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Artificial Neural Networks and Deep Learning 2020

Homework 2 - Image Segmentation

Dataset

We loaded the dataset from a folder on Google Drive. In order to import all the data we divided the paths:

```
PATH_DATA = pathlib.Path("./drive/MyDrive/Development_Dataset")

PATH_WORKING = pathlib.Path("./drive/MyDrive")

PATH_TRAINING = PATH_DATA / "Training"

PATH_TEST = PATH_DATA / "Test_Dev"
```

We created a new pandas Dataframe to store the image name and their respective labels.

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

```
Found 90 training images
Found 120 test images
```

Once done we obtained:

```
72 images for training
18 images for validation
120 images to test
```

Then we defined the `MeanIoU` function in order to keep an eye on the metrics of evaluation.

Training

The training of the model, after several tests with different epochs, has resulted optimally with 50 epochs.

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 (**50 epochs**)

```
Epoch 1/50
18/18 [==============================] - ETA: 0s - loss: 0.8729 -
iou_score: 0.2581 - f1-score: 0.3205INFO:tensorflow:Assets written to:
drive/MyDrive/12-15_14-48/model/assets
18/18 [==============================] - 139s 8s/step - loss: 0.8729 -
iou_score: 0.2581 - f1-score: 0.3205 - val_loss: 0.8600 - val_iou_score:
0.2223 - val_f1-score: 0.2665
Epoch 2/50
18/18 [==============================] - 117s 6s/step - loss: 0.8118 -
iou_score: 0.3768 - f1-score: 0.4737 - val_loss: 0.8672 - val_iou_score:
0.1853 - val_f1-score: 0.2395
Epoch 3/50
18/18 [==============================] - ETA: 0s - loss: 0.7466 -
iou_score: 0.5288 - f1-score: 0.6406INFO:tensorflow:Assets written to:
drive/MyDrive/12-15_14-48/model/assets
18/18 [==============================] - 138s 8s/step - loss: 0.7466 -
iou_score: 0.5288 - f1-score: 0.6406 - val_loss: 0.8222 - val_iou_score:
0.3626 - val_f1-score: 0.4769
Epoch 4/50
18/18 [==============================] - ETA: 0s - loss: 0.6782 -
iou_score: 0.6187 - f1-score: 0.7350INFO:tensorflow:Assets written to:
drive/MyDrive/12-15_14-48/model/assets
18/18 [==============================] - 137s 8s/step - loss: 0.6782 -
iou_score: 0.6187 - f1-score: 0.7350 - val_loss: 0.7832 - val_iou_score:
0.4998 - val_f1-score: 0.6300
```

...

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 .json format..