Requirements analysis

Birds Migration Map

1. Description

This application is concerning the bird migration phenomena. More precisely, this application will gather information from more resources and it's going to analyze them.

During this analysis, on one side the processed data will be stored in a database, on the other side they will become useful in creating a map which is going illustrate the actual phenomena, while also indicating hotspots and offering additional information on them.

Last but not least, the previously stored data will be used to achieve relevant statistics for the study of bird migration phenomena.

2. The major components of „Bird Migration Map"

- **Collection Module:** this component will handle the collection of the data that will be used for the map. The data will be collected from the eBirds database and from two social networks: Twitter and Facebook, using hashtags (e.g #birdmigration, #birdspotting) to discover relevant post or tweets that can be processed.

- **Processing Module:** the component where all data from the collection module will be processed. For the data coming from the eBirds database it will identify the date, the species, the number of birds and location where the birds where seen. As for the data from the social networks, first it will check if the posts or tweets contain the necessary information for it to be

processed and after confirmation of the data, it will start the processing the information.

- **Storage Module:** this component will handle the storage of the data
- **Presentation layer:** the component with which the user will interact with it. It will handle the rendering of the map, the creation of areas where the birds have been spotted based on the data provided from the others modules.

3. Actors and UseCases:

- People who want to find new places for birds spotting: the ornithology is a hobby and a passion for some of us and the application will permit to view and analyze best locations for live seeing the birds.
- People who want to find if a certain species of birds can be found near they're location: not all kind of birds are preferred by the majority. If someone desire to see just some of them, he can submit his email address and he will be notified when these species are close to his location. Of course, this feature will be available without specifying any species and in this case the user will be notified when any kind of flock of birds is nearby him.
- Hunters or hunting associations: based on informations collected from hunting associations or from the government, informations which are related to the legal periods of hunting seasons, the application will provide notifications which tells to the user what kind of species migrates nearby him and is available for hunting.
- People which are willing to use the collected data: after the processing part, all the collected information will be available to be accessed by other applications in a standard manner.
- Students, academic stuff and scientists: ornithology studies will be possible through this application via statistics offered by the application. With a filtering algorithm the user can choose between different species,

locations and historical dates and the map will be reloaded with the desired information. Also, some graphs will be shown to help the user to see more clearly the results.

- Twitter stream: it will provide tweets which will be processed by an efficient in time and memory algorithm. The algorithm must detect which tweets are related to bird migration, extract the location, the timestamp and, if the information is available, the species of birds. These data will be persisted for future use.

- Facebook stream: it will provide data which will be processed by an efficient in time and memory algorithm. The algorithm must detect which posts are related to bird migration, extract the location, the timestamp and, if the information is available, the species of birds. These data will be persisted for future use.

- eBirds stream: it will provide data which will be processed by an efficient in time and memory algorithm. Our application will check for every new information posted here, take it and process it. These data will be persisted for future use.

4. Statistics

Relevant statistics will be provided by the application. They will refer to:

- number of birds that migrate from a region to another
- species and number of birds that migrate from a region to another
- endangered species: which are the fewest species from the world
- anomalies: if small groups separates by the main group
- periods of time when specific species are migrating

5. Map

Illustrate in a 3D graphic manner the position of the birds on the World Map. The user must to have the option to select between different data providers (like Twitter, Facebook or eBirds).

6. Risks

Thinking of getting information from social networks, in some cases those information can be wrongly interpreted. For example a tweet or a post from Facebook can contain the #birdmig hashtag, the location and date, but in the reality the user refers to a hunting plane (MIG).

Another case is when the data collected from Facebook or Tweeter is not enough to provide relevant informations for the user. In order to avoid the inconsistent data the eBirds stream will be used. This is a trusted provider for birds migrations informations with daily updated informations.

The user will have the option to choose from which provider the data comes. In that moment the map and statistics will be updated accordingly.

During the implementation of the application the development team must to take care that other kind of animals could be added to the system. In the future different species of animals will be available to trace and even the connections between a migration and another. This means also, that other data providers can appear in the application.