Title: Using Sift features for small to mid scale image database search
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Equipments:
1 iPhone, 1 server, 1 LCD monitor

Description:
The idea is based on the paper [1] to index images for an image database.

This project constructs an inverted file system on the server to store
SIFT features of known images (~100) for fast image matching.
An iPhone is used to take a query image from a LCD screen,
and will query the server for that image.

I will use k-mean based method to construct visual words, and
use hamming embedding for refined distance comparison. I will also use
tf*idf based scoring method to determine the relevance of returned images.
If time permits, I may deploy the Fuzzy weighting scheme proposed in [2].

Because I want to devote more time to develop the server side inverted
file system, and given I am doing this project alone, I may simplify the
task by using some image markers to indicate the four corners of the query
images, so that the iphone can search for the corners using simple
template matching, and then use (inverse) perspective transformation
to correct the image.

Since the image can be transformed to its upright position, I will compare
the effect of using fixed-position keypoints with upright SIFT descriptors,
versus using Censure keypionts [4] with upright SIFT descriptors.
(Because scale and rotation invariance is no longer important)

I will rewrite the upright SIFT descriptor calculation algorithm
using integral images, as inspired by [4].

The server side code will be in Java, and the iPhone code will be in Objective C.

References:
[1] Hervé Jégou, Matthijs Douze, Cordelia Schmid
Hamming Embedding and Weak Geometry Consistency for Large Scale Image Search,
10th European Conference on Computer Vision (ECCV '08) 5302 (2008) 304--317

[2] Wassim Bouachir, Mutapha Kardouchi, Nabil Belacel

Improving Bag of Visual Words Image Retrieval: A Fuzzy Weighting Scheme for Efficient Indexation, 2009 Fifth International Conference on Signal Image Technology and Internet Based Systems

[3] Yimeng Zhang, Zhaoyin Jia, Tsuhan Chen,
Image Retrieval with Geometry-Preserving Visual Phrases

[4] Motilal Agrawal, Kurt Konolige, Morten Rufus Blas
CenSurE: Center Surround Extremas for Realtime Feature Detection and Matching