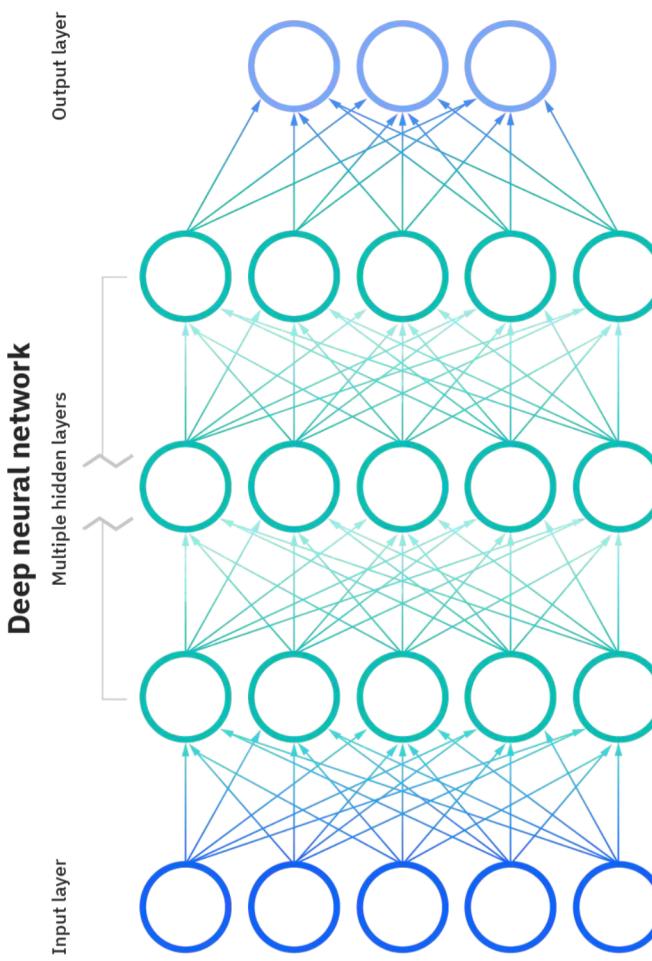


Reading Club

An application of neural network to art and NFT : the GAN

Clément Broutin, Nathan Vergé
Students at INP ENSEEIHT

What is a neural network ?



Definition : machine learning technologies that aim to imitate the human neural networks.

Perceptron model : Linear combination of inputs + threshold function.

-> Examples available on this website
<https://playground.tensorflow.org/>

From Neural Networks, ibm.com

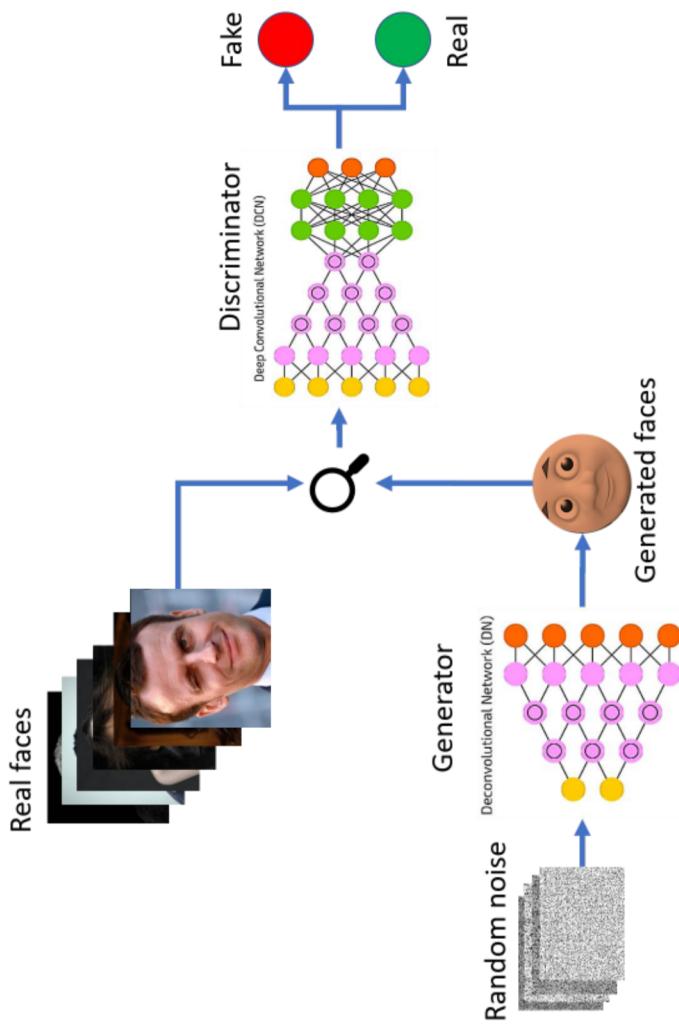
The GAN

GAN = Generative adversarial networks

Composed of 2 networks :

- **Generator neural network** : create realistic fake images.
- **Discriminator neural network** : distinguish real and fake images.

Objective : generator must fool the discriminator.



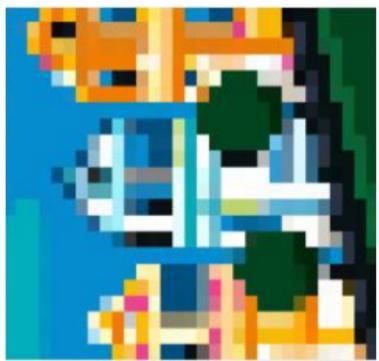
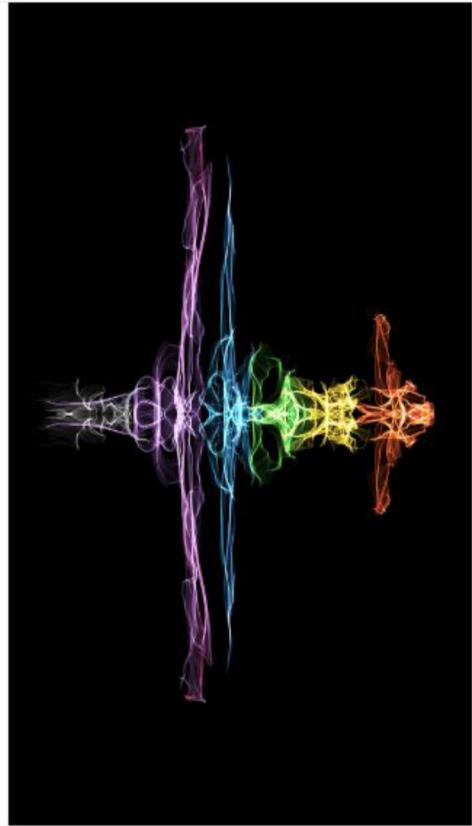
From Generative adversarial networks: when the machine learning is a game, spindox.it

Image dataset used to train the GAN

~ 3000 images

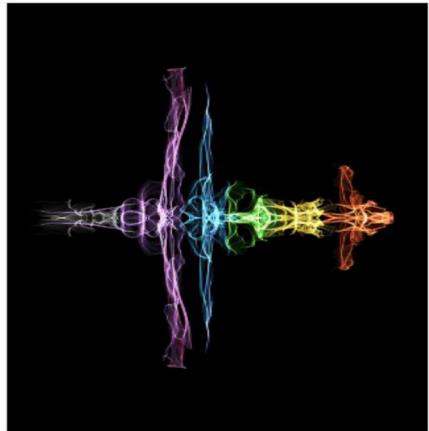
Variable size and resolution
(10kB - 30MB)

Portrait and landscape
formats

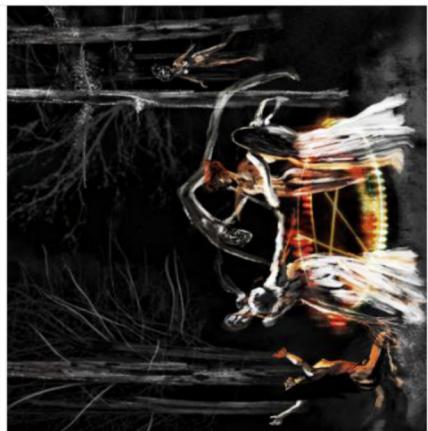


Dataset transformation

- Small images removed
- Other images turned into squares (not cropped) and then reduced to a reasonable size

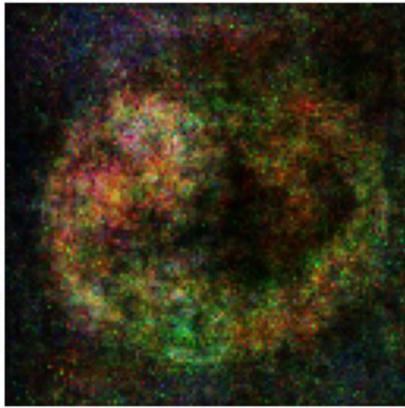


All remaining images are 128x128 pixels



1st Generator : Results after 30k epochs

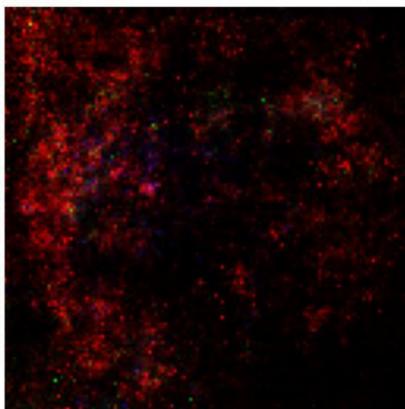
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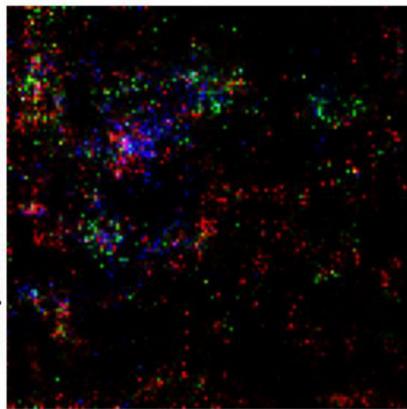
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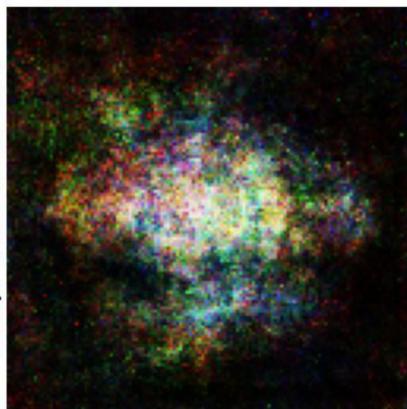
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validity : 0.028548339381814003

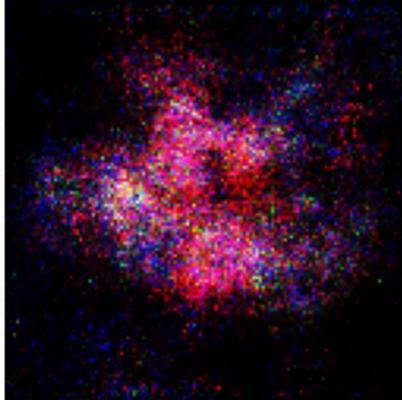


validity : 0.09582026302814484

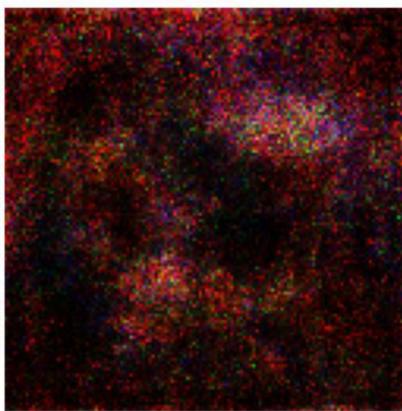


2nd Generator : Results after 5k epochs

validity : 0.017193783074617386



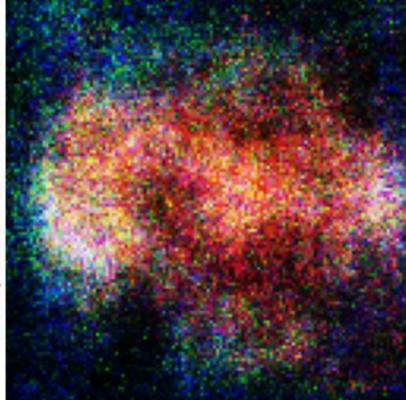
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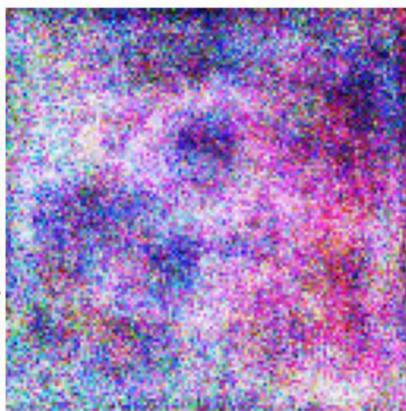
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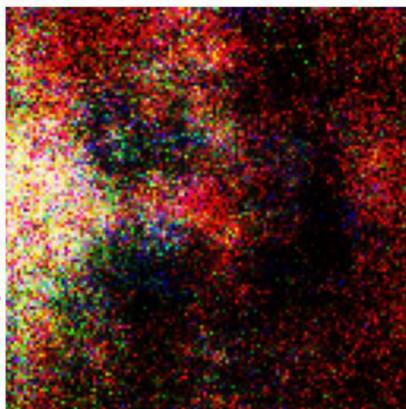
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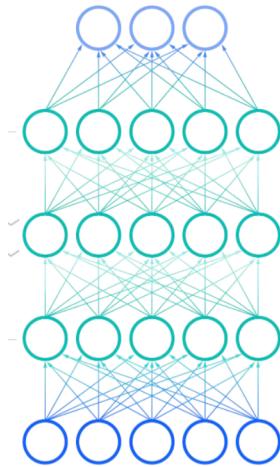
validity : 0.7766873240470886



validity : 0.05096956342458725



Potential improvements



- Training our GAN algorithm on another dataset
(10,000 images with the *same* graphic style)
- Change the neural networks architecture
- Add another treatment (try to remove the noise)

References

- A Beginner's Guide to Generative Adversarial Networks (GANs)
<https://wiki.pathmind.com/generative-adversarial-network-gan>
- Website used to create online neural networks
<https://playground.tensorflow.org/>
- The dataset we used, “NFT art collection 2021” available on
<https://www.kaggle.com/datasets/vepnar/nft-art-dataset>