Maglione Sandro - 10532096 | Cappelletti Andrea - 10529039

Artificial Neural Networks and Deep Learning 2020

Homework 1 - Image Classification

Dataset

We loaded the dataset from a folder on Google Drive. In order to be able to use the `flow_from_dataframe` function correctly, we created a new folder called `tt` in which we copied the `test` folder.

We created a new pandas Dataframe to store the image name and their respective labels, obtained from the `train_gt.json` file.

We then shuffle the dataframe in order to be able to split the training set between actual training and validation.

```
Found 3900 validated image filenames belonging to 3 classes.
Found 1714 validated image filenames belonging to 3 classes.
Found 450 images belonging to 1 classes.
```

Training

The training of the model, after several tests (VGG19, ResNet50V2, EfficientNetB7), has been done using Transfer Learning (VGG16).

We load the model and define the layer of the Convolutional Neural Network that we will use to train the model. We then define the loss function and fit the model (**10 epochs**)

```
Epoch 1/10
488/488 [==============================] - 173s 354ms/step - loss: 3.4952 - accuracy: 0.5831 -
val_loss: 1.0234 - val_accuracy: 0.6179
Epoch 2/10
488/488 [==============================] - 173s 354ms/step - loss: 0.3402 - accuracy: 0.8669 -
val_loss: 1.2734 - val_accuracy: 0.6394
Epoch 3/10
488/488 [==============================] - 172s 352ms/step - loss: 0.1567 - accuracy: 0.9487 -
val_loss: 1.7199 - val_accuracy: 0.6167
Epoch 4/10
488/488 [==============================] - 171s 349ms/step - loss: 0.1474 - accuracy: 0.9649 -
val_loss: 1.6053 - val_accuracy: 0.6476
Epoch 5/10
488/488 [==============================] - 172s 353ms/step - loss: 0.1469 - accuracy: 0.9662 -
val_loss: 2.3059 - val_accuracy: 0.6126
Epoch 6/10
488/488 [==============================] - 172s 353ms/step - loss: 0.1321 - accuracy: 0.9651 -
val_loss: 2.4162 - val_accuracy: 0.6593
```

```
Epoch 7/10
488/488 [==============================] - 172s 353ms/step - loss: 0.2128 - accuracy: 0.9590 -
val_loss: 2.1282 - val_accuracy: 0.6575
Epoch 8/10
488/488 [==============================] - 172s 352ms/step - loss: 0.1310 - accuracy: 0.9679 -
val_loss: 2.4050 - val_accuracy: 0.6523
Epoch 9/10
488/488 [==============================] - 171s 351ms/step - loss: 0.2487 - accuracy: 0.9487 -
val_loss: 2.6791 - val_accuracy: 0.6587
Epoch 10/10
488/488 [==============================] - 171s 351ms/step - loss: 0.1976 - accuracy: 0.9585 -
val_loss: 3.8082 - val_accuracy: 0.6365
<tensorflow.python.keras.callbacks.History at 0x7f6e9006d198>
```

Test

Once the model completed the training phase, we compute the prediction on the test set. We compute the most likely prediction of the model based on the results of the training phase.

We then match the obtained label predictions with the original test image names. Finally, we create a new pandas dataframe containing the result of our prediction and we export it in .cvs.