MLIA Final Projects

- Please note that each paper has related code released online. Feel free to use it!
- All tasks will be performed on our provided images.
- Good luck and enjoy!

T3 (9 teams):

* **Papers for tumor segmentation project:**

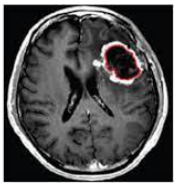

Fig. 1: An example of brain tumor segmentation.

[1] U-Net: Convolutional Networks for Biomedical Image Segmentation
[https://arxiv.org/pdf/1505.04597.pdf]
[2] Optimized U-Net for Brain Tumor Segmentation
[https://arxiv.org/pdf/2110.03352.pdf]
[3] nnU-Net for Brain Tumor Segmentation
[https://arxiv.org/pdf/2011.00848.pdf]
[4] UNet++: A Nested U-Net Architecture for Medical Image Segmentation
[https://arxiv.org/pdf/1807.10165.pdf]
[5] Brain Tumor Segmentation with Deep Neural Networks
[https://arxiv.org/pdf/1505.03540v3.pdf]

* **Papers for image classification project (healthy vs. Alzheimer's disease):**

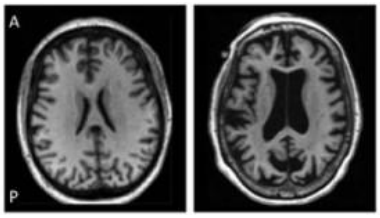

Fig. 2: An example of healthy (left) vs. disease (right).

[1] GhostNet: More Features from Cheap Operations
[https://arxiv.org/pdf/1911.11907v2.pdf]
[2] RandAugment: Practical automated data augmentation with a reduced search space
[https://arxiv.org/pdf/1909.13719v2.pdf]
[3] MixConv: Mixed Depthwise Convolutional Kernels
[https://arxiv.org/pdf/1907.09595v3.pdf]
[4] Selective Kernel Networks
[https://arxiv.org/pdf/1903.06586v2.pdf]

T4 (6 teams):

* **Papers for cardiac myocardium segmentation project**

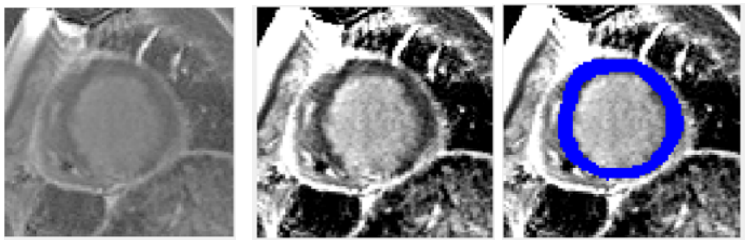

Fig. 2: An example (left to right) of an original image, adjusted image, and segmented image.

[1] Attention U-Net: Learning Where to Look for the Pancreas
[https://arxiv.org/pdf/1804.03999.pdf]
[2] SegNet: A Deep Convolutional Encoder-Decoder Architecture for Image Segmentation
[https://arxiv.org/pdf/1511.00561v3.pdf]
[3] TransUNet: Transformers Make Strong Encoders for Medical Image Segmentation
[https://arxiv.org/pdf/2102.04306v1.pdf]

[**Extra task:**] Write an automatic pipeline of histogram matching (HM) to process all provided images (a reference image will be given). You may use the HM algorithm provided here: [https://scikit-image.org/docs/dev/auto_examples/color_exposure/plot_histogram_matching.html] or any other resources that provides HM code.

* **Papers for image classification project (healthy vs. Alzheimer's disease)**
See image examples provided in T3 team

[1] PCANet: A Simple Deep Learning Baseline for Image Classification?
[https://arxiv.org/pdf/1404.3606v2.pdf]
[2] Efficient-CapsNet: Capsule Network with Self-Attention Routing
[https://arxiv.org/pdf/2101.12491.pdf]
[3] SpinalNet: Deep Neural Network with Gradual Input
[https://arxiv.org/pdf/2007.03347.pdf]

[**Extra task:**] Write an automatic pipeline of deformable image registration (DIR) to register all provided images in the same space (a reference image will be given). A list of registration tools can be found here at [http://pyimreg.github.io/]. **You are required to use both the registration transformation (displacement field) and image intensity as features for classification tasks.**