Mobile-Based Distributed System for Managing Abandoned or Lost Pets

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Abstract: This paper presents the work in progress of a mobile-based distributed system which aims to minimize the social impact of abandoned or lost animals. System is based on the use of smart mobile devices to provide message warnings of animals localized. Messages are stored in a database to be processed. In order to enter data such as photography, audio and artificial images, system uses different mobile device interfaces. Data processing consists mainly in matching localized animals with lost animals, assigning abandoned animals at shelters and generating notifications for animal shelters or authorities. Currently, the system is in the development phase. The technical challenges in which we are working are to optimize data and metadata matching, and the management of message warning.

1. Introduction

In most countries, legislation penalizes animal abuse and neglect. However, animal loss or abandonment is a current problem in some communities. Numerous associations work in communities to help animals either welcoming in animal shelters or finding them a new home. Animal Protection Societies (APS) lack common information, databases and channels to receive animal warnings and notify the news. Smart mobile devices, cloud computing and data storage optimization can provide technological support to APS. Currently, to send information about a lost pet can be easy by using a mobile device because of they have photography camera and microphone. Besides, these devices let send geospatial and temporal data. It is possible to optimize the location of the pet's owner, or an adopter, through data-matching by using a distributed data system. In order to do this, it is necessary to use unified data and synchronize correctly different data sources and destinations. The system presented in this paper aims to help APS to manage the animals and optimize the location of owners or adopters.

This paper is organized as follows. Section 2 reviews the current state of the problem and current solutions found by the authors. Section 3 describes the main system data and components. Finally, section 4 exposes the current state and challenges for the future of animal management.

2. Related work

There has been carried out several studies about protocols that must be followed when either a lost animal or abandoned animal is found by someone [1]. Most of these protocols insist specially on both the importance of information management [2] and the huge possibilities of being applied into other technology fields regarding animal researches [3]. In order to follow these protocols, animal protection societies usually use web pages in which they can warn about a lost animal or search one to adopt.

Warnings get to the APS, which must publicize the loss. APS transmit the notice through their own webs as well as in social networks. Currently advises are sent without checking whether lost animals have been located. Besides, users receive messages without picking the geographic area of interest as they can receive advises of lost animals that are located far away from the area to be searched.

It is of special interest the use of the new technologies to optimize the entire process. Some authors stand out the benefits of using mobile applications to locate lost animals [4]. Concerning Android, there are about ten applications that are able to advice of a lost pet or abandoned one. Most of these mobile applications have a data insertion based on forms and they are adapted to specific data bases [5]. Based on the earlier premises, authors are developing a system based on mobile applications expecting to improve current systems that are described straightaway.

3. System components and current state

Figure 1 shows the system overview. The system has two types of users: Advertisers and Managers. Advertisers send warnings about abandoned or lost pets by means of a smart mobile device or a personal computer (step 1). Advertiser mobile application sends two types of information: data about the pet characteristics and metadata related by the date, time, geolocation and user contact (step 2). Metadata must be approved by the user. In the first version, the characteristics of animals to transfer are three: animal species (dog, cat, etc.), size and prevailing hair colour.
A Web service receives data and stores it in the database (step 3). When data is stored, system launches the matching process with the new animal data (step 4).

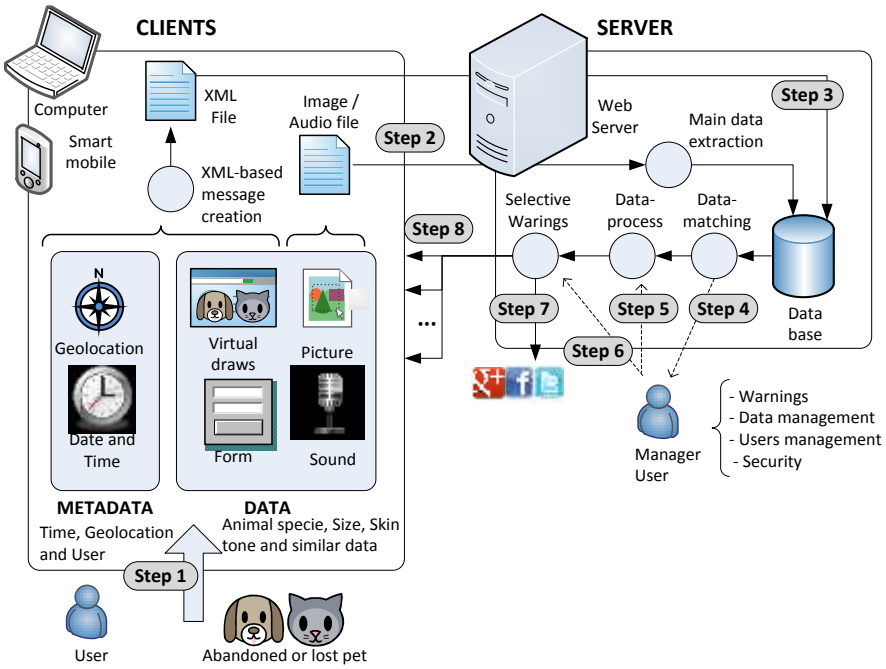

Fig. 1. System overview with Advertiser Users (left) and Manager Users (right).

The matching process returns both matching percentage: data and metadata. Data match result is used to determine if an animal exists in database and to discard animal localized (step 5). If a result is above a threshold, the database sends a warning to a Manager User (step 6) that can determine and adds certainty to the result (step 7). Manager User, or system in automated mode, sends the message warning to the APS nearest to the animal localized (step 8).

Metadata is automatically introduced by the application. There are four methods to enter animal data: Form, Virtual Draw, Picture and Recorded Voice. Form is the classical method used by Web Applications and implies an effort by the user. To reduce this effort, the mobile application offers other three methods. Virtual Draws allows the user to model an animal by using only the touch screen. With the Form and the Virtual Draw the application provides directly the animal parameters. The other two methods facilitate data entry but require data pre-processing.

Picture needs segmented and form detection. Recorded Voice requires keyword detection as “big dog” or “white cat”. Both processes are implemented in the server side. Data match is made by means Linear Discriminant Analysis (LDA). Manager User monitors and increases results accuracy.

The first prototype of the mobile application is developed in Java with the Android SDK provided by Google [6]. But, due to the large amount of data to be treated, the trial version is being developed with the framework Sencha Touch [7].

In the server-side, the services applications are being developed in PHP with MySQL to provide the database support [7].

Currently no significant tests have been performed, so that results are not available. However, the first test will measure the percentage of successes in the collation within the pets located and the lost pets. Simultaneously it's necessary to test if the system reduces the time that it takes to locate an animal since the warning occurs compared with current methods used by the APS, and if the system increases animal's warnings.

5. Conclusions and Challenges

Nowadays the system is being developed. In the first phase, we are developing the mobile application and the server-side applications. In second phase, the collation algorithms, with the selective alarms, will be developed. This project has several technological challenges that should be achieved are mainly associated with data collation and selective advises.

The system suggests a few social challenges. The main one consists of achieving a collation level that permits to increase the lost animal location, as selective messages allow delimiting the search up to the recent places in which the animal has been to. Other challenges refer to avoid duplicate data in databases or even to provide a simple storage method, so as to optimize the abandoned animal adoption depending on the characteristics searched by the adopter.

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