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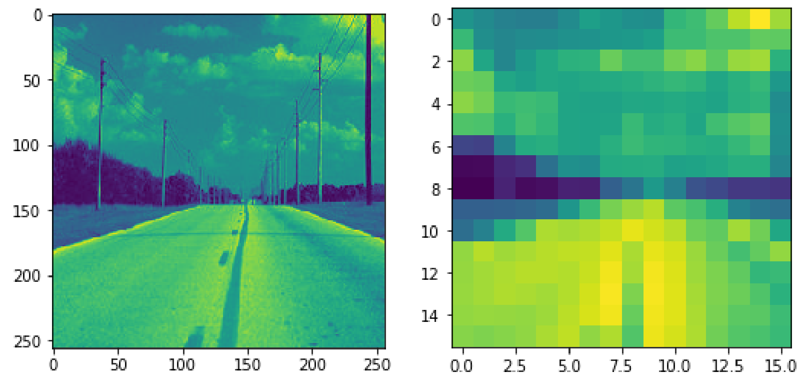
Computer Vision

HW 3: Scene Classification

1. Tiny Image KNN Classification

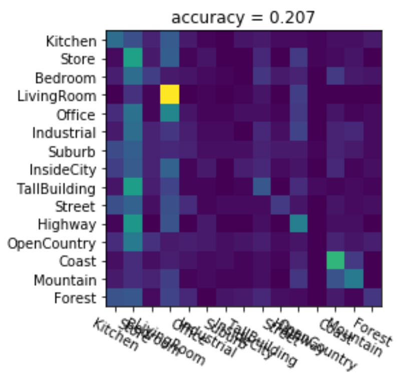
<u>Image Resizing</u>

The first step was resizing an image into a tiny image. For this function, I just iterated through the pixels of the initial image and averaged them. An example is shown below.



<u>Predicting KNN and Classifying Images</u>

The predict_knn function is simple - I imported a KNeighborsClassifier, fit it on the training set, and predicted the test set. The classify_knn_tiny function is pretty simple as well - I resized all the images in the training set, resized all the images in the testing set, extracted their features, and ran the predict_knn function. With this method, I got an accuracy of .207, as shown below.

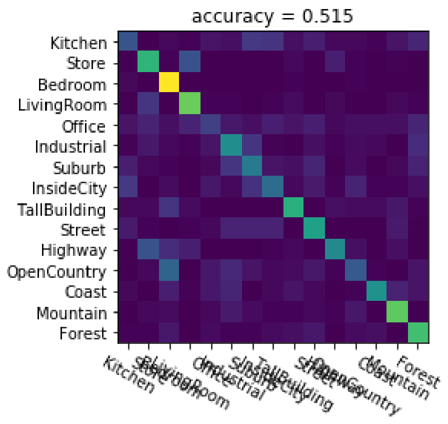


2. Bag of Words Visual Vocabulary

compute_dsift was simple - I iterated through the image and set keypoints, then computed their SIFT descriptors. I used a stride and step of 16. build_visual_dictionary was similarly simple - I imported Kmeans, clustered the pool of features, and returned the centers. I used a dic_size of 100, since 50 wasn't working well enough. Finally, compute_bow uses NearestNeighbor to find the nearest neighbor to each SIFT descriptor, creates a histogram of the nearest neighbors, and normalizes it.

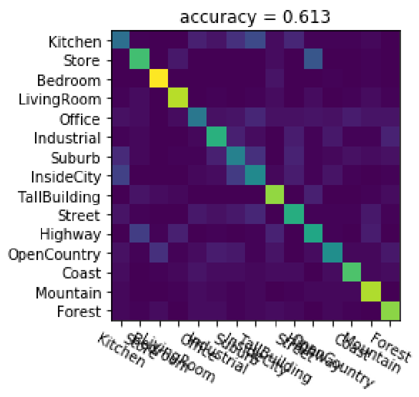
3. Bag of Words KNN

The classifier combines the previous functions - generating a pool of dense SIFT features, clustering them to build a vocabulary, computing the Bag of Words for each training image based on the vocabulary, and then training predict_knn on the BoW vectors. With this, I got an accuracy of .515.



4. Bag of Words and SVM

For predict_svm, I converted the labels into 15 different binary labels, one for each type of classification. I trained 15 different classifiers on each set of labels, and then used the best prediction as the prediction for each test sample. With this method, I was able to get an accuracy of .613, as shown below.


accuracy = 0.613
Kitchen
Store
Bedroom
LivingRoom
Office
Industrial
Suburb
InsideCity
TallBuilding
Street
Highway
OpenCountry
Coast
Mountain
Forest