Generating Summaries for Large Collections of Geo-Referenced Photographs

Public collections of geo-referenced photographs, such as 'geotagged' images on Flickr, are increasingly available and rapidly growing in size. Location information provides clear benefits for searching and browsing these large photographic collections. However, as the ease of capturing and publishing geotagged images increases, content overload becomes unavoidable. Our work seeks to generate summaries and discover the most representative photos from a large geo-referenced collection. Our system accomplishes this goal by leveraging spatial, social and topical patterns in the dataset.

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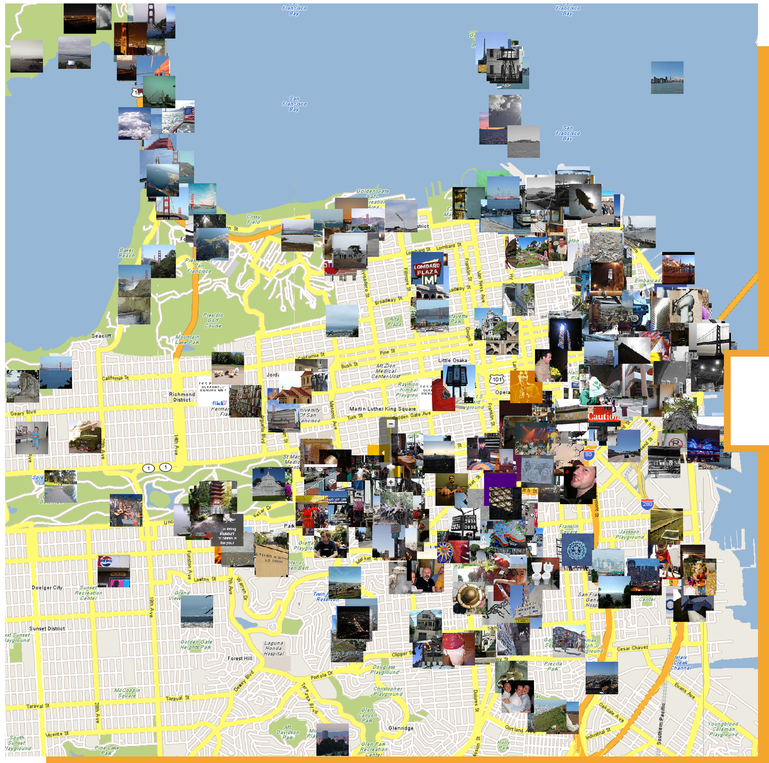
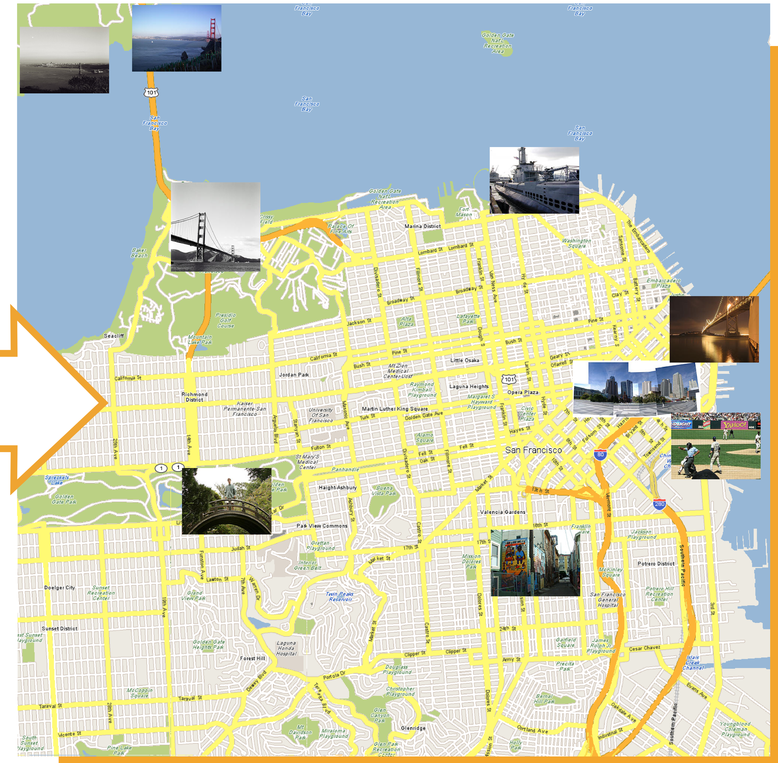
* Our dataset was the set of geotagged "San Francisco" photos from Flickr as of January 2006 (approximately 1200 photos).





Initially, our system looks at the geo-distribution of photos in a given region. We use a hierarchical clustering algorithm to identify meaningful groupings of photographs. We assign initial scores to the clusters based on the following heuristic:

A. More photographs in a given location may suggest the presence of a relevant/interesting landmark or object.

The rank and score for location clusters are also informed by social and topical properties in the data:

B. A location is more relevant if the photos around it were taken by a large number of photographers (User Distinguishability).

C. Textual tags can imply relevance, by identifying locations with tags that appear frequently there, but rarely elsewhere (Tag Distinguishability).

Both factors are demonstrated in the map visualization above, where the prominent tag for each cluster is displayed at a size proportional to its User and Tag Distinguishability.
This map alone acts as an effective display of concepts that are representative of San Francisco.

Finally, the system produces a summary of the photo collection. The summary is based on the clusters' scores, and attempts to balance breadth of coverage with relevance. Above are the top nine photos automatically selected by our system for San Francisco, including three different views of the Golden Gate Bridge, Fisherman's Wharf, the Bay Bridge, Golden Gate Park, etc.

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