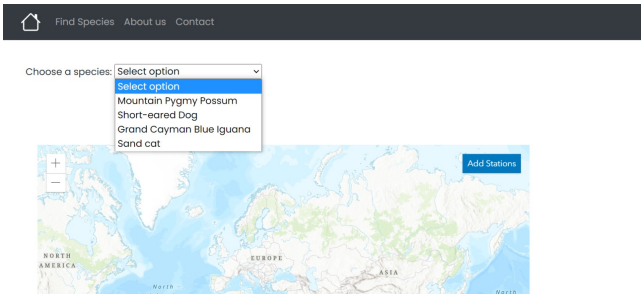

Figure 4: Option button for species

Figure 5: Map with clusters for species occurrences (red) and weather stations (grey)

However, the goal was to see the differences in environment between weather stations and to compare locations where species occurred with other locations that have the same environment. The steep learning curve of the software ArcGIS, resulted in not being able to full fill the goal of this research project. With more time and research the environmental data can be added to the weather stations on the map.

REFERENCES

[1] "Iucn red list."
[2] "Gbif."
[3] "National centers for environmental information."