COMPUTATIONAL INTELLIGENCE (CI-MAI) Project proposal: CIFAR (object recognition in images)

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Abstract

The CIFAR-10 is an established computer-vision dataset used for object recognition. It is a small subset of a large 80 million tiny images dataset; it consists of $60,000$ 32×32 color images containing one of 10 object classes, with $6,000$ images per class. It was collected by A. Krizhevsky, V. Nair and G. Hinton. You are asked to solve this problem using neural networks.

1 Introduction

The problem can be found in the following url:

`http://www.kaggle.com/c/cifar-10/data`

You have to download the *train.7z* and *test.7z* files. In order to do so you need to register in `www.kaggle.com` [1] Once you have the data (*train.csv* and *test.csv* files) you are expected to predict the labels of the test set using a classifier that you will have to train in the training set. You are not allowed to set the labels in the test set manually. [2].

2 A look at the data

The CIFAR-10 data consists of $60,000$ 32×32 color images in 10 classes, with $6,000$ images per class. There are $50,000$ training images and $10,000$ test images in the official dataset.

This is a multiclass classification problem. The possible labels of the images are:

- airplane
- automobile
- bird
- cat
- deer
- dog

[1] Kaggle is a company that shares data mining problems and expects people to compete with each other in order to get the best solution.

[2] The url `http://rodrigob.github.io/are_we_there_yet/build/classification_datasets_results.html` contains information on state of the art methods in image recognition (and in this problem in particular). It can be useful if you want to check how well you are doing comparing to the state of the art.

- frog
- horse
- ship
- truck

It is important to know that the classes are mutually exclusive (for example, there is no overlap between 'automobiles' and 'trucks'; the former includes sedans, SUVs, things like that, while the latter includes only big trucks).

If you think that there is too much data (your computer takes too long or cannot handle those sizes) you can reduce the training set. If you do so, keep the proportions of the classes (*e.g.*, do not erase $10,000$ instances out of which $9,500$ are cats!).

3 Evaluating your models

Once you have trained your neural network, the predictions have to be stored in a .csv file in order to know how well you do on the test set. The results have to be uploaded to Kaggle in order to get the score (which is the fraction of labels that are predicted correctly).

The format is as follows: a header with the identifier and the label (the prediction). Then predictions are written with the name of the predicted class:

```
id,label
1,cat
2,truck
3,cat
4,plane
...
```

Submissions are evaluated based on predictive classification accuracy.