

UNPAIRED IMAGE TO IMAGE TRANSLATION FOR BRAIN MR IMAGES

● Overview

Darwina, a healthcare provider, was facing difficulties in ensuring consistency in MRI scans from different medical centers, which impacted the effectiveness of their tumor detection processes. To address this, we developed a solution that standardized MRI scans across different vendors, enabling consistent and reliable image analysis. To address these problems we developed a pipeline to perform image-translation from one domain to another to produce a general representation of the image. We used CycleGans specifically to learn this image-translation with the minimum reconstruction-loss possible.

● Customer

Darwina, Roche Pharmaceuticals

Country: USA

Industry: B2B & B2C

Customer Size: 1000+

Publish Date: 19/06/2024

● Problem Statement

MRI scans are crucial in the early detection and analysis of brain tumors. However, machines from different vendors produce images with varying characteristics, even for the same patient. This variability creates inconsistencies, making it difficult to generalize tumor detection models across different datasets. The lack of standardization not only hampers diagnostic accuracy but also increases the workload for medical professionals who must account for these differences manually.

● Technical Solution

To address this challenge, we developed a sophisticated image-to-image translation pipeline using CycleGANs. This approach allowed us to learn the translation between MRI scans from different vendors, ensuring minimal reconstruction loss while maintaining the integrity of the medical images. Our pipeline was meticulously designed to handle training, testing, and inference phases, ensuring robustness across various scenarios.

We deployed the final solution on Docker Hub, enabling the client to use the model seamlessly on their specific datasets without needing in-depth implementation knowledge. The technology stack included Python, TensorFlow, Keras, SimpleITK, and SnapITK, which worked together to create a reliable and efficient image standardization process.

● Results

The implementation of our solution led to the successful standardization of brain MRI images across different scanners, significantly enhancing the generalization capability of the client's tumor detection pipelines. This not only improved diagnostic accuracy but also reduced the manual effort required by healthcare professionals. Feedback from the client confirmed the effectiveness of the solution, underscoring its potential in both B2B and B2C healthcare applications.

● Technologies

- Python
- Keras
- SimpleITK
- Tensorflow
- Docker
- SnapITK

● Domains

- Computer Vision
- Deep Learning
- Machine Learning