

Computer Vision Final Assignment

Kasper Bouwens Wolf Vos

March 2016

1 Introduction

In this assignment the main goal is to build a bag-of-words image classifier. In order to achieve this first a codebook (visual vocabulary) has to be made. This is done by applying k-means on the different descriptors found by SIFT in the training set. Then a classifier has to be trained, in this assignment we used a Support Vector Machine (SVM) to perform this task. Four different SVM's are trained for the four different image classes. For the test images the same procedure will be applied and then the four different SVM's will output a probability that the image belongs to that specific class. The 200 test images can be ranked according to their probability within that respective class.

In the following sections we will discuss the influence of different variables on the results.

2 Dense vs key-point sift

The main difference between dense and key-point sift is that amount of descriptors, when using dense sift the k-means algorithm takes a long time to compute because generally dense sift generates a lot more descriptors. Also dense sift is more prone to classifying objects that have similar backgrounds as the same objects, this can be a problem when trying to classify birds compared to other flying objects since the blue sky will mostly influence the classification. A way to solve this could be by using a modified version of TD-IDF.

3 Vocabulary size

The vocabulary size or amount of clusters will influence the performance of the system because too few words will result in too little discriminating power and too much words will result in noise and this is computationally very expensive.

4 SIFT descriptor

We have not been able to check the different SIFT descriptors. We only used the grayscale SIFT.

5 Number of training samples used

Number of training samples used also has the quite same effect as the vocabulary size. More training samples will reduce overfitting. Less training samples will increase variance. Due to time complexity we have not been able to perform exhaustive empirical research on this topic.

6 Kernel choice

We have not been able to check the different kernels for SVM.