



<https://www.midjourney.com/>



$$\overline{\partial \mathbf{x}}^f(\mathbf{x})$$

Geometry, materials, poses, ...

<https://www.mitsuba-renderer.org/>



today's topic.

Change pose, haircut, crossbreeding,
lighting, environment

Change pose, haircut, crossbreeding,
lighting, environment



Antic, 2020

these images have in common (ears, tail...)

Our models will have **similar structure** (generation + inference)

explicitly defining it.

WGAN

- **Unsupervised representation learning:** We should be able to learn what these images have in common, e.g., ears, tail, etc. (*features*)

- Glow
- Ffjord

Figure copyright and adapted from Ian Goodfellow, Tutorial on Generative Adversarial Networks, 2017.

- Glow
- Ffjord

Figure copyright and adapted from Ian Goodfellow, Tutorial on Generative Adversarial Networks, 2017.



TREE
SKY



These images are [CC0 public domain](#)



- Glow
- Ffjord

Figure copyright and adapted from Ian Goodfellow, Tutorial on Generative Adversarial Networks, 2017.



Input data



Input data



Input data



Input data



Input data

Input data

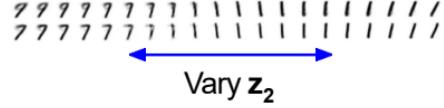
Input data

Input data



Input data

<https://www.jeremyjordan.me/variational-autoencoders/>



Input Data

x



Head pose

Input Data

x

- Glow
- Ffjord

Figure copyright and adapted from Ian Goodfellow, Tutorial on Generative Adversarial Networks, 2017.

- Samples are blurrier and lower quality than e.g. GANs, diffusion models

Input Data

x

Input: Random noise

z

Input: Random noise

z

Input: Random noise

z



But gradient in this
region is relatively flat!



for bad samples => works much better! Standard in practice.



Arjovsky et al. "Wasserstein GAN." arXiv preprint arXiv:1701.07875 (2017)

Berthelot, et al. "Began: Boundary equilibrium generative adversarial networks." arXiv preprint arXiv:1703.10717 (2017)



Real data



Fake data



Real data



Fake data



Real data



Fake data



Real data



Fake data



Real data



Fake data



Real data



Fake data



Real data



Fake data



Real data



Fake data



Real data



Fake data



Real data



Fake data



Real data



Fake data



Real data



Fake data



Real data



Fake data



Real data



Fake data



Real data



Fake data



Real data



Fake data







Karras et al.,Arxiv 2018.

