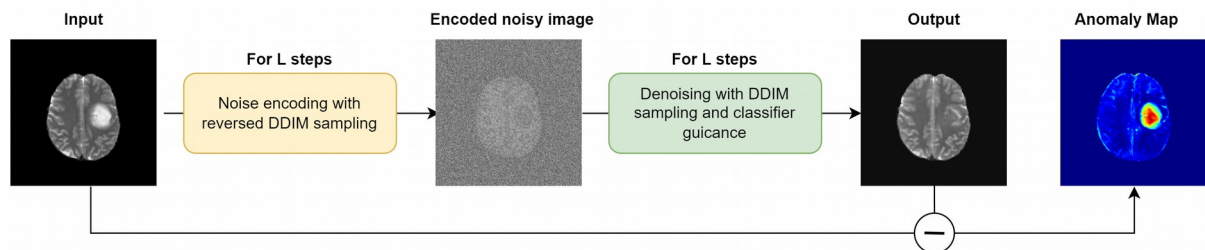


Master of Science – Biomedical Engineering
Thesis Proposal

Multi-class Image-to-Image Translation using Diffusion Models

Denoising diffusion models are a class of deep learning models that have shown a great performance in the generation of synthetic images. Based on an iterative noising and denoising process, synthetic images are generated out of random noise. Exploiting this idea, image-to-image translation based on an external classification network can be performed. So far, the focus lied on binary classification for anomaly detection, i.e. the translation from diseased to healthy, as shown in the following Figure.



The goal of this project is to perform multi-class image-to-image translation. The starting point is the CelebA dataset of facial photos, where multiple attributes (e.g. gender, hair color, eyeglasses, ...) are provided. Similar to StarGAN, we want to explore how multiple attributes can be changed using diffusion models. For the medical application, the CheXpert dataset provides lung X-Ray images of multiple diseases as well as a healthy control group. It is of interest whether the proposed approach works for translation of images of patients suffering from different diseases to an image of a healthy subject. This can be useful for anomaly detection.

Nature of the Thesis

Programming: 80%
Documentation: 20%

Specific Requirements

Programming skills in Python

Supervisors

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*multiple labels:
blond, female, wavy
hair, ...*