PROJECT PROPOSAL:
COSC3000: VISUALIZATION, COMPUTER GRAPHICS & DATA ANALYSIS

William E. G. Kvaale
University of Queensland
w.kvaale@uq.net.au
s46301303

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What

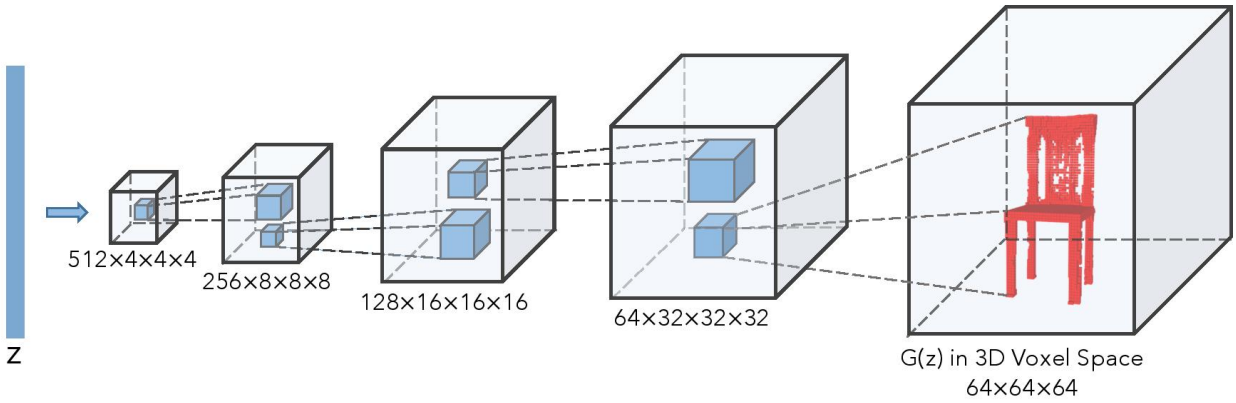

Figure 1: The generator of 3D Generative Adversarial Networks (3D-GAN)
Source: http://3dgan.csail.mit.edu/

For my computer graphics project, I would like to investigate Generative Adversarial Networks (GAN) and their applications in relation to textures, segmentation, colorization, resolution up-scaling and GPU-usage.

The goal of my project is not perfectly defined as of now, however, I am inspired by the paper *Learning a Probabilistic Latent Space of Object Shapes via 3D Generative-Adversarial Modeling* [1] from the researchers at MIT. One of the ideas I have is to attempt to render some 3D representations of handwritten digits from the MNIST dataset [2]. This is a current working idea, that might develop into something else, yet, still related to the learning objectives of the course.

Why

In the coming academic year 2020/2021 I will be writing my Computer Vision master thesis on what seems to involve GAN's in one way or another. Due to this I would like to capitalize on this opportunity on getting hands on experience with working on data and models, and become familiar with the concept of discriminator and generator.

How

I will use Python for my language of choice, and MNIST [2] as my datasource. Also, I will use the *Deferred Neural Rendering: Image Synthesis using Neural Textures* [3] paper in addition to the formentioned paper [1] as a great influence and direction for my project. BigGAN [4] and CycleGAN [5] will also be an inspiration for my project.

References

[1] Jiajun Wu et al. "Learning a probabilistic latent space of object shapes via 3d generative-adversarial modeling". In: *Advances in Neural Information Processing Systems*. 2016, pp. 82–90.

[2] Yann LeCun and Corinna Cortes. "MNIST handwritten digit database". In: (2010). URL: `http://yann.lecun.com/exdb/mnist/`.

[3] Justus Thies, Michael Zollhöfer, and Matthias Nießner. "Deferred Neural Rendering: Image Synthesis using Neural Textures". In: *ACM Transactions on Graphics 2019 (TOG)* (2019).

[4] Andrew Brock, Jeff Donahue, and Karen Simonyan. "Large Scale GAN Training for High Fidelity Natural Image Synthesis". In: *CoRR* abs/1809.11096 (2018). arXiv: `1809.11096`. URL: `http://arxiv.org/abs/1809.11096`.

[5] Jun-Yan Zhu et al. "Unpaired Image-to-Image Translation using Cycle-Consistent Adversarial Networks". In: *CoRR* abs/1703.10593 (2017). arXiv: `1703.10593`. URL: `http://arxiv.org/abs/1703.10593`.