



POLYTECHNIQUE
MONTRÉAL

LE GÉNIE
EN PREMIÈRE CLASSE

GAN lab

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GitHub: <https://github.com/TheDriller/GAN-Lab>

Handwritten Digits



1st experiment

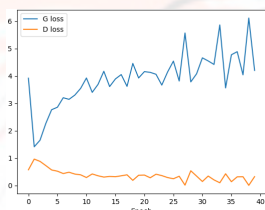
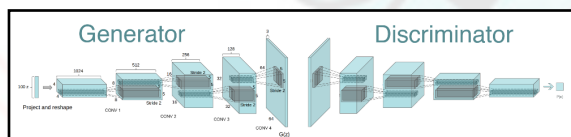
- Generate handwritten digits
- Easiest task to test basic GAN



MNIST [1]
60'000 black and white 64 x 64 images



Models are **convolutional networks**
Inspired by **DCGAN** [2]



Loss
(MNIST)

Latent
interpolation

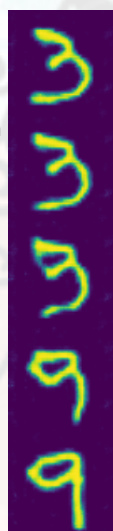
Real
numbers



Our generated
numbers



State of the
art DCGAN [3]



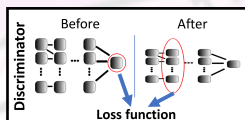
Epoch 1 Epoch 10 Epoch 20 Epoch 30 Epoch 40

Improvements
with time



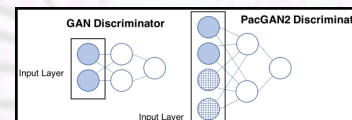
Goal : Train GANs to generate *artistic* and *creative* results
How ? Different GAN architectures and techniques over different datasets.
Included improvements to prevent **mode collapse**:

**Feature
matching**
Compute loss
based on
features



PacGAN2

Send 2 images at a
time of the same
class to the
discriminator



2nd experiment

- Use more complex dataset than experiment 1
- Use **different styles of painting** (cubism and impressionism)



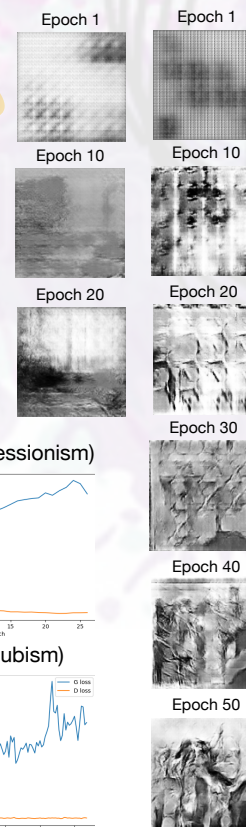
Painter by Numbers, Kaggle [4]
Images cropped to 128 x 128
Experimented with greyscale
Color will be explored later



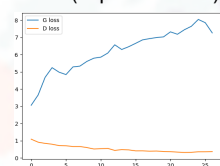
Same architecture as
experiment 1, based on
convolutional layers

Painting

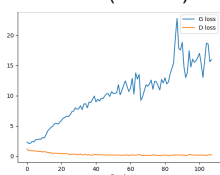
Improvements
with time



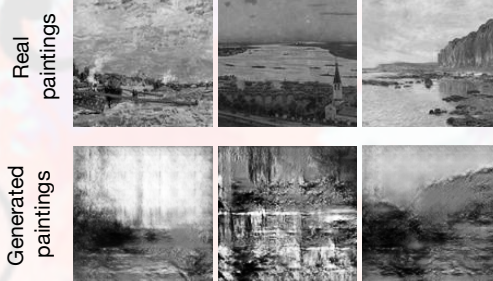
Loss (impressionism)



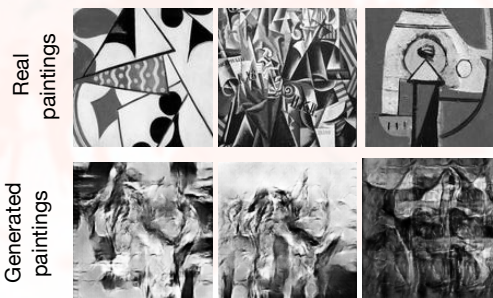
Loss (cubism)



Impressionism



Cubism



Music



3rd experiment

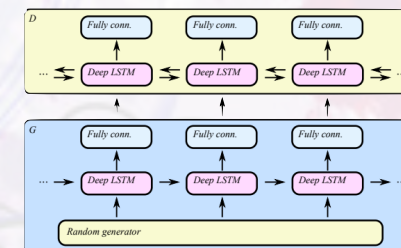
- Use art form less studied with GAN
- Use architecture appropriate for **temporal data**



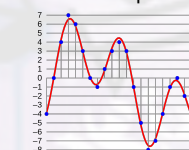
Dataset from **mfiles** [5]
193 classical mp3 songs, subsampled and
cut down to 10 seconds



Use basic **RNN** and **LSTM**
Inspired by **C-RNN-GAN** [6]

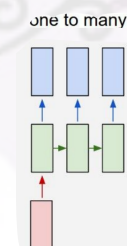


Music representation
Samples of the audio
wave as inputs

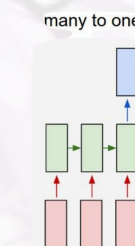


Scan me to
hear a training
sample

Generator



Discriminator



To be continued...

Références

- LeCan et al. (1999)
- <https://arxiv.org/abs/1511.06434>
- <https://github.com/zxn1wm/pytorch-MNIST-CelebA-GAN-DCGAN>
- <https://www.kaggle.com/c/painter-by-numbers>
- <https://www.mfiles.co.uk/classical-mp3.htm>
- <https://arxiv.org/abs/1611.09904>