Assignment 1 - Applied Deep Learning WS 22/23

October 2022

Maximilian Viehauser - 11945353

Topic of the project: *Contemporary Art Generator*

Type of the project: *Bring your own data* AND *Bring your own method*

Description of Project idea:

The idea of this project is to build a *Contemporary Art Generator.* In other words, Deep Learning should be used to build a Generator which outputs Art works, which are similar to the style of contemporary artist (e.g. Peter Doig, Mark Bradford, Jean-Michel Basquiat).

As this is my first Deep Learning project I came to the conclusion that a ProGAN (Progressive Growing GAN) is suitable for this project. ProGANs delivered good results in the past, but are still not too complex to understand and implement by beginners in the field of Applied Deep Learning. While a StyleGan2 might produce better results, it is probably not the best choice to start with, since the complexity is quite high.

The following implementation will be implemented using a tutorial to get an understanding of ProGANs. (Implementation: https://github.com/aladdinpersson/Machine-Learning-Collection/tree/master/ML/Pytorch/GANs/ProGAN — Tutorial: https://www.youtube.com/watch?v=nkQHASviYac) Furthermore, the paper *Progressive Growing of GANs for Improved Quality, Stability, and Variation* by Karras et al. will be studied to gain a deep comprehension of ProGANs. In the step „*Training and fine tuning the network“* other papers/implementations will be explored to get ideas on how to improve implementation of the ProGAN. (e.g. *GANSim: Conditional Facies Simulation Using an Improved Progressive Growing of Generative Adversarial Networks (GANs)* by *Song et al.)*
Different approaches will be tried, to see how they influence training time and results, like changing the activation functions or the type of convolutional layers.
In the last step, the goal is to build a demo application of the trained ProGAN using Docker.

Description of the dataset:

A big part of this project will be collecting and creating a new dataset. As far as I planned, the Google Chrome extension *Faktun* will be used to download images. A simple google image search for a range of contemporary artists will be done. For each artists the images will be downloaded. Next, the resulting artists folders will be viewed and non fitting images (e.g. photos of the artist or exhibitions) will be deleted manually. Afterwards, some images will be cropped manually (e.g. crop image inside a frame). In the end the pictures will be cropped to 512x512 which will be the input size of the pipeline.
Other sources might also be used.

The aim is to get between 1000 - 5000 images of contemporary artworks.

Work Breakdown - 3 ECTS = 75h

Task	Number of hours
Researching and writing of assignment 1	10
Dataset collection and preparation	15
Designing and building an appropriate network	10
Training and fine tuning the network	15

Building an application to present results	15
Writing final report	5
Preparation of Presentation	5
Overall	75

Sources:

Karras, T., Aila, T., Laine, S. and Lehtinen, J., 2017. Progressive growing of gans for improved quality, stability, and variation. *arXiv preprint arXiv:1710.10196*.

Song, S., Mukerji, T. and Hou, J., 2021. GANSim: Conditional facies simulation using an improved progressive growing of generative adversarial networks (GANs). *Mathematical Geosciences*, *53*(7), pp.1413-1444.