POLYTECHNIQUE MONTRÉAL
LE GÉNIE EN PREMIÈRE CLASSE

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GANlab

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

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

Before / After
Discriminator
Loss function

PacGAN2
Send 2 images at a time of the same class to the discriminator

GAN Discriminator / PacGAN2 Discriminator
Input Layer
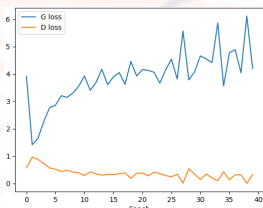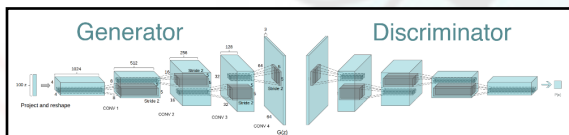
Handwritten Digits

1st experiment
- Generate handwritten digits
- Easiest task to test basic GAN

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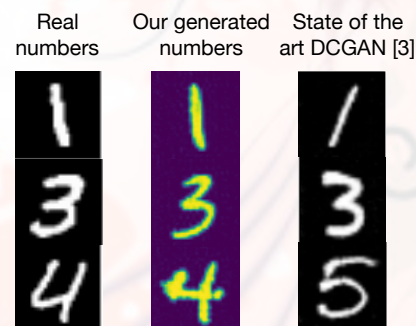60'000 black and white 64 x 64 images

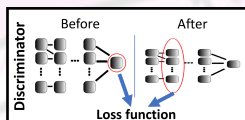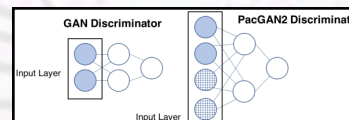Models are **convolutional networks**
Inspired by **DCGAN** [2]

Generator / Discriminator

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

Painting

2nd experiment
- Use more complex dataset than experiment 1
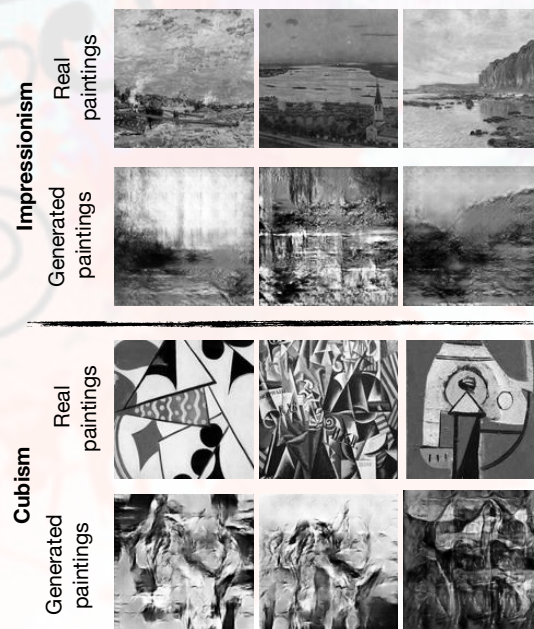- Use **different styles of painting** (cubism and impressionism)

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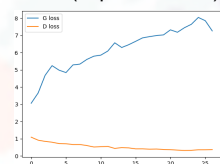Color will be explored later

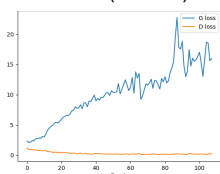Same architecture as experiment 1, based on **convolutional layers**

Improvements with time

Impressionism
Real paintings / Generated paintings

Cubism
Real paintings / Generated paintings

Epoch 1   Epoch 1
Epoch 10 Epoch 10
Epoch 20 Epoch 20
Epoch 30
Epoch 40
Epoch 50

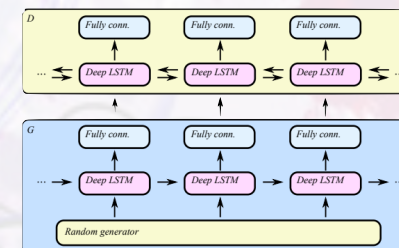Loss (impressionism)

Loss (cubism)

Music

3rd experiment
- Use art form less studied with GAN
- Use architecture appropriate for **temporal data**

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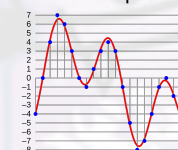193 classical mp3 songs, subsampled and cut down to 10 seconds

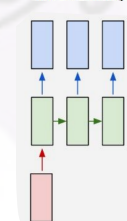Use basic **RNN** and **LSTM**
Inspired by **C-RNN-GAN** [6]

D — Fully conn. / Deep LSTM
G — Fully conn. / Deep LSTM
Random generator

Music representation
Samples of the audio wave as inputs

Generator
one to many

Discriminator
many to one

Scan me to hear a training sample
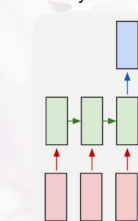
To be continued...

Références
1. LeCun et al. (1999)
2. https://arxiv.org/abs/1511.06434
3. https://github.com/znxlwm/pytorch-MNIST-CelebA-GAN-DCGAN
4. https://www.kaggle.com/c/painter-by-numbers
5. https://www.mfiles.co.uk/classical-mp3.htm
6. https://arxiv.org/abs/1611.09904