COMPUTER SCIENCE AND ENGINEERING

ARTIFICIAL NEURAL NETWORKS AND DEEP LEARNING

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HOMEWORK 1

IMAGE CLASSIFICATION

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1. INTRODUCTION

This is the first Homework of the Artificial Neural Networks and Deep Learning course, held at Politecnico di Milano in the Computer Science context.

In this homework the groups are required to classify images of leaves, which are divided into categories according to the species of the plant to which they belong. Being a classification problem, given an image, the goal is to predict the correct class label.

Figure 1: an example of leaf images

1.1 DATASET

The dataset provided by the competition's promoters is a folder containing 17 728 files, grouped into several categories. In particular, there are 14 different types of leaves with whom is possible to classify the images (Tomato, Orange, Soybean, Grape, Corn, Apple, Peach, Pepper, Potato, Strawberry, Cherry, Squash, Blueberry, Raspberry).

1.1.1 CLASS DISTRIBUTION

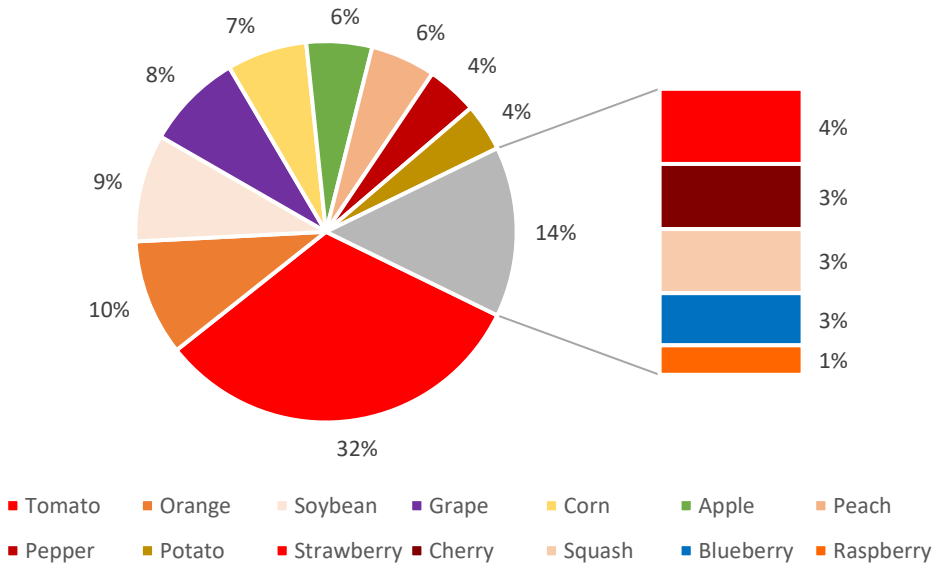

Table 1: the non-homogeneous distribution of the classes in the dataset

As is shown in the *Table 1: the non-homogeneous distribution of the classes in the dataset*, some classes contain much more images than the others. In particular, the sum of Tomato, Orange and Soybean represents more than the half of the entire distribution.

This problem is also known as "class imbalance". Due to this, the fitted model tends to be biased towards the majority class data, which leads to lower accuracy during the testing phase.

One of the most used techniques to bring the required balance in the data is called under-sampling.