Image Analyzer -- iLocator

By Ka Shing CHAN, Victor CHANG, Lik Hang CHAU, Kin San LAI

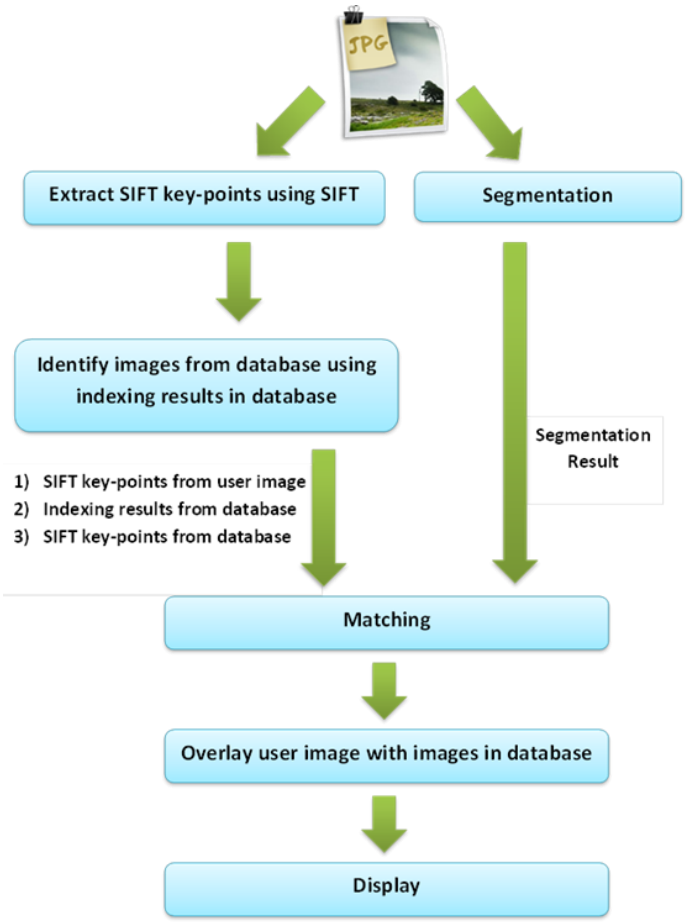
Supervised by Prof. Albert C. S. CHUNG

Introduction

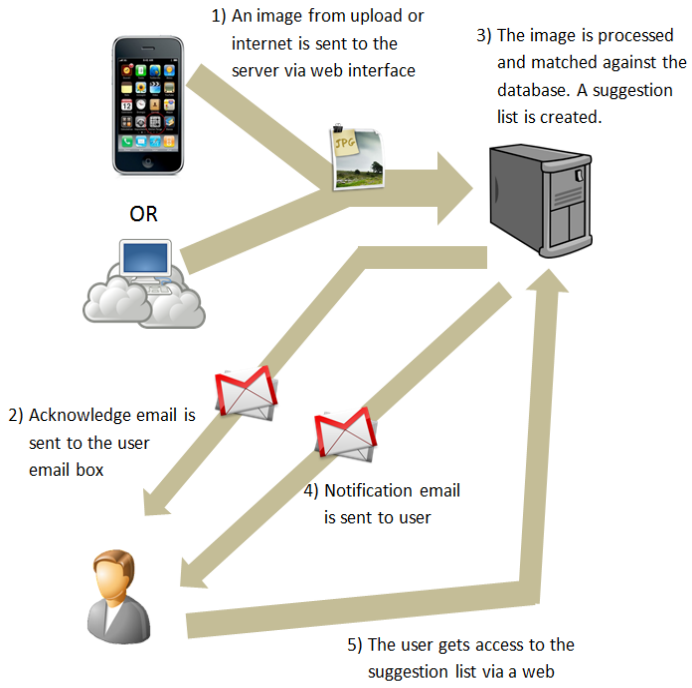
Inspired by very limited location recognition power of Google Goggles, we developed a fully automatic photo geo-tagging system, **iLocator**, to locate a photo on map, which possibly covers every street in a city-scale geographic area, by sharpening the distinctiveness of collection of image features. Photo overlay is automatically created between query photo and the closest geo-tagged photo in the database. Place description of a photo can be more detailed than a GPS coordinate.

Design

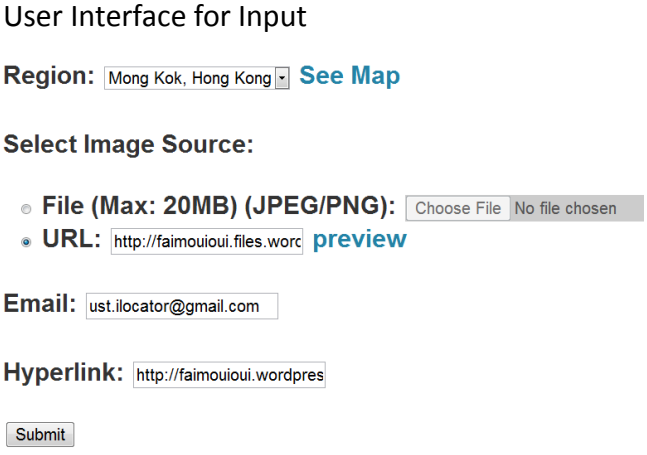
Server Query Process



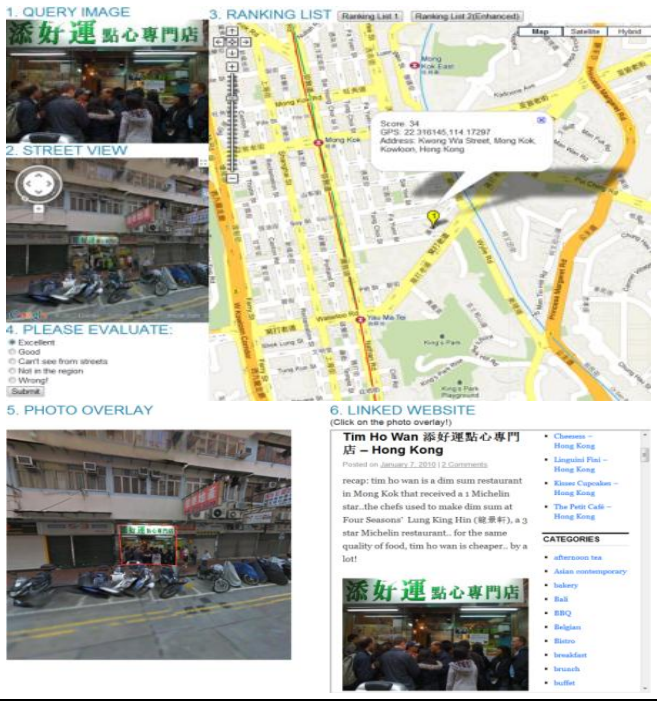
User Experience



User Interface for Input

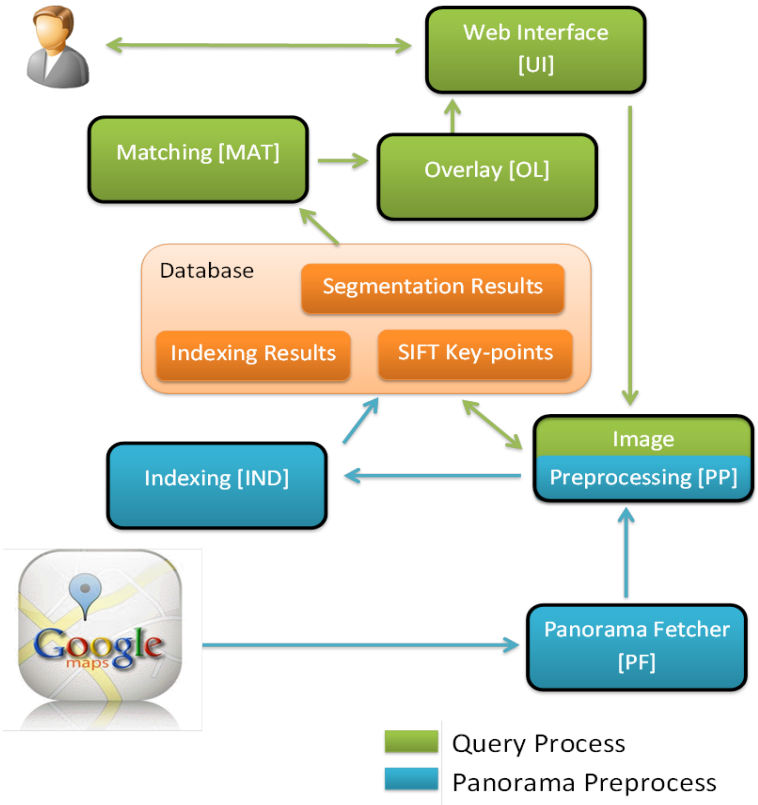


User Interface for Output



Implementation

Our system is Linux based, using Ubuntu 10.10. The database is run under PostgreSQL. We have also employ some external libraries such as VLFeat (in MATLAB®), for SIFT Key-point generation, Caltech Large Scale Image Search Toolbox (in C++), for segmentation and PTViwer (in Java), for projection and overlay.



Indexing [IND]

- Enhance M. Aly's implementation of indexing algorithm by distributing work to multiple Hierarchical K-means Trees based on SIFT Key-point

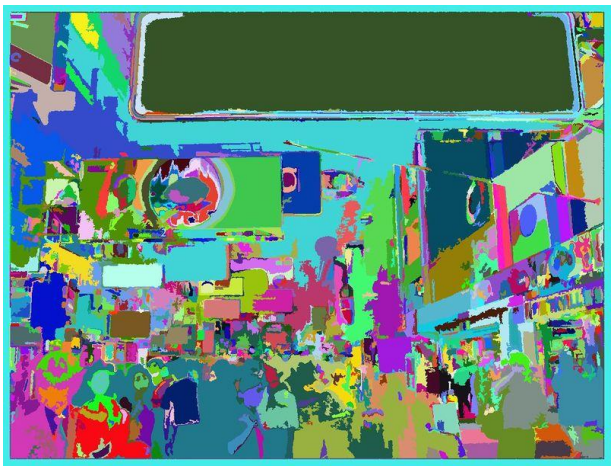
Enhanced Segmentation using CIELAB color space [PP]

- Image resize
- K-means clustering on a-, b-channel pixels
- Union small neighboring connected components and clusters with similar color
- Define a graph G(V,E), where V is set of clusters from previous step, and an edge exists if any pixels in the clusters are neighbor to each other. Search for cut vertex. If a cut vertex exists, union clusters corresponding to the cut vertex and the smallest connected component.

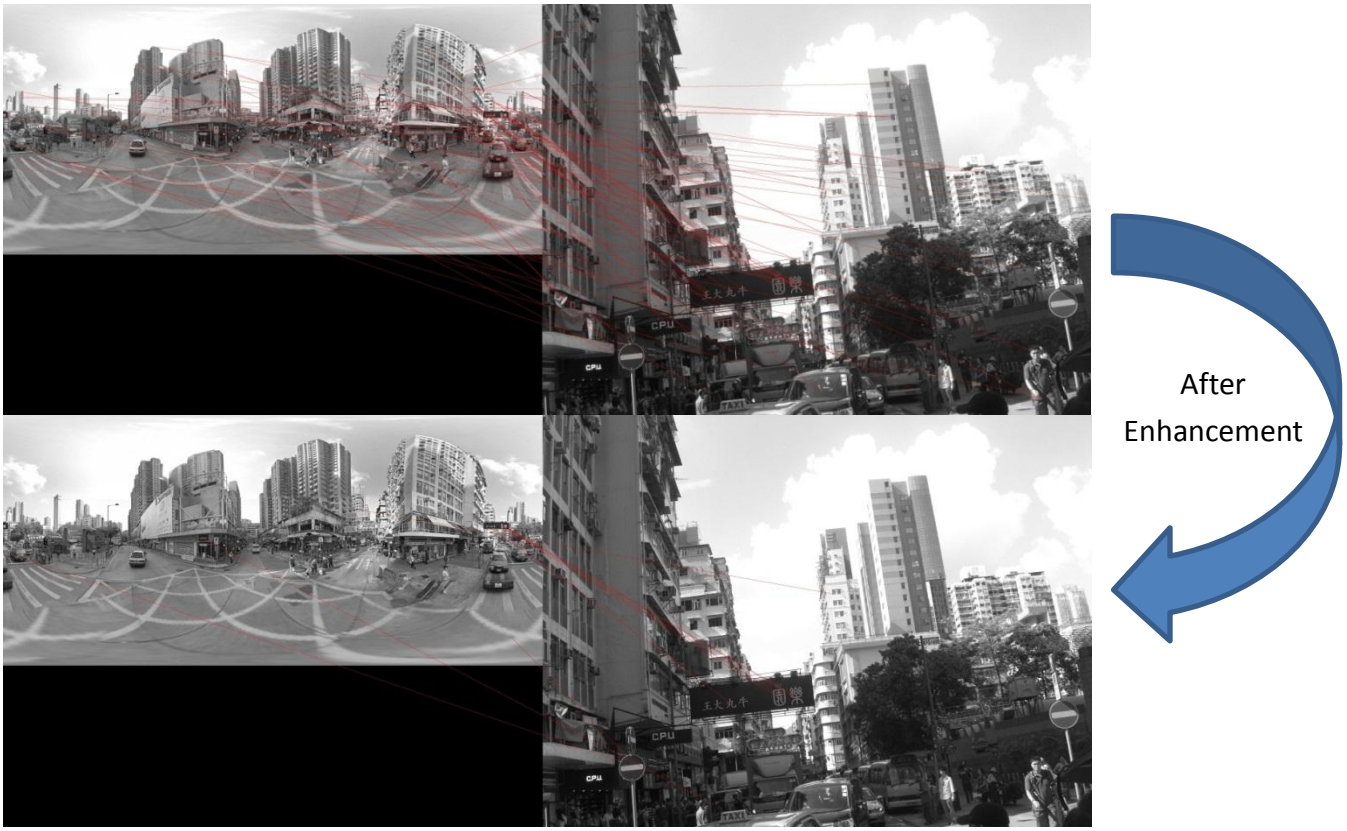
Enhanced SIFT Key-points Matching [MAT]

- Employing original SIFT Key-point matching to find out the matched key-point.
- Frequency counting on the matched SIFT Key-point
- Orientation restriction on matched SIFT Key-points
- Cluster Matching
- Sorting based on the number of matched key-points

Result

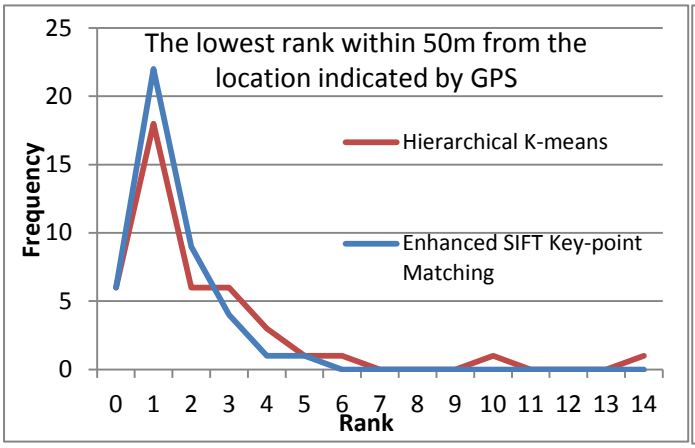


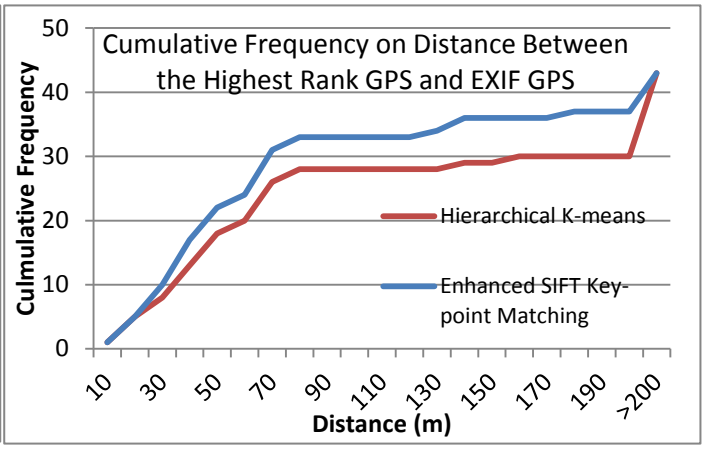
Segmentation



Matching

Performance Evaluation





Conclusion

Application of iLocator is not limited to locate a user uploaded photo. It would greatly help integrate free location services, like Google Maps and Microsoft Bing Map, with social media. With iLocator, photos from various social media can be overlaid onto a street-level panoramic view. When location service users browse street-level panoramic views, they can see refreshed and updated views of a location from social media, and the corresponding content on the social media. In this way, location service can deliver more social values to users, instead of just looking for directions on map. It will be a huge e-marketing potential when users look for more valued information from location service. An example would be replacing static ads, like poster, with real-time ads from the internet.