ECSE 415: Introduction To Computer Vision

Final Project

Due Date: April 11th, 2017

Cats vs. Dogs - Classification:

For this project, you will participate in an in-class Kaggle competition on Image Classification. The goal is to devise a machine learning algorithm to analyze images and classify them to their respective categories (i.e. Cats or Dogs). The competition, including the data, is available here (you must create a Kaggle account using your *@mail.mcgill.ca* account): https://inclass.kaggle.com/c/ecse415-classification.

A description of the dataset is included: https://inclass.kaggle.com/c/ecse415-classification/data. The dataset consists of 7384 images of various cat and dog images ranging from 37 different breeds. The original dataset can be found at [1].

To participate in the competition, you must submit a list of predicted outputs for the test instances on the Kaggle website (see example file on Kaggle website for the file format). You can submit multiple prediction entries throughout the competition, and track your performance on the Kaggle Leaderboard. The test set is divided into two parts; one set (the public set) is used to update the scoreboard and the other set (the private set) is used to calculate the final score of each team.

Performance on the Kaggle Leaderboard will be calculated based on the percentage of instances in the test set that are correctly classified. The project should be completed in a group of 2. You can use the discussion board on myCourses to find a team.

The main portion of this assignment is creating your appearance features and fine-tuning your classifier. Some examples of appearance features we have already covered in class are SIFT, LBP, Harr, etc.. You must think of different methods to apply these features. In addition, it may prove useful to first extract the cat/dog (foreground) from the background image using some of the image segmentation methods we learned in class. The classifiers you are allowed to use are any classifiers covered in class (i.e. SVM, Adaboost, and Random Forests). You are allowed to use any built-in openCV features. In addition, for the classification methods, I would suggest using the scikit-learn library. This library has a lot of built-in classifiers (including the ones covered in class). More information on installing this library can be found at: http://scikit-learn.org/stable/.

Your final submission should include the code developed during the project, a README file containing instructions on how to run the code, and a short written report describing your methodology and results. The report should include the following:

- Project title.
- Name of your team as it appears on Kaggle.
- List of team members, including their full name, email and student number.
- Introduction: briefly describe the problem and summarize your approach.
- Problem representation: feature design/selection methods. Which features you decided to use in this challenge and why you believe these are good features to use.
- Algorithm selection and implementation: include any decisions about training your data, describe your hyper-parameters and how you went about choosing them.
- Testing: detailed analysis of your Kaggle results.
- Discussion: pros/cons of your approach and methodology.
- References: (optional): use any reference format you wish.

The main text of the report should not exceed 5 pages.

Marks will be attributed based on your performance on the private set of the competition, your code, and lastly your report. 25% will be allocated for the performance on the Kaggle competition while the remainder will be allocated towards your report and code. All code should be written in jupyter.

For the competition, the performance grade will be calculated as follows: the top team, according to the score on the private set will receive 100%. A random baseline, entered by myself will score 0%. All other grades will be calculated according to interpolation of the private test set scores between those two extremes.

Good luck and have fun!

REFERENCE

[1] O. M. Parkhi, A. Vedaldi, A. Zisserman, C. V. Jawahar, Cats and Dogs, IEEE Conference on Computer Vision and Pattern Recognition, 2012.