# Generative Adversarial Networks (GANs) for 3D Medical Images

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Deep learning methods have seen a recent surge of interest in many application fields, in which these methods have also set the state of the art. Hence, these methods have gained popularity over the last years, which resulted in several novel research areas, one of which are Generative Adversarial networks (GANs). The aim of generative modeling is to create new authentic fake samples which portray the same characteristics and features as the original data. The basic idea behind GANs is to make two neural networks compete with each other. A generator is trained to synthesize realistic samples, while a discriminator tries to distinguish the real from the fake ones. GANs can be used for a variety of tasks including image augmentation, image-to-image translation (cross-domain or cross-modal generation), character generation, aging simulation, and many others.
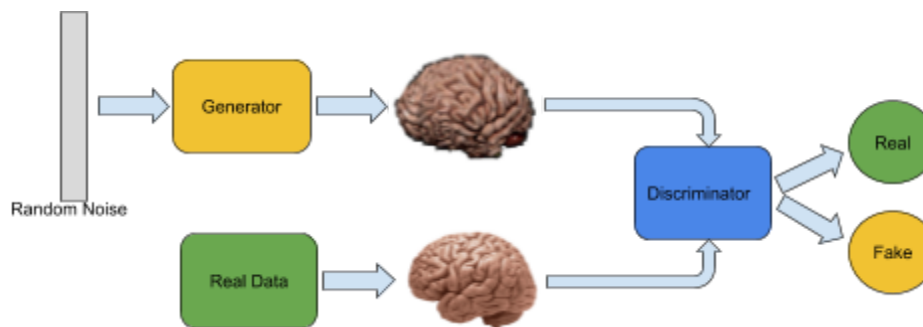
GANs will be the methods in focus for this Master's thesis, especially for their applications to 3D images (e.g. medical scans). These methods have many applications in the medical imaging domain, and are therefore important to be advanced and worked on. This thesis allows you to explore the recent advancements in this research area [1,2,3,4,5], and help advance this field by working on new model architectures, losses and other techniques required to improve the results in this field.

Your profile

- Master's student in Computer Science (ITSE), Digital Health (DH), Data Engineering (DE), and all related programs.
- Knowledge in areas of Deep Learning (ideally attended deep learning courses offered by the chair)

- Good programming skills (e.g. Python)
- Experience in Deep Learning frameworks (e.g. Tensorflow or PyTorch) would be a great plus
- Quick learner and willing to share knowledge
- Good English language skills

If you find this topic interesting, please contact us.

References

[1] https://arxiv.org/pdf/1809.04536.pdf
[2] https://arxiv.org/pdf/1806.06397.pdf
[3] https://n.neurology.org/content/92/15_Supplement/P5.2-025.abstract
[4] https://arxiv.org/pdf/1708.01155.pdf
[5] https://arxiv.org/abs/1802.09655