POLITECNICO
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Artificial Neural Networks and Deep Learning
Homework 2 - Image Segmentation, final phase

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Chapter 1

Introduction

1.1 Description of the task

This homework consists in fine-tuning the model obtained in the Development phase. To see the model in details and its development, please follow the link in Chapter 3.

(1) dataset image

(2) segmented image

The competition is public and organized by the ACRE (Agri-food Competition for Robot Evaluation).

1.2 Dataset

For this final phase, the original dataset has been extended adding the Test_Dev images. As done before, we decided to apply for maize from the Bipbip dataset.

1.2.1 Data augmentation

We have performed data augmentation in order to increase the dataset dimension. Some of the parameters used to perform the transformations are: rotation, zoom, horizontal/vertical shift and flip.

1.2.2 Tiling

During the training, we have experienced many issues with the RAM and VRAM. This happened both with Colab Pro and local tests. We decided not to downsize the dataset images, since the quality loss would have been too much, so we performed image tiling. In the final version, we splitted the original images into 8 tiles per image.

1.3 Validation set

No automatic validation set is provided. This means that a subset of the training set must be used to perform validation.

In our case, we parametrized the number of training images to be moved into the validation set, with a 10% probability.

1.4 Test set

The test set has changed and now includes new images, which are provided without any ground-truth mask.

1.5 Evaluation

In this final phase, there is no public evaluation. The leaderbord is published after the end of the competition.

Chapter 2

Neural network architecture

As in the previous phase, we have modified the function `read_mask_example`. The modified function can be found into the `starting_kit` folder.

2.1 U-Net, with VGG as a backbone and skip connections

The model we chose is the best performing in the Development phase.

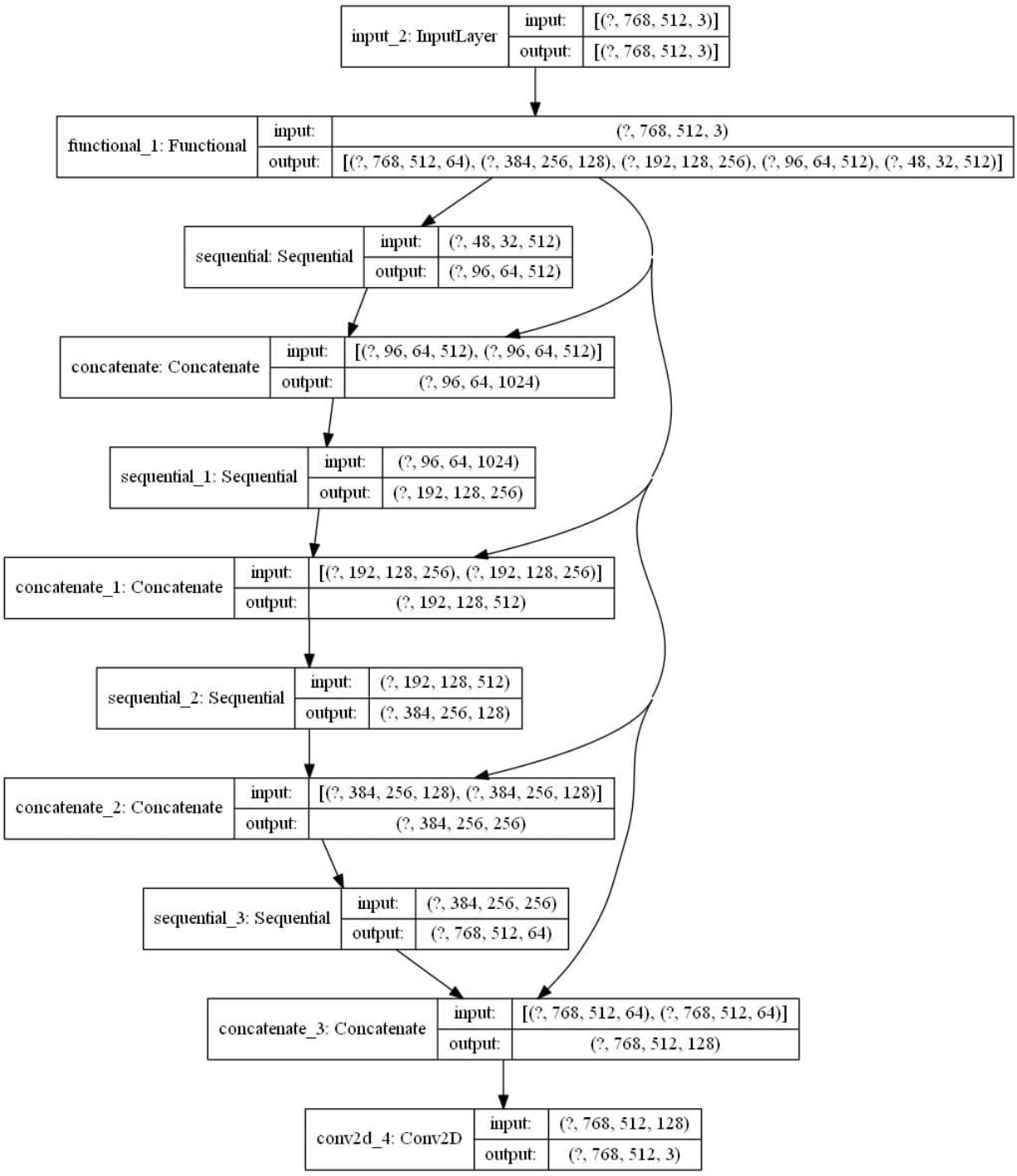

Figure 2.1: network obtained with VGG and skipped connections

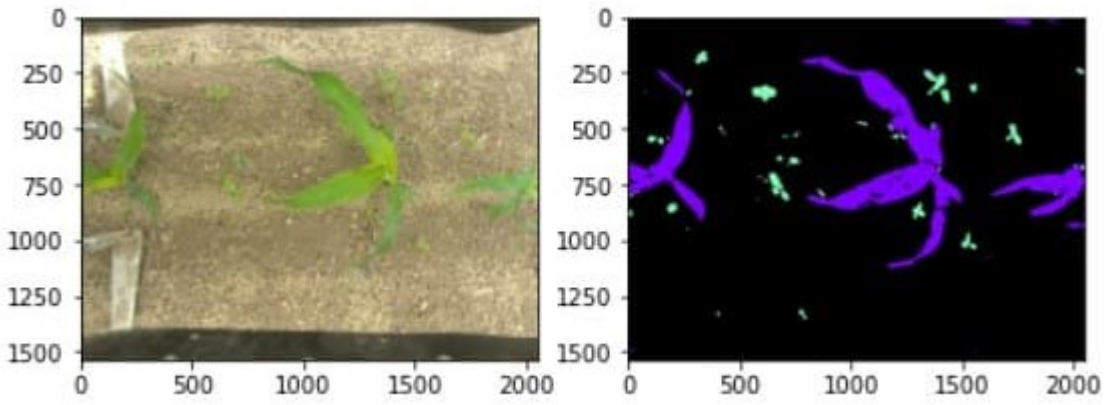

Figure 2.2: image segmentation

Chapter 3

References

3.1 Links

- GitHub repository of the project, including Development phase: `https://github.com/tizianofucci/A2NDLSegmentation`
- Competition web page: `https://competitions.codalab.org/competitions/27176`