VannGuard AI

UNPAIRED IMAGE TO IMAGE TRANSLATION FOR BRAIN MR IMAGES

Overview

Roche, a global pharmaceutical leader, partnered with Darwinia to address an essential issue in medical imaging analysis. Roche, known for its pioneering work in healthcare sectors like oncology and immunology, sought a solution for standardizing Brain MRI images from various sources. The goal was to improve consistency across MRI images from different machines to ensure the efficacy of pre-trained models used for brain tumor classification and segmentation.

Customer

Darwina, Roche Pharma

Country: USA   **Customer Size:** 1000+

Industry: B2B & B2C   **Publish Date:** 19/06/2024

Problem Statement

Roche faced a significant challenge in processing MRI images due to data inconsistencies stemming from multiple hospitals and imaging devices. These variations hindered the performance of their machine learning models, which were trained on standardized data. The primary problem was that the lack of uniformity across T1 and T2 FLAIR images prevented accurate tumor detection, causing inefficiencies in their diagnostic workflows.

Our role was to design a solution that could standardize these images without requiring paired data, which was unavailable across the different hospitals involved.

Technical Solution

To address this, our team developed an Unpaired Image-to-Image Translation Pipeline using CycleGAN, a model specifically designed for unpaired image translation. After a comprehensive review of relevant literature, we identified CycleGAN as the ideal model to transform the unpaired 2D slices extracted from 3D brain MRI images. The pipeline converted images from the varying source domains into a standardized target domain suitable for use by Roche's pre-trained models.

Once the model was trained on a dataset of T1 and T2 FLAIR scans, it was tested rigorously. We containerized the pipeline using Docker to facilitate easy deployment and integration into Roche's existing systems. This allowed Roche to apply the translation model to their MRI images, enabling consistent data processing across various imaging environments without requiring deep technical expertise in deploying the solution.

Results

The Unpaired Image-to-Image Translation pipeline provided Roche with a seamless solution to standardize MRI images from multiple hospitals and imaging devices. This led to significant time savings, as Roche's diagnostic models no longer required re-training or fine-tuning for different data sources. As a result, Roche could efficiently process diverse imaging datasets, improving both the scalability and reliability of their brain tumor classification and segmentation tasks. Furthermore, the integration of the solution via Docker allowed for easy adoption without additional infrastructural changes, ensuring faster deployment across their global operations.

Technologies

- Python
- Tensorflow
- 2D/3D GANs
- ITK Snap
- PyTorch
- Docker
- Lambda Labs
- SimpleITK
- SnapITK
- Scikit-Image

Domains

- Medical Image Analysis
- Deep Learning
- Computer Vision