Title – Efficient and Accurate MRI Super-Resolution using a Generative Adversarial network and a 3-D multi-level densely connected network

Abstract – High-Resolution images traditionally comes at a cost of more time, less or partial coverage of the scan. Single image super resolution is a technique to recover HR details form LR image input, with the help of DCNN. DCNN consumes a lot of memory, and run slowly in 3D configuration. In this paper, they proposed a multi-layer densely connected super-resolution network (mDCSRN) with generative adversarial network, that trains and validate quickly, and with the help of GAN the output are close to real images. There architecture is 4x faster in recovering LR images and runs 6x faster.

Introduction - HR MRI generates comprehensive information, results in better clinical diagnosis, decision making and quantitative analysis, but it comes with some drawbacks like, longer scan time, etc. Hence SISR seems to be a better approach for this type of scenario. But SR is a challenging problem because of its underdetermined nature.

Literature Survey – An infinite number of HR/SR images can be produced by same LR image after resolution degradation, which make it quite difficult to accurately restore texture and structural details. Constraints like total variation implicitly assume that the image is overall constant, which create a problem for images with many local details and tiny structures. Many medical images are 3D volumes, but previous CNNs only work with slice by slice, discarding details from continuous structures in the third dimension, and 3D models have far more parameter than 2D model and the difference is like 5x, and it create another problem i.e. memory consumption and computational expenses, making it less feasible for production and using MSE only leads to overall blurring and low perceptual quality.