

iRain: A Spatial Crowdsourcing App for Real-time Rainfall Observation



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Why iRain

In June 2013, President Obama announced the Climate Data Initiative, an effort to encourage tech innovators to use data about climate change to help communities make smart choices in the face of climate change.

Precipitation information is a key variable in water resources management, hazard preparedness, and climate studies.

Satellite remote sensing technologies are often associated with **uncertainties**.

iRain serves (1) **First global real-time crowd-sourced precipitation observation**. (2) **Improving quality of satellite precipitation estimation**.



Spatial Crowdsourcing

Ubiquity of mobile users

6.5 billion mobile subscriptions by the end of 2013

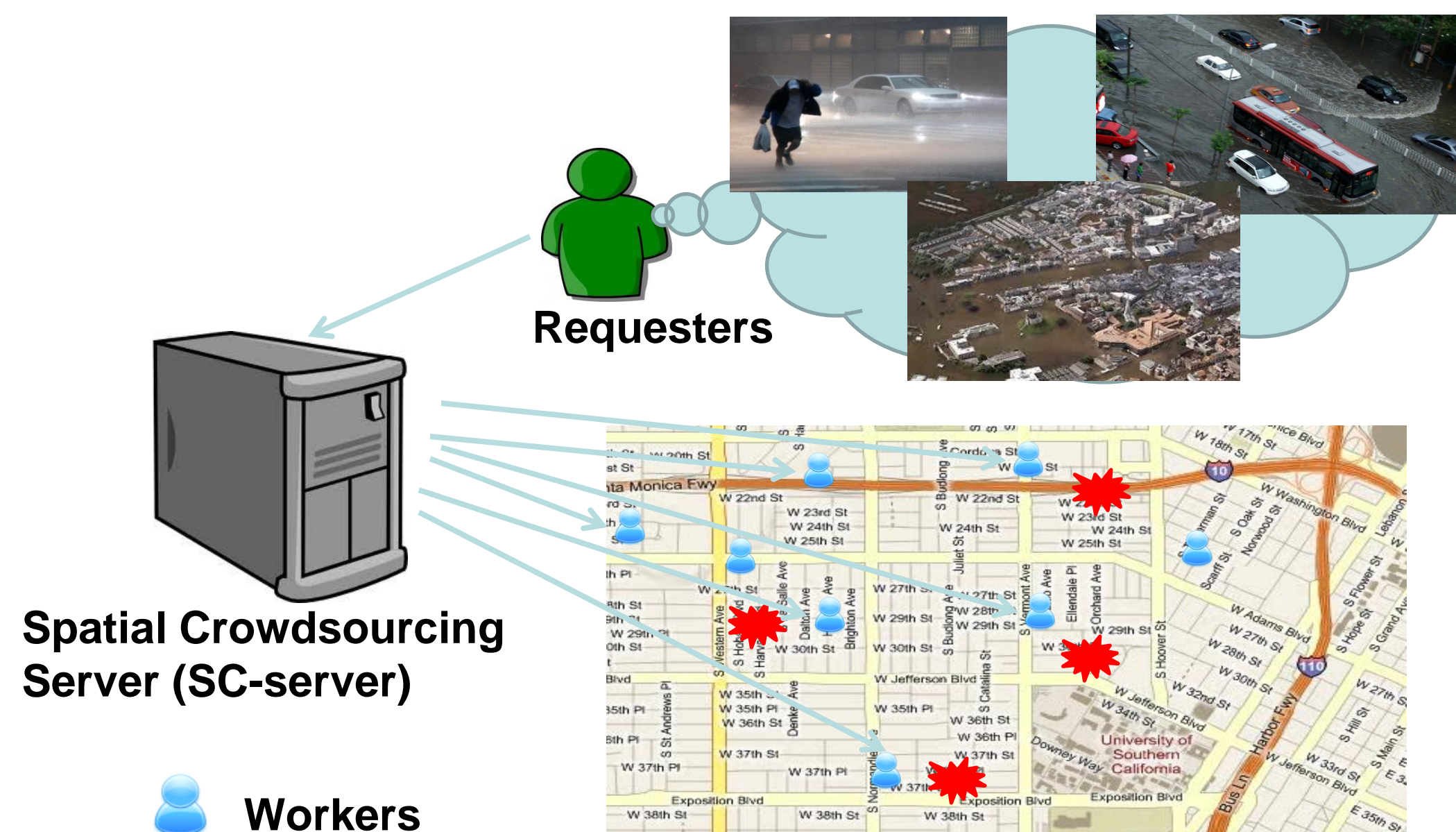
Technology advances on mobile phones

Spatial crowdsourcing (SC) engages individuals, groups, and communities in the act of collecting, analyzing, and disseminating urban, social, and other spatiotemporal information.

iRain Scenario

Red Cross (i.e., requester) is interested in collecting rainfall levels at different areas.

- + The requester issues tasks to a SC-server
- + The SC-server crowdsources the tasks among the available workers in the vicinity of the tasks
- + Once the workers document their tasks with their mobile phones, the results (i.e., rainfall level) are sent back to the requester



iRain

Main features

Voluntary report

On-demand report

Post a task

Response to a task

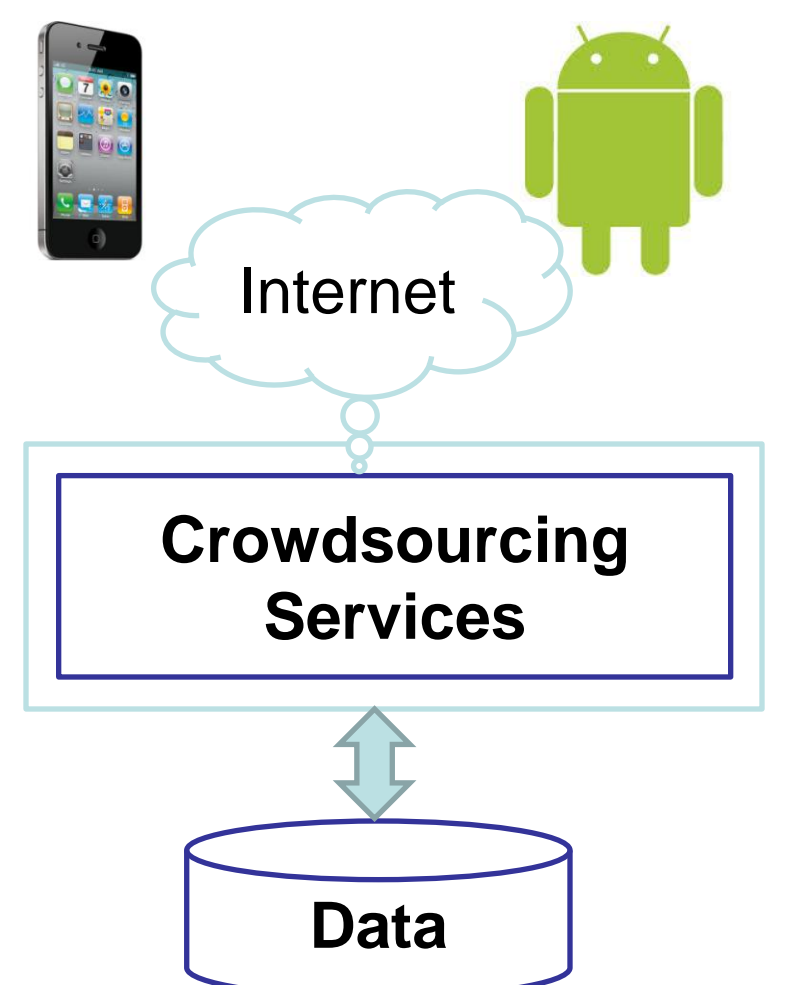
Weather report

User management

Client
(Smartphones)

Application Server
(PHP)

Database Server
(MySQL)



System Architecture

Geospatial Techniques

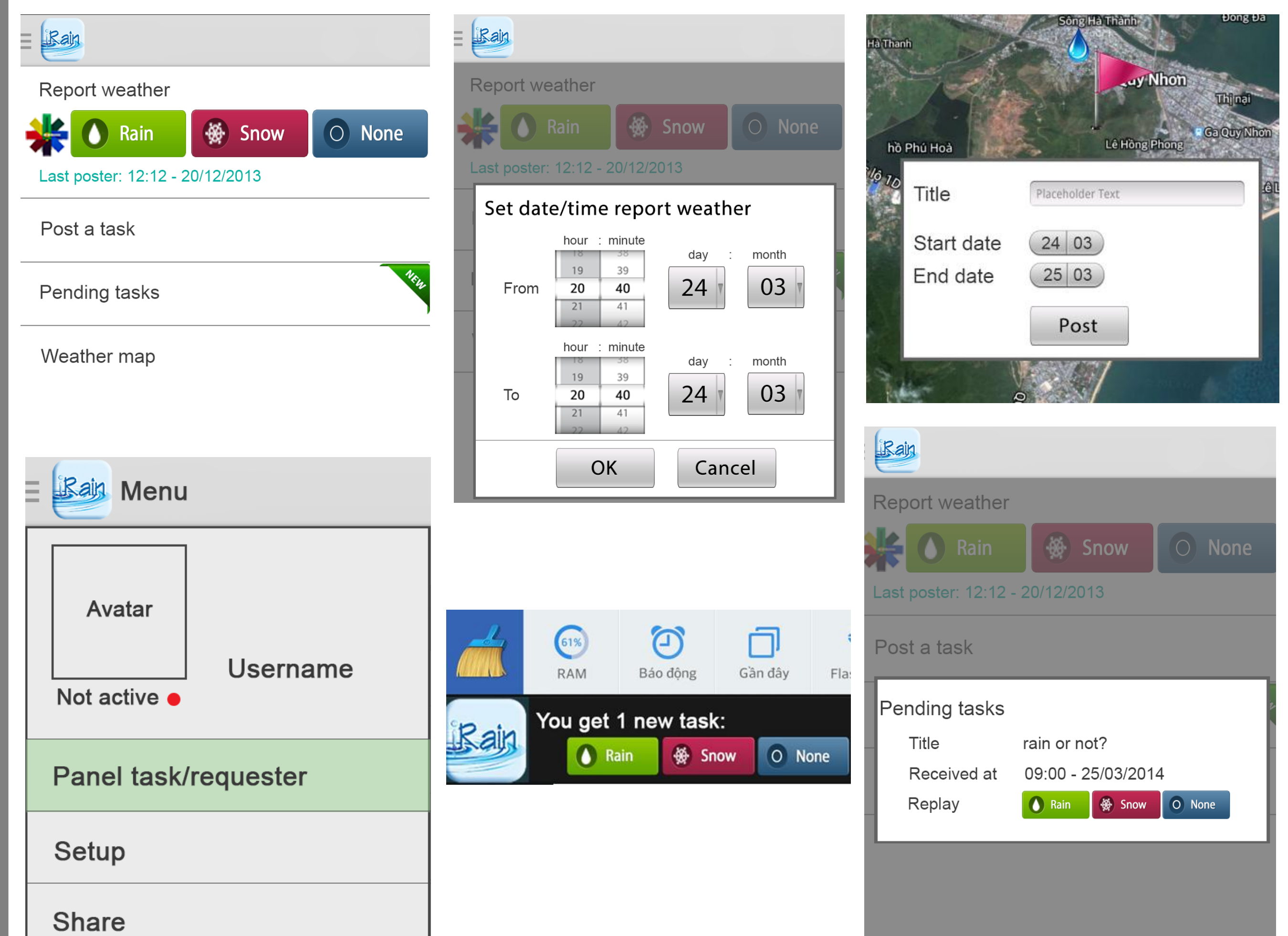
Spatial Query: finds all online workers in the vicinity of the tasks.

Push Notification: to enable *real-time crowdsourcing*, tasks are sent to the workers in the form of push notification.

Task Pruning: if a posted task is close (i.e., in terms of space and time) to other completed task, its result is retrieved from database rather than crowdsourcing to the workers.

Space and Time Filtering: search rainfall information by filtering in space and time.

Screenshots



Future Work

❖ Extend our app to more task types, i.e., other forms of precipitation include drizzle, rain, sleet, graupel and hail.