Simurgh Team Method Description

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1   Preprocessing

1.1   Brain Extraction

We used the registered images (located at pre folders) for training. To extract the brain and exclude other structures, such as skull and eyes we applied FSL-BET on both T1 and Flair images. The resulting masks were then used to extract the Brain.

1.2   Resampling

We resampled all the training images to have the same spacing of 0.9x0.9 at the x and y directions. We then applied appropriate padding and cropping to make the sizes the same.

1.3   Intensity normalization

We normalized the intensities per image to be within the range of [0, 1].

2   Model

We used 2D convolutional neural networks (CNNs) with both T1 and Flair as different input channels to the network. The architecture is a custom variant of the U-Net architecture [1].

3   Training

We used five fold cross-validation on the whole training data as well as on each institute data separately, which resulted in 20 experiments and models. We picked 16 best models and used them for prediction and deployment.

4 Prediction

For prediction time we first detect the class of the test data and then use both general models (trained on all institutions) as well as specific models (trained on single institutions). For clustering the input test image we use both the physical properties of the image as well as the normal distribution of the image intensity.

References

[1] Olaf Ronneberger, Philipp Fischer, and Thomas Brox. U-net: Convolutional networks for biomedical image segmentation. In *International Conference on Medical Image Computing and Computer-Assisted Intervention*, pages 234–241. Springer, 2015.