In this report, we have used developed Convolutional Neural Network (CNN) to perform image segmentation of cardiovascular magnetic resonance (CMR) images. Given 200 CMR images including training, validation and testing data, this task aims to segment masks into four features: the myocardium (Myo), the right ventricle (RV), the left ventricle (LV) and the background. More specifically, our task is semantic segmentation that we should focus on analysing each pixel of given images to segment features properly. Many experts have tried to implement automated CMR segmentation with CNN concepts to redeem manual segmentation approaches which requires lots of time. As the inspiration attracts many people’s interests, various methods and approaches to perform segmentation of CMR has been introduced and developed combining with deep learning in many challenges such as ACDC challenge. Avendi et al. demonstrated automatic segmentation of the left ventricle in CMR images using CNN. They used MICCAI 2009 challenge dataset which contains 45 images and 4 labels of them. The accuracy of the result was evaluated as 0.94 using dice coefficient metric. Khened et al. have been organized their research by applying to ACDC 2017 challenge dataset using residual DenseNet with ensemble of classifiers: SVM with radial basis function, MLP with 2 hidden layers with 100 neurons each, Gaussian naïve Bayes and Random Forest with 1000 trees. The organized methods are used to approach two tasks: segmentation and automated cardiac disease diagnosis task. Based on the related works, we strive to obtain robust result with our model: FC-denseNet.

Reference List

M.R. Avendi, Arash Kheradvar, Hamid Jafarkhani. (2016). ‘A combined deep-learning and deformable-model approach to fully automatic segmentation of the left ventricle in cardiac MRI’, *Medical Image Analysis*, Volume 30, pp.108-119,

Mahendra Khened, Varghese Alex Kollerathu, Ganapathy Krishnamurthi, (2019) ‘Fully convolutional multi-scale residual DenseNets for cardiac segmentation and automated cardiac diagnosis using ensemble of classifiers’, *Medical Image Analysis*, Volume 51, pp. 21-45,