Participatory sensing framework

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Context

Participatory sensing is a promising approach to collect information on the surrounding environment (both physical measurement and human observation and reasoning) in a massive scale. It combines the powerful processing capacity of the mobile devices and their growing number, the mobility and intelligence of the participants and the extensive coverage of the wireless communication network. As a result, participants can contribute valuable information (in various forms such as sensory data, text and numeric inputs, location, multimedia content and on-screen selections), which is subsequently stored, processed and aggregated. In the context of open and smart cities, participatory sensing have been used in many different cases, for example collecting outdoor noise level [1], locating potholes on the street [2], reporting traffic-related issues and mapping cellular signal strength [3]. However, several drawbacks of existing participatory sensing applications have hindered their widespread deployment in the society. Among these drawbacks, the lack of spatial and temporal context, the inability to flexibly manage sensing campaigns and the single functionality are common among existing participatory sensing applications.

Actions

- To add new type of sensing tasks to the Citizense framework
- To define different incentive mechanisms to be incorporated in the Citizense framework
- To test the Citizense framework and its components before running the experiments (performance testing, usability testing, security testing)
- To specify the context for the sensing tasks of the experiments (location, time, sensing tasks, incentive, participants)
- To monitor different parameters of the experiments, and correct any issues that might arise
- To analyze the collected data from participants
- To summarize the experience and best practices for deploying participatory sensing in a city context
- To promote the Citizense participatory sensing framework in different cities

! Challenges

To define the common characteristics and requirements of participatory sensing applications

To define the novel features that should be implemented in a future participatory sensing application

To deploy incentive mechanisms and context-aware sensing to obtain more and/or better sensing results from participatory sensing campaigns

To design, implement and deploy a participatory sensing framework that allows easy access to the creation, execution and management of participatory sensing campaigns; with focuses on the extendibility and scalability of the framework.

Impact

A generic multi-purpose participatory sensing framework can be beneficial for different stakeholders (city authority, scientists, citizens, public and private sectors) in the following ways:

- It allows the city authority (and interested individuals or organizations) to launch sensing campaigns in real-time to understand the dynamics in the city while the citizens can contribute data, give feedbacks to the city authority and share information among them.
- A two-way communication channel is established, which can directly engage citizens in the public decision making process.
- Furthermore, scientists can have a large dataset on different domains to analyze.
- Emerging demands from the citizens can be addressed by the public and private sectors based on the results of participatory sensing campaigns.

Scaling Up

The framework can be deployed in any target cities, with minimal customization. The server side of the framework can be hosted in cloud computing platforms (campaign server, storage), therefore supporting increased demand. The client side of the framework (the mobile app) can be integrated in existing city-owned apps, if required. Based on these properties, the framework can be launched as a city-wide communication platform between city authorities and citizens.

Results

- The architecture of the framework “Citizense” is defined (campaign manager, campaign server, campaign obecjt and mobile app) (Figure 1)
- The framework prototype “Citizense” is publicly available online: http://www.citizense.uji.es/
- OCT contribution: software, data sets and guidelines

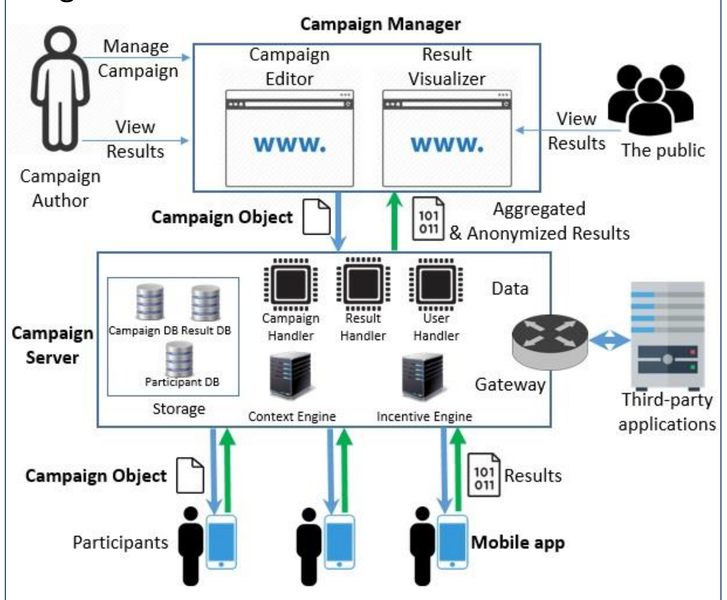

Figure 1. The architecture of the Citizense framework

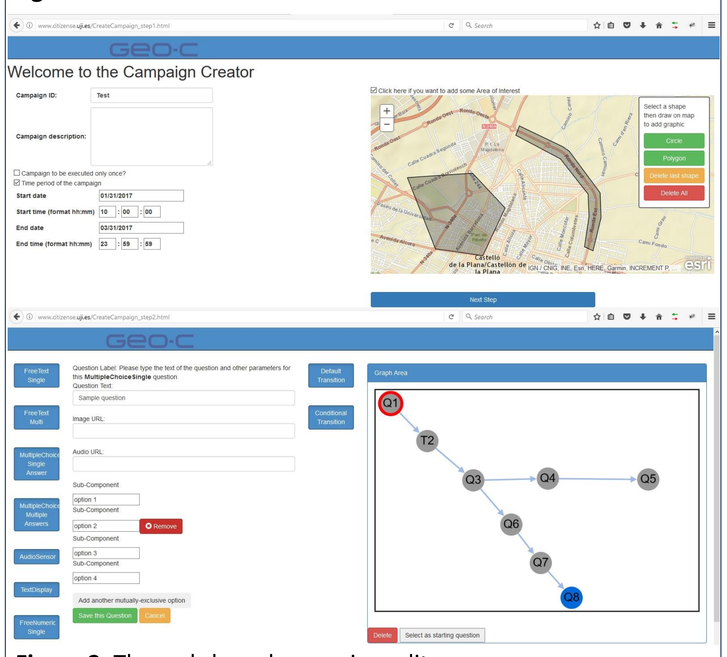

Figure 2. The web-based campaign editor

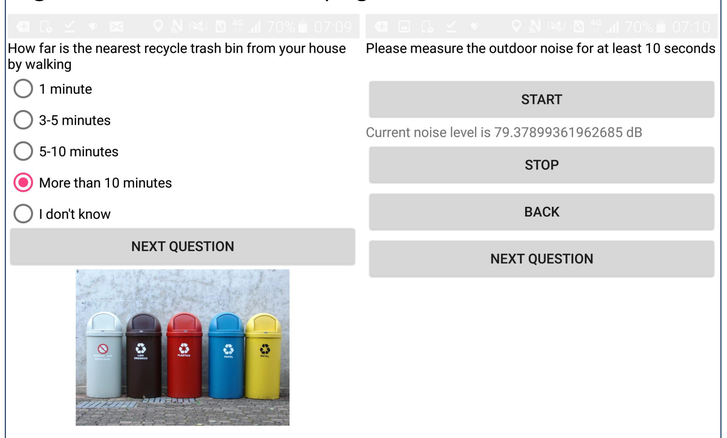

Figure 3. The mobile app, with rendered sensing tasks

Figure 4. The aggregated and anonymized results

Consortium

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