Homework 2 - Machine Learning: Weather Classification

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1 Introduction

1.1 Assignment

The assignment of the homework was to build an image classifier capable of assigning pictures to one of the following classes: {*RAINY*, *HAZE*, *SUNNY*, *SNOWY*}; based on how the weather was like at moment of the picture's capture. In particular, the request was to address the former problem in 2 different ways:

1. Defining and training a CNN from scratch for this particular task;
2. Applying transfer learning and fine-tuning on a pre-trained model.

1.2 Dataset

The provided datasets[1] are separated in several different archives and folders. I have chosen to use *MWI-Dataset-1.1_2000*. It contains 500 different pictures for each class and I have divided it into training and testing datasets, with the former containing 85% of the pictures and the latter the remaining ones.

Chosen resolution In order to train both the new CNN and the pre-trained model I have resized all the pictures to a fixed resolution of 160x160. However simply resizing the pictures would've ended up radically changing the aspect ratio of the non-square ones, potentially leading to the distortion of the information contained in them. That's why, for each picture, I have resized the longest side to 160, keeping constant the aspect ratio; i.e. proportionately resizing also the other side; and pasted the so-obtained picture on a black 160x160 square: basically adding some padding to the edges.

As an example of this resizing process here is one sample picture:

(a) Original picture with resolution 900x601

(b) Resized picture with resolution 160x160

Notes Due to the limited computing power I have just chosen 160x160 as the resolution of pictures instead of actually studying the effect of this hyperparameter via, for example, Random Search.

Similarly, instead of running cross validation, I have randomly sampled the training and testing datasets once.

[1] available here: https://drive.google.com/drive/folders/1UzH28Q8xki8_DMYdDgHxi40-CJ800Kaq

2 Experimentation

2.1 Framework