CS587 Course Projects

Presented by Hien To
August 26, 2015
Schedule

• 2\textsuperscript{nd} week – decide team, fill this form, email TA
• 3\textsuperscript{rd} week – decide project, fill this form, submit project proposal (1 page, template, sample) in Blackboard.
• 8\textsuperscript{th} week – submit midterm progress report (1 page, sample) in Blackboard.
• 15\textsuperscript{th} week – project presentation and demo, submit deliverables in Blackboard.
Deliverables

• Project packages (including src, res, lib, etc), both client and server
• Tech report on explaining the program and how it works (installation, execution, major modules, snapshots of the running program, etc)
• Final presentation slides in power point
Rules

• Decide your team (1-4 students for each project)
• Choose the project that you wish to do
• Notify the TA yaguang@usc.edu
  – Names on the team
  – Project name
Grading

• A base credit (60%) will be given if basic features of the project is implemented
  – Program (50%)
  – Reports (5%)
  – Demo (5%)
• Credit on GUI/usability design (15%)
• Credit on creativity, new ideas, adding good features (25%)
• Extra credit (10%) for some new projects.
Requirements

• Client: iOS, Android or WindowPhone
• DB Server: any, e.g., Oracle, Postgresql, Mysql, Oracle, DB2, Mongodb
• Web Server: any, e.g., PHP, Java Servlet, Django
Global Internet Device Sales

- The number of smart phones sold was greater than the number of standard computers sold in 2011.

Source: Gartner, IDC, Strategy Analytics, company filings, BI Intelligence estimates
Global Smartphone Market Share

Global Smartphone Market Share By Platform

Source: IDC, Strategy Analytics
Prepare yourselves

• How to get started?
  – Android
    • [https://developer.android.com/training/index.html](https://developer.android.com/training/index.html)
  – iOS
Old Projects

1. PalHunter (2-3*)
2. iCampusProfiler (2-3*)
3. GeoFence (2-3*)
4. iCampusEvent (2-3*)

* Recommended number of team members
PalHunter
PalHunter

• Mobile client record its location changes (moving trajectory)
• Server monitors the moving trajectories of all clients
• Clients can query trajectories of others
  – Time dependent range query (e.g. show me all the users within 20 meters)
  – User trajectory query (e.g. show me the trajectory of one user in the past 2 hours)
PalHunter-Client

- View the trajectory of yourself on mobile phone
- Send location updates to server in real-time
- Clients receive location updates when friends move close by (within some predefined range)
- Client can issue queries on the server
- Integrate with Facebook
PalHunter-Server

• Server receives location updates from users
• Server renders users’ moving trajectories on a Map view (real-time)
• Server supports queries from mobile client
  – E.g. show me all the users within 20 meters range
  – show me the trajectory of one user in the past 2 hours
iCampusProfiler
iCampusProfiler

• Consider your cell phones as moving sensors
• Implement an app to collect information on/around campus in the interest of iCampus
• Share geo-tagged and timestamped messages with the server
• The server shows all messages on campus maps with location markers
iCampusProfiler

• Define your message, e.g. time, location, category, rating, content
• Typing-free input: enable voice input instead of using keyboard to input text messages
• Example 1: implement a project to collect food related information on/around campus
  – Recommend good meals of the day
  – Free food information
  – Special meals/drinks in the restaurants near campus
iCampusProfiler

• Example 2: implement a project to collect availability information about USC gym
  – Rate the overall crowdedness
  – The availability of treadmills, racquetball rooms, etc
  – The gym and pool hours

• Example 3: Ambience project
  – Light, A/C, noise, temperature, comfortableness of seats, projector, screen, white board, air condition, other multimedia equipments,
GeoFence
GeoFence

- GeoFences are critical areas defined by either a mobile user or by a security officer.
- GenFence information is stored in the database on Server.
- Mobile clients received GeoFence alerts once their location are relevant to some GeoFences.
GeoFence

• Define GeoFences from Mobile app
• Show GeoFences on Google map interface
• Clients receive alerts once a GeoFence is violated
Geofence Mobile Client Interface

1. Show user current location
2. Show all geofences returned by the server when the client query `getGeoFences()`
3. Periodically send the server current location of the client
4. Redraw geofences on the map when receive updates
5. Vibrate mobile phone when the user is in/close to a geofence
When user click on a GeoFence, show the detail information about the geofence returned by the server.
iCampusEvent
iCampusEvent

- USC events data from online sources
- Store event data in database
- Event search function
- Show nearby events or search results on map interface
iCampusEvent

• User can search events by keywords, category, etc
• Mobile clients receive alerts of events by location
• Users can view details of a specific event
• Get walk directions to the event venue
Sample GUI

Student Reflections on Portraiture Port

In a show honoring Selma Holo, director of the USC Fisher Museum, students present work inspired by one of the museums exhibitions

2010-12-07 11:30:
New Projects†

1. MediaQ for Data Analysis (1-3*)
2. GeoQ for Disaster Response (1-3*)
3. CrowdPark (1-3*)
4. GeocrowdSensing (2-3*)
5. GeocrowdPricing (1-3*)
6. Scenic Path (1-3*)

† Extra Credit and Mentors are available

* Recommended number of team members
MediaQ for Data Analysis
Spatial Crowdsourcing

Crowdsourcing: outsourcing a set of tasks to a set of workers. Amazon Mechanical Turk

Spatial crowdsourcing (SC): requires workers to physically travel at the task's location in order to execute the task.

Applications

Ubiquity of mobile users

6.5 billion mobile subscriptions, 93.5% of the world population [1]

Technology advances on mobiles

Smartphone's sensors, e.g., video cameras

Network bandwidth improvements

From 2.5G (up to 384Kbps) to 3G (up to 14.7Mbps) and recently 4G (up to 100 Mbps)

MediaQ helped PBS cover the Presidential Inauguration on Jan. 20, 2013

https://www.youtube.com/watch?v=Jlejkl1rsOo
MediaQ: Multimedia Mobile Management System

• Media management system to **collect, organize, share, and search** mobile videos using geo-tagged metadata

• Rich video metadata
  
  – **Where** and **When** metadata
  – **Who** metadata, e.g., people counting
  – **What** metadata, e.g., keyword tagging [2]

https://www.youtube.com/watch?v=JIejkI1rsOo

Field Of View (FOV) model [1]

p: camera location
\( \hat{d} \): camera view orientation
\( \alpha \): viewable angle
R: viewable distance
time: timestamp
MediaQ: Spalotemporal Ranking Videos

Contact
Abdullah Alfarrarjeh, alfarrar@usc.edu
Suggested Topic 1: Spatiotemporal Ranking Videos
MediaQ: Hotspots/Events Detection

Contact
Hien To hto@usc.edu
Suggested Topic 2: Hotspots/Events Detection

http://mediaq.usc.edu/MediaQ_MVC_V3/home?vid=88d93e00eccaab4ca53e9aac2358e656f1f678cc&startTime=8926&endTime=89269&duration=80343&lat=34.020460583053&lon=-118.28542759026
MediaQ: Work with MediaQ Team

Contact
Yaguang Li yaguang@usc.edu
Work with MediaQ Team

1. Involve in Android/PHP development
   - Upload video’s metadata to server
   - Notification mechanisms between Android phone and Server

2. Develop pricing strategy for MediaQ
   - Pricing algorithm is given

http://mediaq.usc.edu/home/
**MediaQ Services**

- **MediaQ API**
  - Created by MediaQ Team
  - See more at [http://local.eclipse.org](http://local.eclipse.org)
  - Contact the developer

### GeoQ-related Operations

<table>
<thead>
<tr>
<th>Method</th>
<th>Endpoint</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GET</td>
<td>/geoq/test_swagger</td>
<td>Test</td>
</tr>
<tr>
<td>GET</td>
<td>/geoq/sample_videos</td>
<td>Returns a set of videos</td>
</tr>
<tr>
<td>GET</td>
<td>/geoq/rectangle_query</td>
<td>Returns a set of videos</td>
</tr>
<tr>
<td>GET</td>
<td>/geoq/sample_fovs</td>
<td>Returns a set of video frames</td>
</tr>
<tr>
<td>GET</td>
<td>/geoq/video_metadata</td>
<td>Returns a set of video frames</td>
</tr>
</tbody>
</table>

### Groups Operations

- Show/Hide | List Operations | Expand Operations

### Key Operations

- Show/Hide | List Operations | Expand Operations

### Users Operations

- Show/Hide | List Operations | Expand Operations

### Videos Operations

- Show/Hide | List Operations | Expand Operations

[base url: /MediaQ_MVC_V3/api, api version: 1.0.0]

[http://mediaq.usc.edu/MediaQ_MVC_V3/docs/api/]
MediaQ APIs

Python

https://github.com/ubriela/mediaq-clipy

JavaScript

https://github.com/ubriela/mediaq-js

Contact
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GeoQ for Disaster Response

Contact
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GeoQ: Geographic Tasking System

**Work cell:** large disaster area can be divided into small cells of 1km squares, which can be assigned to analysts.

**Analyst:** (personnel with expertise in situational crisis) work on his assigned work cell

GeoQ’s Work Cells
Mapping Tools used in Nepal Earthquake 2015

[Video](https://www.youtube.com/watch?v=X8eiXjbhfOc#t=29m)
GeoQ – MediaQ Integration

https://github.com/ngageoint/geoq
http://mediaq-demo.usc.edu:8000/geoq/jobs/19/
CrowdPark

Contact
Cedrick Ngalande cedrick.ngalande@gmail.com
CrowdPark

- App for deducing vacant parking spots (for citizens) and state of traffic in the city (for decision maker)
- Brings these two parties (city and citizens) together to solve each other’s problem

Contact: Cedrick Ngalande
cedrick.ngalande@gmail.com
CrowdPark: Requirements

• Design a phone app which will periodically capture the phone’s location and speed and send this data in real time to the server.

• Algorithms on our server to deduce vacant parking spots and traffic information from the data sent by the app.
  – Direct app carriers through the app to possible vacant street parking spots
  – Infer current traffic speed or jams on the roads
GeoCrowdSensing

Contact
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GeoCrowdSensing

Crowdsourcing weather information (e.g., rain, air pollution, light intensity, temperature, noise level)

Contact (Optional)
Hien To hto@usc.edu
GeoCrowdSensing - Functions

• Requesters submit a task, e.g., a location
• Workers within a distance (e.g., 5 miles) from the task can view the task and response (e.g., light/medium/heavy rain)
• Map-based GUI for posting tasks and reporting weather

iRain
http://irain.eng.uci.edu/
GeoCrowdPricing

Contact
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GeoCrowdPricing (Research)

• How reward correlates with various costs in order to incentivize people to accept a spatial task?
ScenicPath

Contact
Ying Lu ylu720@usc.edu
ScenicPath (Research)
Find the most scenic path on a road network

ScenicPath (Example)

Given $B = 4$
(cost, value)
Propose Your Own Projects

Candidate Topics*:
1. Media data retrieval and analysis.
2. Crowdsourcing disaster response.
3. Crowd sensing.

Contact
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* Other topics are not allowed
Useful links

- http://www.flaticon.com/
- https://bitbucket.org/
- https://ellislab.com/codeigniter
Questions?