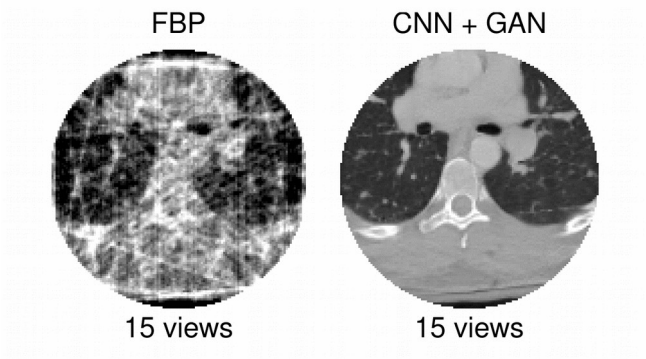
Medical Imaging and Biometrics Group
Institute of Computer Graphics and Vision
Graz University of Technology

Low-Dose CT Reconstruction Using Deep Learning

Master's Thesis/Project



Description:

Computed tomography (CT) is a widely used medical imaging modality to generate a volumetric image representing the interior structure of a subject. To reconstruct a three dimensional (3D) CT image, a series of two dimensional (2D) X-ray based projections are acquired from different views of the subject. While the Filtered Backprojection (FBP) method yields an analytical solution to reconstruct a 3D CT image from these 2D X-ray projections, it also relies on a large number of them which correlates to the amount of ionizing radiation the subject is exposed to. In order to decrease the amount of ionizing radiation and consequently the subject's risk to develop cancer, new CT reconstruction approaches that yield a decent image quality even from a low radiation dose need to be investigated. Recent research in low-dose CT reconstruction employed deep convolutional neural networks (CNNs) to find low-dose solutions to this problem. The goal of this project is to explore and evaluate deep learning based low-dose CT reconstruction approaches to investigate new solutions to this demanding problem.

Objective:

- Perform literature review on low-dose CT reconstruction and related topics.
- Train and test CNN based approaches to solve this problem.
- Evaluate the performance of the trained CNN models.

Qualification:

- Knowledgeable with TensorFlow
- Interested in machine learning and computer vision

Literature:

Thaler et al., Sparse-View CT Reconstruction Using Wasserstein GANs, *International Workshop on Machine Learning for Medical Image Reconstruction*, 2018

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