Computer Vision Project 3,4

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1 Tiny images representation and nearest neighbor classifier

First we need to read images and resize them to 16×16 and put them in a row vector. Then we should normalize our images matrix and find the sample with minimum distance with each test set image and assign training sample label to it.

Using Tiny Image Representation with K-Nearest Neighbour method we obtained 9% accuracy.

2 Bag of Words with SIFT

We extracted feautures of all images and clustered them with K-Means algorithm. The centriod for each clusters show us the visual vocabulary.
Using visual vocabulary we extracted image descriptors (Histograms) for each image. These histograms are normalized.
Now we can use a classifier to classify our test images.

2.1 KNN

Using this classifier it is similar to what we did with tiny images. In this case finding nearest neighbour gave us 36.09253% accuracy.

2.2 SVMs

In order to classify images we used 15 binary-linear SVMs to train for each category.To train SVMs we give images in features space (histograms) and label them as for classifying categories 1-vs-all.
This gave us 51.8432% accuracy.

We can do experiments for different parametes, like changing visual vocabulary size or SVM parameters.

Note: Confusion Matrix for best performance is attached.

	Insidecity	kitchen	Highway	TallBuilding	Forest	bedroom	Office	Coast	store	Street	Suburb	livingroom	OpenCountry	Mountain	industrial
Insidecity	100	12	6	13	0	12	12	0	13	15	1	5	3	0	16
kitchen	13	34	0	2	0	15	22	0	3	2	2	9	0	0	8
Highway	7	1	81	13	0	2	0	12	2	12	11	1	6	6	6
TallBuilding	32	3	9	139	0	5	8	6	13	12	8	5	5	2	9
Forest	0	0	0	0	218	0	0	0	1	0	1	0	5	3	0
bedroom	4	15	1	4	2	37	9	1	10	5	3	17	4	1	3
Office	2	14	0	0	0	17	52	0	2	0	2	18	0	0	8
Coast	1	0	41	8	11	5	0	124	0	14	6	1	29	20	0
store	7	8	0	4	8	7	5	0	134	14	5	7	1	1	14
Street	13	1	0	8	1	6	2	0	23	111	2	3	3	6	13
Suburb	0	1	4	2	2	7	4	0	1	0	112	2	2	2	2
livingroom	7	30	1	2	1	32	28	0	16	7	7	50	0	0	8
OpenCountry	0	1	12	4	51	1	0	28	2	10	11	0	140	49	1
Mountain	0	0	7	1	29	2	0	16	0	5	8	0	28	176	2
industrial	23	7	8	10	1	16	7	2	33	27	15	13	6	3	40