Development of Supporting System for Nature Observation and Investigation Activities Around Users Using Smartphones

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Abstract: In this research, we develop a supporting system for nature observation and investigation activities around users using smartphones. By using smartphones equipped with GPS and a camera for nature observation, users can record the target pictures and position information to observe. Users can share many data by uploading these records with the others. Moreover, it is useful to data map creation of observation information by performing continuous use. We are developing the system which users enable to learn about natural environment by observation and investigation activities of dragonflies, being familiar with the nature around users using smartphones equipped with GPS. Since dragonflies are one of the index insects of waterside environment, users enable to learn about natural environment through observation and investigation activities of dragonflies. We aim at visualization of changes of natural environment by performing natural observational-research activities using this system.

Keywords: Smartphone, iPhone, Nature Observation, Position Information, GPS

Introduction

In recent years, smartphones and cellular phones are used for outdoor activities by many researches. For example, There are researches with GPS of smartphones, the camera and information sharing. The feature of the researches using the GPS function and the camera is to add information to a map, and other feature is offering learning support which is different for each location[1][2]. In addition, there are researches of information sharing of the outdoor activities by communication with mobile phones and servers[3][4]. We develop a new useful system for environmental learningby combining these advantages.
In this research, we utilize smartphones equipped with the camera and the GPS function taking advantage of the function of such a mobile terminal. Additionally, we develop the natural-environmental-learning supporting system through experiential activity in the outdoors about the natural environment of surrounding areas.

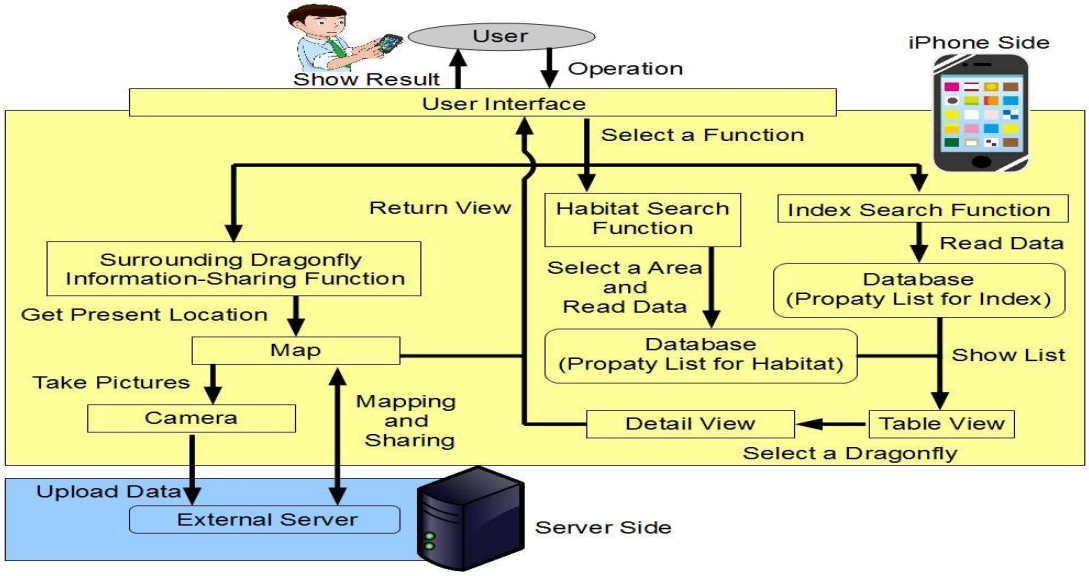
Dragonflies are one of indexes of waterside environment in fieldwork. For this reason, we develop the learning supporting system which enables to learn natural environment around users by observation and investigation activities of dragonflies using smartphones equipped with GPS. We have already developed and open an information system called a “Dragonfly Kingdom Saga”. This system is a system developed for PC. Therefore, it is not easy to use this system in outdoor activities.

So, we adopted iPhone as a terminal, and developed a new information system of dragonflies. As field learning new functions, we are developing a record function and a

share function for the information on user's surrounding dragonflies. Users can investigate the dragonfly's feature and ecology information easily on that spot. Also, users can upload the information on a position and time to the server, when users take pictures of dragonfly by a camera. Users can refer to the uploaded information as an information map from a terminal. When users perform outdoor activities, users enable to understand the past life list for dragonflies at a glance. Moreover, when users continue such activity, it is possible to put the information in a database. Therefore, this system is able to create an ecology information map. We aim at visualization of changes of natural environment using this system.

1. System architecture

Figure 1 shows architecture of our system and behavior. This system uses fundamental UI and GPS function of iPhone, and the Exif information on a photograph. Exif information specifies the file format for recording a graphics file. Therefore, we can describe camera information in a graphics file, when we take a picture. Now, We have developed three search functions. They are a “dragonfly's index search function”, a “dragonfly's habitat search function”, and a “surrounding dragonflies information-sharing function”.



1: Flowchart of system

2. System functions

2.1 Index search function

The index search function can display the names of dragonflies on a table, and can search detailed information of dragonflies with the order of the Japanese syllabary from the name of the dragonfly.

By using this function, users enable to investigate the photograph of dragonflies, the classification, the form, the ecology, and the origin of name. In observation and investigation activities for dragonflies, when the name of the dragonfly is known, we are able to search quickly by slide a table, inputting a name into a search bar, or choosing the initial of the name of the dragonfly.

2.2 Habitat search function

In habitat search function, users can specify a habitat and retrieve the information on the dragonfly which inhabits the place. When a habitat is pinpointed, we look the table view of only the dragonfly which lives in the habitat. This function also has Index search function. In observation and investigation activities for dragonflies, by this function, users enable to choose a dragonfly from a habitat and enable to do Japanese syllabary search.

2.3 Surrounding dragonflies information-sharing function

The surrounding dragonflies information-sharing function is a function in which dragonfly information is sharable, by taking pictures of dragonflies and uploading to the server. When users take pictures, users can add the filming date, position information and so on to photograph by Exif. Since this function maps on the map based on the position information, users enable to investigate what kind of dragonflies lives around users. Users can upload photographs and dragonflies information, and users can share with retrieving the information on dragonflies from the map with other users. For this reason, In observation and investigation activities for dragonflies, users enable to know information of dragonflies.

3. Conclusions

In this research, we have developed the supporting system for nature observation and investigation activities around users using smartphones. In this system, users can investigate the feature and ecology information on dragonflies easily on that spot. Additionally, users can take pictures of dragonflies using a camera and upload to a server with the information on a position and time. By using the uploaded information, users can create the ecology map of dragonflies. When users perform outdoor activities, they enable to understand the past life list at a glance and offer useful information in the case of observation. In addition, when users continue such activity, it is possible to put the information in a database. Therefore, this system is able to create an ecology information map. We are going to conduct an evaluation experiment after developing the function which supports identification of dragonflies from the feature of the body of dragonflies.

References

[1] Miyata, H., Ishigami, M., Sannomiya, M., & Matsushita, E., (2010). Development and Evaluation of the Flower Identification Database for Mobile with a Geo-tagged Picture Map, Proceedings of the 18th International Conference on Computers in Education, Putrajaya, Malaysia, 344-351.

[2] Ogino, T., Suzuki, M., Kusunoki, F., & Hatono, I., (2008). Cellular Phone with GPS Based Learning Support System for Field Studies, Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2008, Vienna, Austria, 1812-1817.

[3] Takenaka, M., Inagaki, S., Kuroda, H., Deguchi, A., & Ohkubo, M., (2006). Fieldwork support system using mobile phones: Evaluations of information sharing in the second grade's Life Environment Study, Proceedings of ED-MEDIA 2006, Orlando, Florida, 1325-1331.

[4] Milrad, M., Multisilta, J., (2009). Sharing Experiences with Social Mobile Media, Proceedings of the 11th international Conference on Human-Computer interaction with Mobile Devices and Services, Bonn, Germany, 1-3.