Modality and Style Transfer in Medical Imaging and Other Domains

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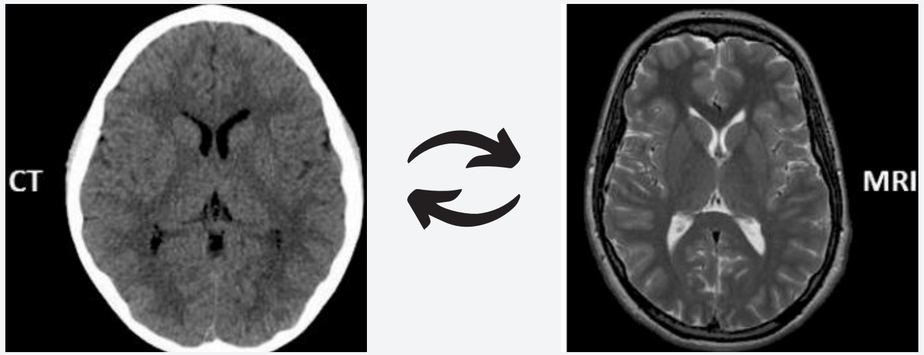
Relevant papers and dataset links:

https://docs.google.com/spreadsheets/d/1pmAH3INKGdljRKn1L-qSghSMyzpPqAljcNm6_HXGoyo/edit?usp=sharing

TRANSFER MODALITIES

Ct to MRI image conversion and vice versa



Unsupervised MR-to-CT Synthesis Using Structure-Constrained CycleGAN:
https://ieeexplore.ieee.org/abstract/document/9164889

CycleSGAN: A cycle-consistent and semantics-preserving generative adversarial network for unpaired MR-to-CT image synthesis
https://www.sciencedirect.com/science/article/pii/S0895611124001083

IMAGE TRANSFORMATION

Advancements in High-Resolution Style Transfer: Unveiling the Precision-Enhanced-Cycle-GAN
https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10581722&tag=1

DRB-GAN: A Dynamic ResBlock Generative Adversarial Network for Artistic Style Transfer
https://arxiv.org/abs/2108.07379

AttentionGAN: Unpaired Image-to-Image Translation Using Attention-Guided Generative Adversarial Networks
https://ieeexplore.ieee.org/abstract/document/9527389

UVCGAN: UNet Vision Transformer Cycle-Consistent GAN for Unpaired Image-to-Image Translation
https://openaccess.thecvf.com/content/WACV2023/html/Torbunov_UVCGAN_UNet_Vision_Transformer_Cycle-Consistent_GAN_for_Unpaired_Image-to-Image_Translation_WACV_2023_paper.html

DATASET

CT and MRI brain scans:

https://www.kaggle.com/datasets/darren2020/ct-to-mri-cgan

- Contains **1744 MRI** and **1744 CT** scan images of brain for training
- Contains **744 MRI** and **744 CT** scan images of brain for testing

A collection of MRI,CT,X-ray dataset:

https://github.com/TheLion-ai/UMIE_datasets

- **882,774 images** from **20 open-source** medical imaging datasets

Real and Monet, Vangogh Style Images:

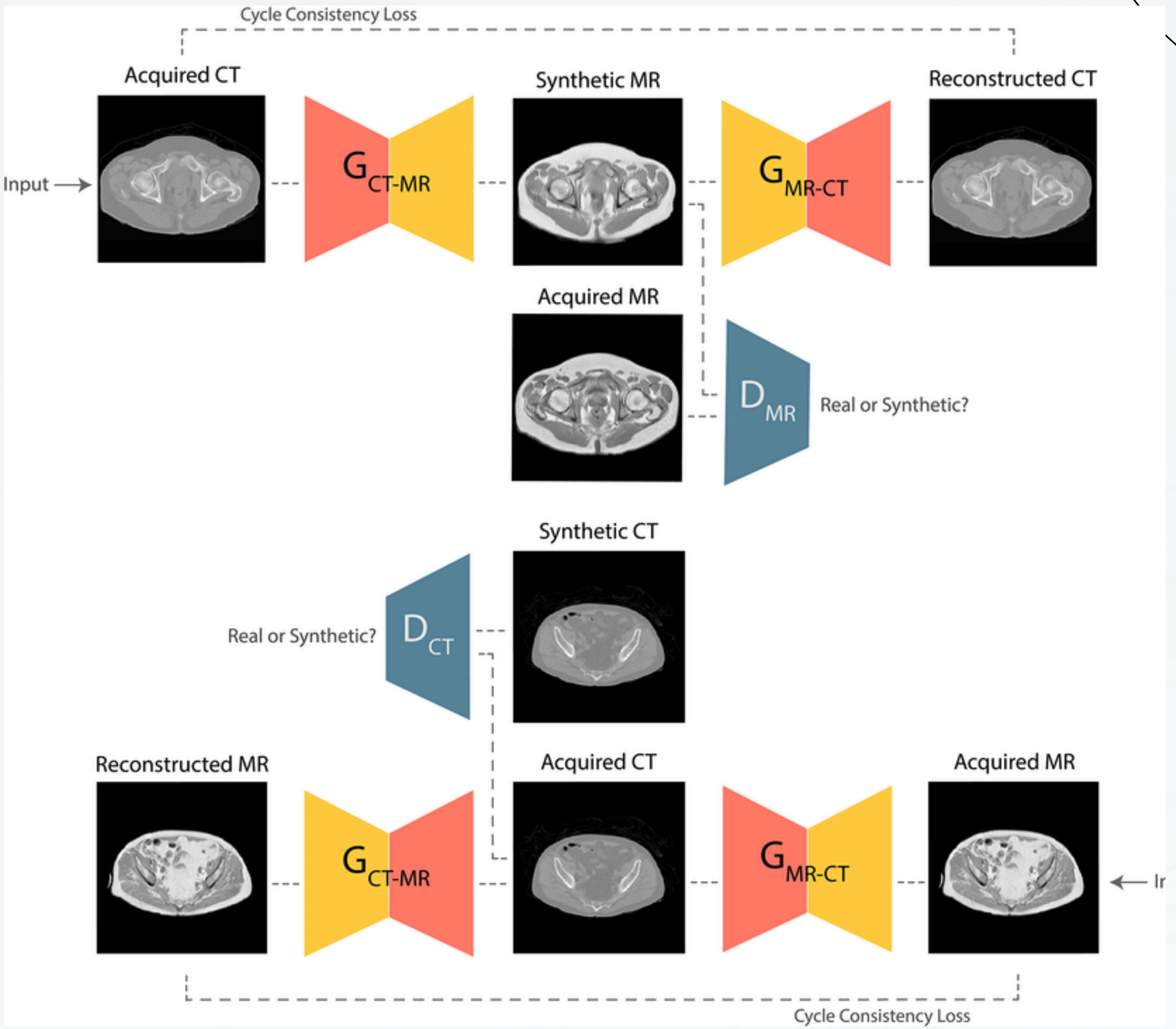
https://www.kaggle.com/competitions/gan-getting-started/data
https://github.com/michaelvin1322/scrapWikiArt

- Contains **300 Monet style** paintings
- Contains **7028 Real** landscape images
- Need to scrap **Vangogh** other styleart from **wikiArt**

BD Artist Dataset:

https://sadekahmed.com/painting-for-sell/

- About **319** landscape painting


Cycle Consistency Loss
Acquired CT
Synthetic MR
Reconstructed CT
Input
G CT-MR
G MR-CT
Acquired MR
D MR
Real or Synthetic?
Synthetic CT
Real or Synthetic?
D CT
Reconstructed MR
Acquired CT
Acquired MR
G CT-MR
G MR-CT
Cycle Consistency Loss

EVALUATION METRICS

PSNR (Peak Signal to Noise Ratio):

PSNR, or Peak Signal-to-Noise Ratio, is a measure used to evaluate the quality of images (or any data in general) by comparing how much "noise" or error exists between an original image and a translated or processed one.

SSIM (Structural Similarity Index Measure)

It is used to used to assess image quality by comparing the "structure" of a generated image to that of a real image.

SSIM focuses on three key aspects of an image:

- Luminance (brightness): SSIM compares the overall brightness in corresponding areas.
- Contrast: It compares the range of intensity (how light and dark differ) in each small section.
- Structure: It checks how the pixels are arranged in terms of patterns and shapes.

FID (Fréchet Inception Distance)

FID compares the distribution of real images (e.g., actual CT images) with the distribution of generated images (e.g., GAN-generated CT images) in a feature space.