Product Detail Document[1230]

1 Introduction[1231]

2 Intended Use[1215]

Limitations	GPU's are required
Intended Use	It is Used to Generate Non Contrast Abdomen CT scans (No stone) for building ML models.
Intended User	Radiologists
Out of scope use cases	-

3 Objective and Key Results[1307]

In shadow project 1 (ReSt), we developed an algorithm to detect renal stones from non-contrast abdominal CT scans. In order to develop such an algorithm, we need abdominal CT scans with stones and no stones. In the real world scenario, the number of renal stone in the population is approx 5-10%. Therefore, acquisition and creation of non-renal stone abdominal CT scans for algorithm development is challenging and expensive. The objective of this project is to generate **synthetic non-contrast abdominal CT scans, non renal-stone images** for renal stone detection algorithms.

Key Results

1. Acquisition of non-renal stone images from Radiology Data Lake
2. Develop desired image properties for Synthetic Data
3. Literature survey on previous algorithms for synthetic data in 3D images and Medical Imaging
4. Develop an model architecture to generate synthetic images given the desired image properties
5. Evaluation of algorithm on the quality of synthetic images for the desired properties and task (renal stone detection)
6. Software as a Medical Device for Machine Learning Process - documents, data versioning, code versioning, deliverables and phases

4 Literature Review[1308]

4.1 Relevant references and Data[1249]

Papers:

S.no	Title	Reference Link
1.	Generative Adversarial Network in Medical Imaging: A Review	https://arxiv.org/pdf/1809.07294.pdf
2.	Medical Image Generation using Generative Adversarial Networks	https://arxiv.org/ftp/arxiv/papers/2005/2005.10687.pdf
3.	Efficient and Accurate MRI Super-Resolution using a Generative Adversarial Network and 3D Multi-Level Densely Connected Network	https://arxiv.org/ftp/arxiv/papers/1803/1803.01417.pdf
4.	Synthesizing Diverse Lung Nodules Wherever Massively: 3D Multi-Conditional GAN-based CT Image Augmentation for Object Detection	https://arxiv.org/pdf/1906.04962.pdf
5.	GANs for Medical Image Synthesis: An Empirical Study	https://arxiv.org/pdf/2105.05318.pdf
6.	Generative Adversarial Networks (GAN) Powered Fast Magnetic Resonance Imaging	https://arxiv.org/pdf/2105.01800.pdf
7.	3D-StyleGAN for Generative Modeling of 3D Medical Images	https://arxiv.org/pdf/2107.09700.pdf
8.	Which Training Methods for GANs do actually Converge?	https://arxiv.org/pdf/1801.04406v4.pdf
9.	ON CONVERGENCE AND STABILITY OF GANS	https://arxiv.org/pdf/1705.07215.pdf