A Mobile Location Search System with Active Query Sensing

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Motivation

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• How should the second query be taken once the first query fails in mobile location search?

A mobile search system with a unique Active Query Sensing (AQS) function to intelligently guide the mobile user to take a successful second query.

Demo Overview

• Offline
 • Built upon a scalable visual matching system covering over 0.3 million street view reference images in New York City, where each location is associated with multiple surrounding views and panorama.
• Online
 • Once the mobile user marks the initial search results unsatisfactory, the system performs online analysis and suggest the most discriminative viewing angle for taking the 2nd query.
• Method
 • The suggestion is based on both offline salient view analysis, online viewing angle recognition, and intelligent view suggestion.
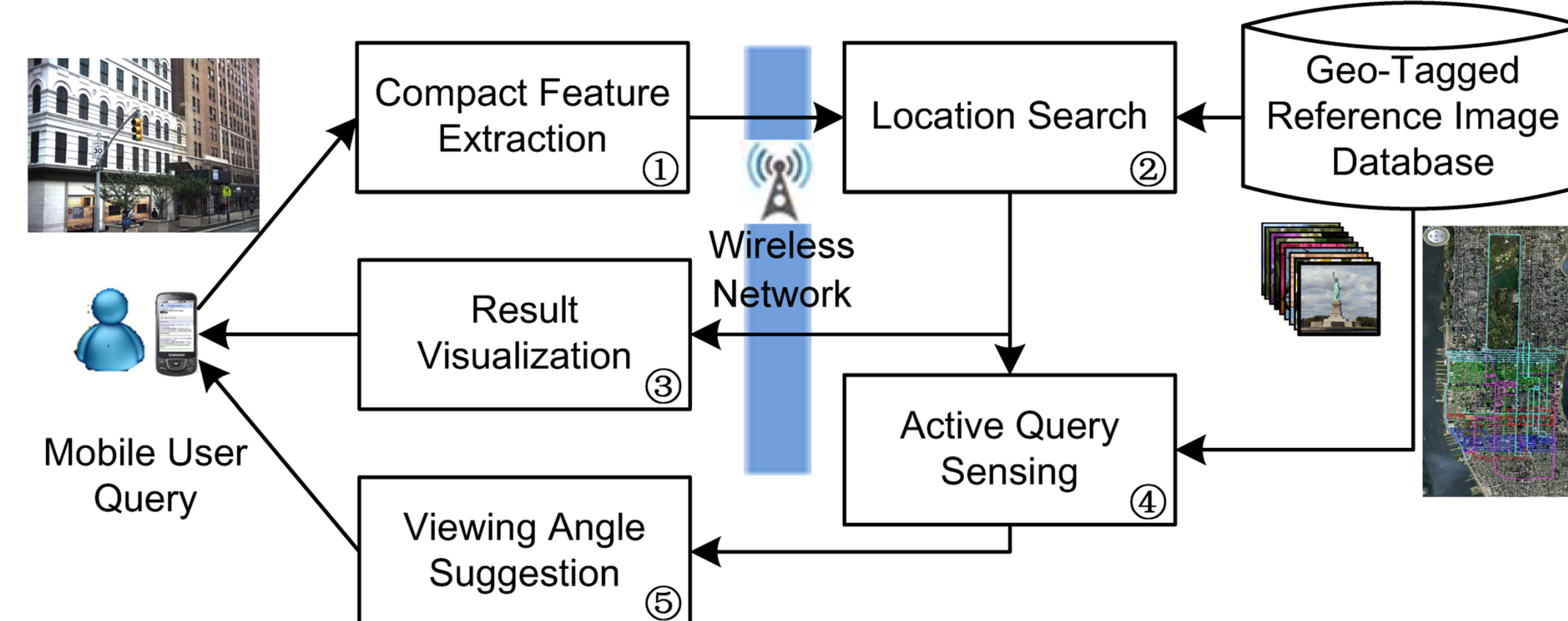
Performance at a Glance

• Improve the mobile location search with a performance gain as high as 100%
• Reduce the failure rate from 28% to only 12% after taking the second query.

Our AQS system implemented several unique ideas:
1. An offline process for analyzing the saliency of each view associated with each location in the database
2. An online process to estimate the likely view of the current query, and determine the optimal view change in order to disambiguate the uncertainty of the top confusing locations.
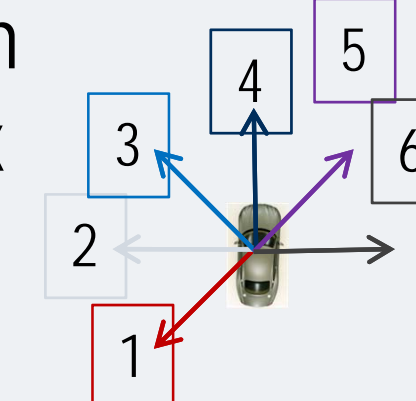
Active Query Sensing Work Flow

AQS Workflow

1. User captures a query image of his surrounding using the camera phone. And the image (or alternatively the extracted compact descriptor) is sent to the server through the wireless link.
2. The location search system receives the visual query, searches matched images, and returns the top matched location.
3. After checking and comparing the surrounding views and points of interest, if the user determines the found location is wrong, he may trigger AQS function to ask for the suggestion of the best query view.
4. Upon user's request, AQS finds the best view for the next query. It sends specific instructions to the user.
5. User follows the suggestion to turn the camera and take the next query and search again

Unique Contribution of AQS Demo
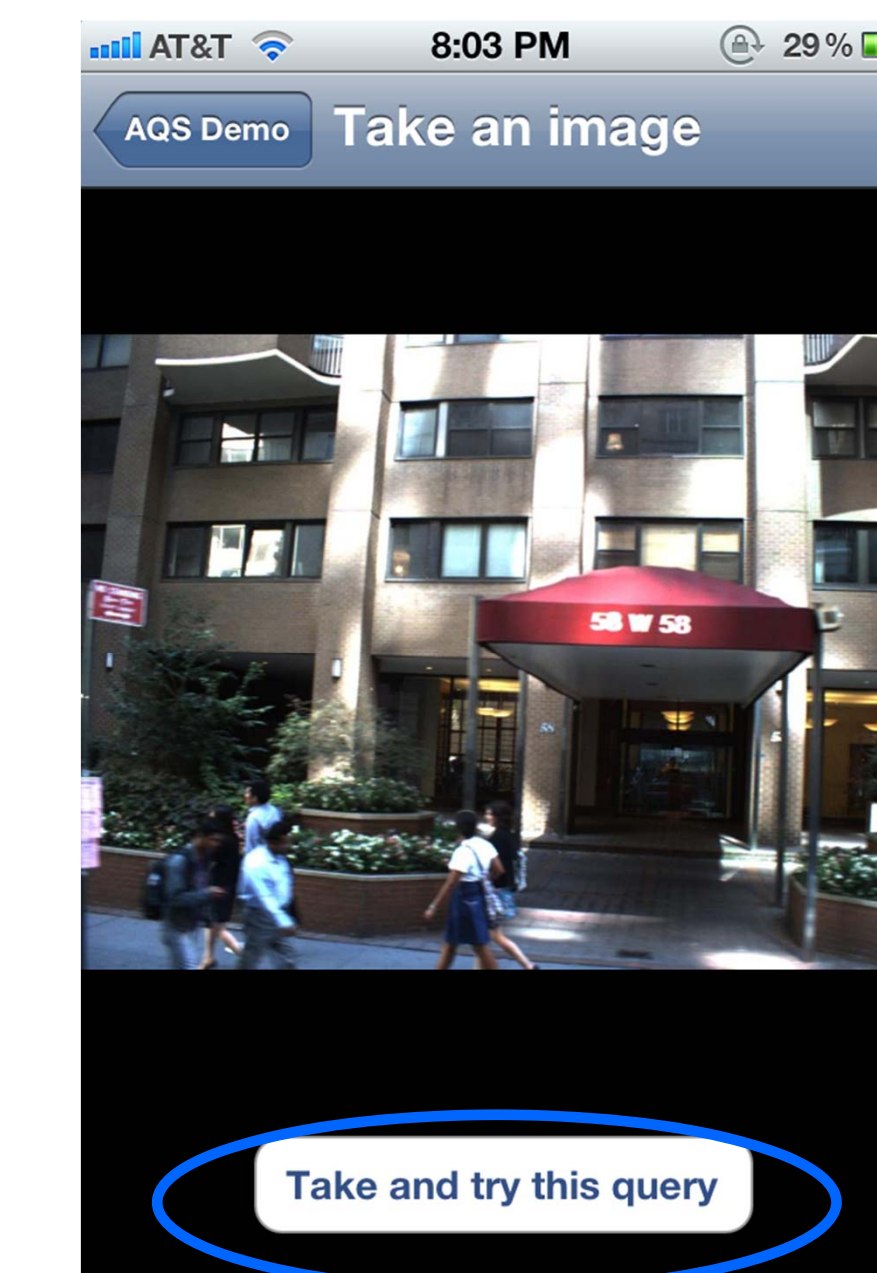
Dataset (NYC 0.3M images)

0.3 million reference images in NYC from NAVTEQ; Right: six views of an example location. Bottom Right: configuration of the six views.

Network Communication

• Php and http for up-and-downloads of the query and results
• the front-end processes and compresses the image with objective-C's CGImage Class
• Support multiple users by identifying each client device with the built-in iOS device ID
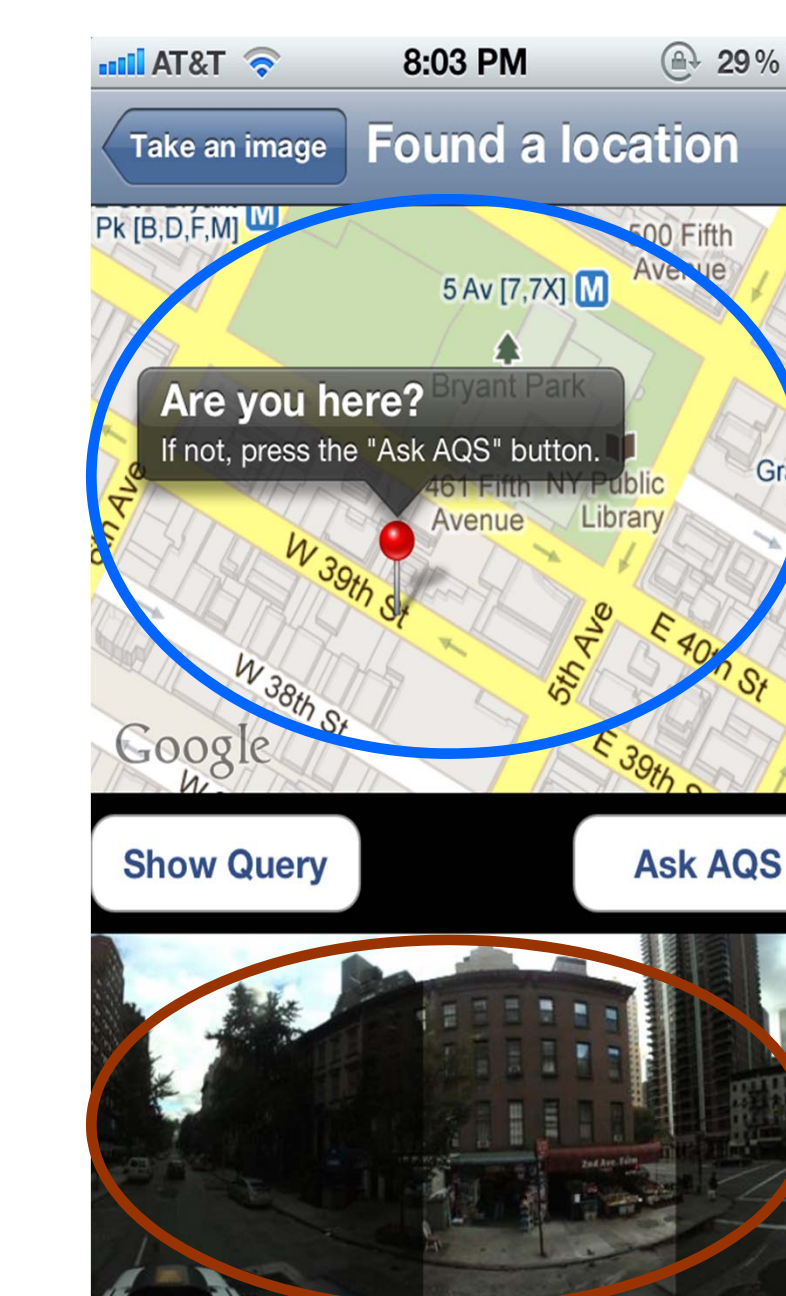
Take an image and send it to the server by pressing "Take and try this query" button.
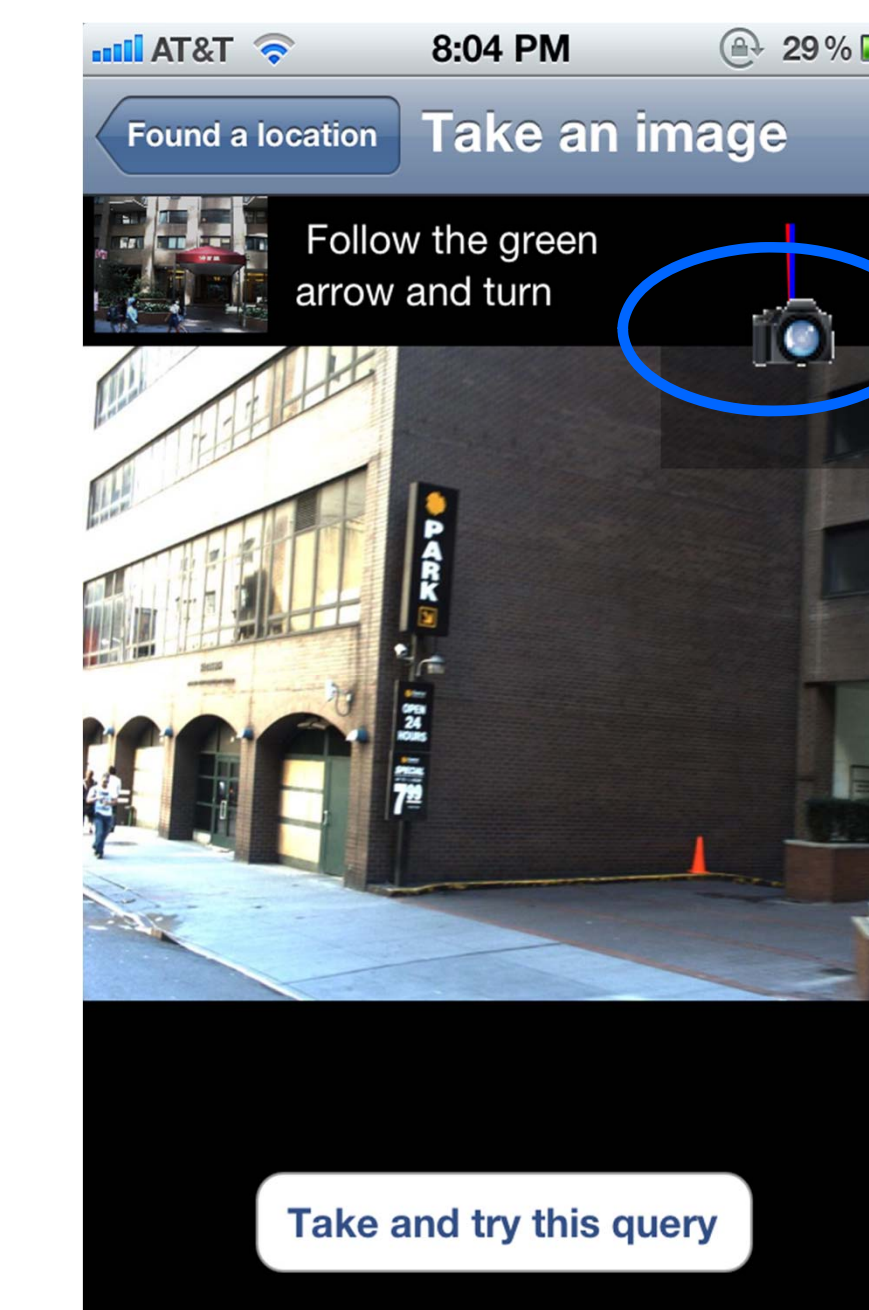
If the first result is wrong, press "Ask AQS", then follow the compass to turn camera
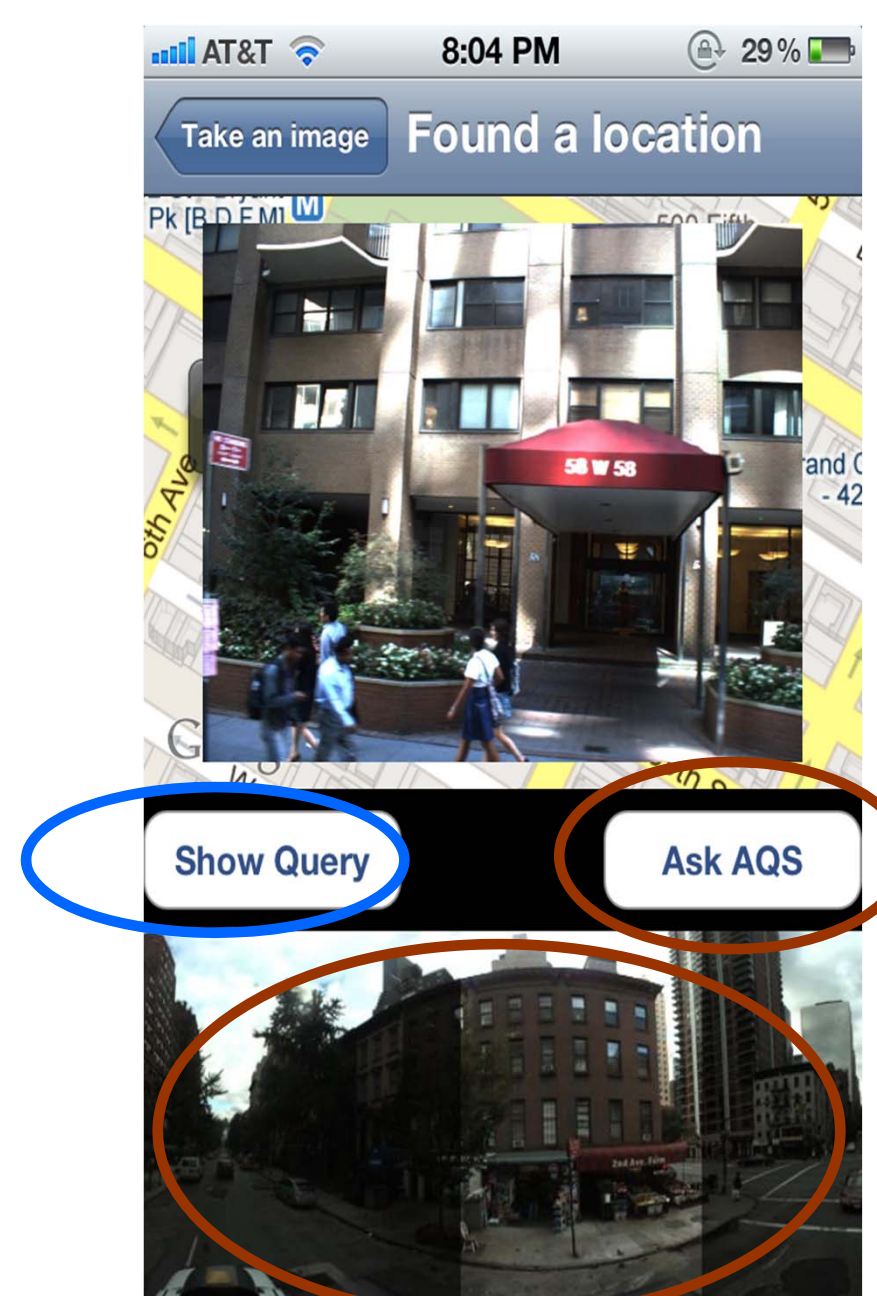
After receiving a result, you can inspect **the map** or **panorama** to determine whether it's correct.

When you turn to the suggested angle, a camera icon will show up. Now press the query button again.

User can compare the query image with the **highlighted matched area in** the panorama.

Once the correct location is found, you can browse points of interest in the surrounding areas