Project 3

**Locality-constrained Linear Coding for Scene Classification**

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### 1. Download images (Emily)

Download the 15-class natural scene dataset.

### 2. Download baseline and set up your pipeline (Emily)

Put here

### 3. Implement LLC method by modifying the spatial pyramid code (Giang)

I modified some files when implementing LLC method:

a. **BuildPyramid2.m**:

This file will call new methods to generate SIFT descriptor, calculate dictionary, build histogram with LLC and compile pyramid.

b. **GenerateSiftDescriptors2.m**:

This file is a modified version of **GenerateSiftDescriptor.m**. I modified it to extract proper features for LLC method.

c. **CalculateDictionary2.m**:

This file is a modified version of **CalculateDictionary.m**. Here I replaced *sp\_kmeans* method with *FastKMean* to train a k means cluster model faster.

d. **BuildHistograms2.m**:

This file is a modified version of BuildHistogram.m. In this file, I implemented LLC method (function *CalculateLLC*) as in the paper which uses locality constrained linear coding.

e. **CompilePyramid2.m:**

This file is a modified version of CompilePyramid.m. LLC uses max pooling to form the histogram feature.

### 4. Evaluate your implementation on the 15-class natural scene dataset (Emily)

Results here

### 5. Grading and Bonus Points

a. **Optimize codebook:**

* + - **Use fast k-mean for faster clustering (Giang):**

As mentioned in (3c), I used a new algorithm fast k-mean to train a k means cluster model faster than the original k-mean algorithm in *sp\_kmeans*.

* + - **Build optimized codebook (Emily)**:

b. **Try different parameters and experimental settings:**