

Monitoring migratory bird population in India

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Ministry Category: Ministry of Environment, Forests and Climate Change

Problem Code: #MEF7

College Code: 1-2811634924

Team Name: BreakThrough

Team Leader: Sumit Roy

Solution Approach

Step 1:

In order to collect data from the bird watchers from all over India, a web application portal will be made, where users can login with their user-id.

Step 2 :

Once verified by the admin, the birdwatcher can upload migratory bird count data through the input form. There will be 2 categories of form inputs :

Category 1:

Purpose : *Data Collection*

1. *Site Name, in terms of IBA code [latitude-longitude if the area is not a bird-site]*
2. *Bird Species and their count*

Category 2:

Purpose : *Generating visualizations and details regarding the bird-counting method*

- | | |
|---|------------------------------|
| 1. <i>Terrain</i> | 2. <i>Breeding time</i> |
| 3. <i>Fluctuations in number of adult birds</i> | 4. <i>Presence of forage</i> |
| 5. <i>Forest Type</i> | |

Step 3 :

Only verified users, with special permission can download the data, because these sensitive data might be misused by the poachers. The data will be available in .csv format, under the following parameters :

- 1. Species Common Name*
- 2. Time period*
- 3. Site name*

Step 4 :

Complete verified information regarding the migratory birds is available at the website :

http://bnhsenvis.nic.in/Database/MigratorybirdsIndia_835.aspx. It has also identified important bird areas of India state-wise, uniquely identified by the IBA code. This is taken as a input as "Site name" in the data upload form.

Parameters for migratory birds :

- | | |
|------------------------------|--|
| <i>1. Common Name</i> | <i>2. Scientific Name</i> |
| <i>3. Type of Migration</i> | <i>4. Distribution in Indian sub-continent</i> |
| <i>5. World Distribution</i> | <i>6. <u>IBACode</u></i> |
| <i>7. Site Name</i> | <i>8. Area</i> |
| <i>9. Status</i> | <i>10. Habitat type</i> |
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Step 5 :

Every transaction, user, species will be uniquely indexed(*Bird areas are already indexed by a unique IBA code*).

Information uploaded by the bird-watcher will be stored in a relational database(*PostgreSQL*).

After 1 week, these records will be enriched by adding already established background information and will be stored in a NoSQL database(*MongoDB*) for easy scalability and improved query processing based on the added context.

These datasets obtained from data.gov.in will be used :

1. *Land use*
2. *Vegetative Fraction bhuvan*
3. *Forest type*

“They face many dangers: destruction and degradation of habitats, loss of critical stopover sites such as coastal wetlands, illegal hunting, poisoning and pollution, and collisions with badly-sited infrastructure like power lines and wind turbines.”

-Report on Migratory Birds

Step 6 :

A summary will be generated of the population of the species in particular, over the last few years and all the species in general in the current year.

The change in population, arrival and departure times will be monitored, with the change in causal factors like change of land-use in the stopover sites.

Step 7 :

The alarming trends of these categories will be analysed separately:

- 1. Changes in migratory bird's population, arrival and departure time, breeding place*
- 2. Changes in migratory bird's habits and association with climate change.*

The results of earlier such studies clearly mentions the effect of climate change on the behavior of the migratory birds.

Step 8 :

The results indicating the factors of climate change will be further validated. When we detect any deviation, it is reported as an alarming trend, since any minute change may adversely affect the migratory bird habits.

Step 9 :

From the Category-2 birdwatcher input, meaningful and summarized results can be drawn. This will help us get a better understanding on both climate change as well as factors that affect that affect the migratory bird's behavior.

The information is transformed into the format suitable for easy, robust and compact integration in the climate change study platform.

Step 10 :

BirdVis software (<http://birdvis.org>) used for visualizing bird distribution models in space, time and across species. The change in their distribution of over time and years can be used to correlate with the corresponding climate change.

Plots of the temporal trajectory that can be used to identify minute changes in the bird's arrival or departure behavior, one indicator may be the bandwidth of the plot.

Implementation

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Home › Data › Birds › Add bird

Add bird

IBA Code:

Species:

Area in sq.km:

Latitude:

Longitude:

Site Name:

☐ Breeding point

☐ Stoppig point

Terrain: ▼

Breeding Time(in weeks):

Technology Stack

Python 3.5

Django 1.10

PostgreSQL 9.5.5

MongoDB 3.4.1

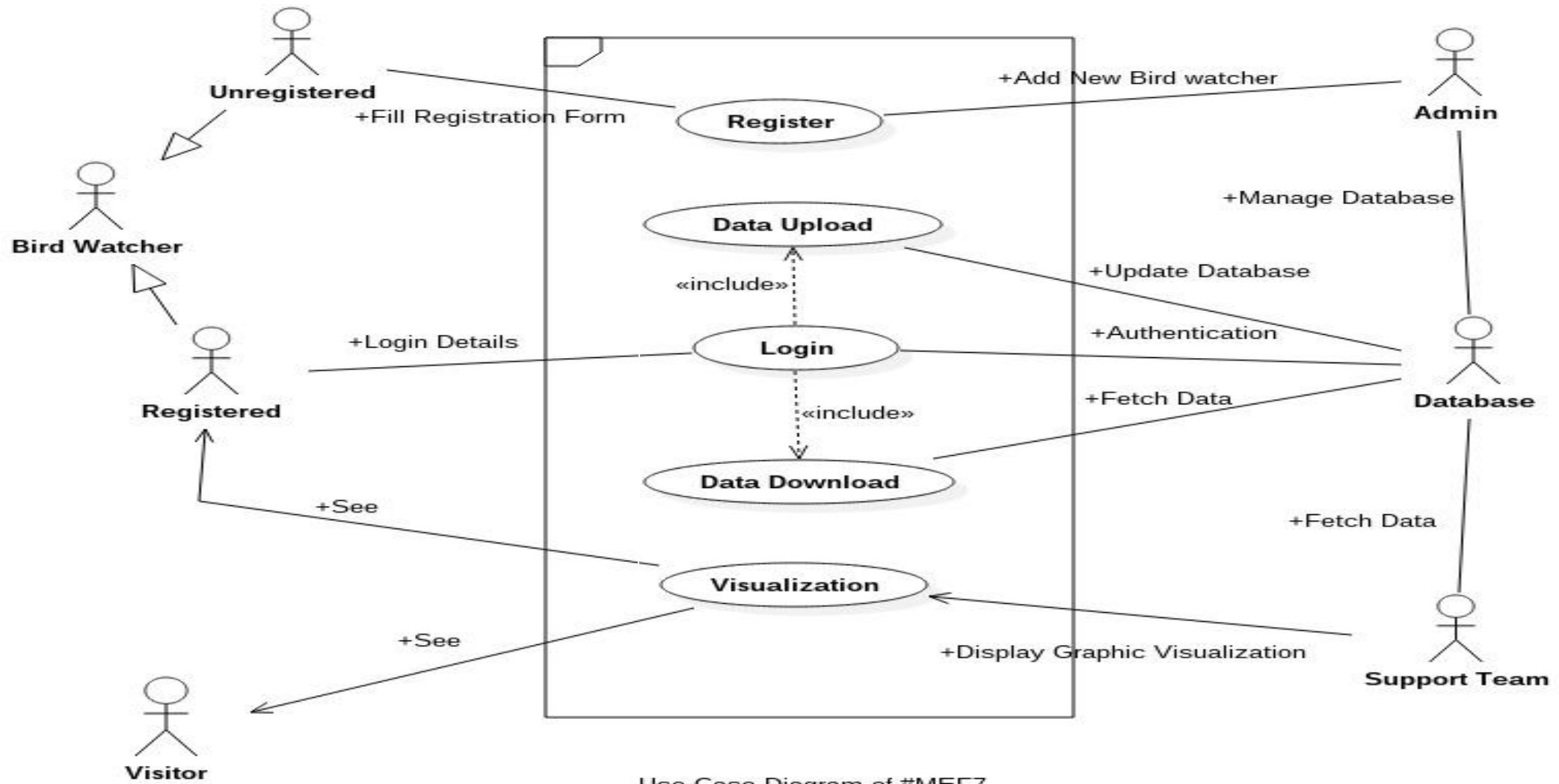
Neo4j 3.1.1

Charts.js

Apache Spark 2.1.0

R 3.3.2

Use-Case Diagram



Use Case Diagram of #MEF7

Dependencies

Apache HTTP Server