Quicknat implementation in MONAI

Project Management and Software Development
for Medical Applications

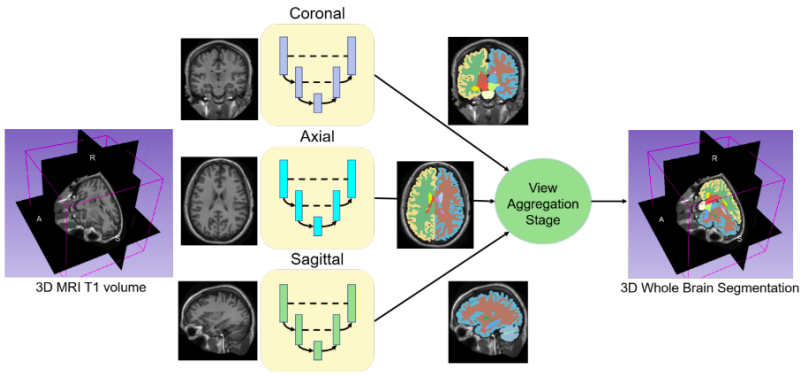

Figure 3: We show the multi-view aggregation step that combines segmentations from models trained on 2D slices along three principal axes: coronal, sagittal and axial. The final segmentation is obtained by combining the probability maps from all the three networks.

General Info

The goal of this project is to implement Quicknat[1] in Monai, in order to contribute to Monai ZOO library [2]. To successfully complete the project, the student needs Pytorch/Monai knoledge, as well as time management skills. The students who attended the monai workshop will have priority in the selection process.

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Project Abstract

Segmentation of brain sections on structural magnetic resonance imaging (MRI) is time consuming and user dependent. Quicknet is a fully convolutional, densely connected neural network for brain segmentation. It uses the 3 ortogonal views to make a segmentation predictions. The architecture proposed by Abhijit and his team is available in github on Pytorch [3]. It needs Monai adaptation. The dataset OASIS is available in our hospital server and the GPUs resouces will be given in person or distantly. Good results on this project could open the posibility of a Master thesis in the laboratory.

Background and Motivation

It exists many sematic segmentation networks for medical images. Nevertheless each time a researcher wants to compare his/her architecture with the state it the art, he/she spends hours **re-implementing** the network because code is not available in an easy format. **Monai** zoo solve the gap, roviding architectures and pretrained weights.

Student's Tasks Description

1. Understand the network,

2. Run the pytorch code on the GPUs,

3.Adapt the code to monai,

4. Contribute to the library

5.Create a google colab tutorial.

Technical Prerequisites

Lenguages: Pytorch, Monai.

IDE: visual Studio or pycharm.

Not needed but apreciated: Git

References

[1] Roy, A. G., Conjeti, S., Navab, N., Wachinger, C., & Alzheimer's Disease Neuroimaging Initiative. (2019). QuickNAT: A fully convolutional network for quick and accurate segmentation of neuroanatomy. NeuroImage, 186, 713-727.

[2] https://github.com/ai-med/quickNAT_pytorch

[3] https://github.com/Project-MONAI/model-zoo

Please send the completed proposal to ardit.ramadani@tum.de, zl.jiang@tum.de, lennart.bastian@tum.de and tianyu.song@tum.de. Please note that this proposal will be evaluated by the BMC coordinators and will be assigned to a student only in case of acceptance.