Hands-on Machine Learning Training

Session 9 – Generative Adversarial Networks

Preparation

In this session, you will learn how generative adversarial networks work and how they are implemented.
Preparation consists of the following tasks:

- Read and understand the following literature:
  - Goodfellow et al., "Generative Adversarial Networks", NIPS 2014 [1].
  - Alec Radford et al. "Unsupervised representation learning with deep convolutional neural networks", 2015, arXiv:1511.06434 [2]
- Based on this literature you should have an understanding of
  - What is a generative adversarial network (GAN)?
  - What is the function of the Generator and Discriminator, respectively?
  - How are GANs trained?
  - How many networks are trained?
  - What is the training objective?
  - What is the difference between a GAN and a DCGAN?

Further Reading

For further understanding and deeper knowledge the following (advanced) papers on adversarial networks might be interesting:

- Tim Salimans et al., "Improved Techniques for Training GANs" [3]
- Martin Arjovsky et al., "Wasserstein GAN" [4]
- Phillip Isola et al., "Image-to-Image Translation with Conditional Adversarial Networks" [5]

[1] https://papers.nips.cc/paper/5423-generative-adversarial-nets.pdf
[2] https://arxiv.org/abs/1511.06434
[3] https://arxiv.org/abs/1606.03498
[4] https://arxiv.org/abs/1701.07875
[5] https://arxiv.org/abs/1611.07004

- Jun-Yan Zhu et al., "Unpaired Image-to-Image Translation using Cycle-Consistent Adversarial Networks" [6]
- Tero Karras et al., "A Style-Based Generator Architecture for Generative Adversarial Networks" [7]

[6] https://arxiv.org/abs/1703.10593
[7] https://arxiv.org/abs/1812.04948