Generative Models

Chris Gruber

What is a generative model?

Model that learns from data and produces synthetic data as output

Train

Model

Generate

Where are generative models actually used?

Supplementing existing datasets

Image augmentation: colorization, resolution improvement, inpainting

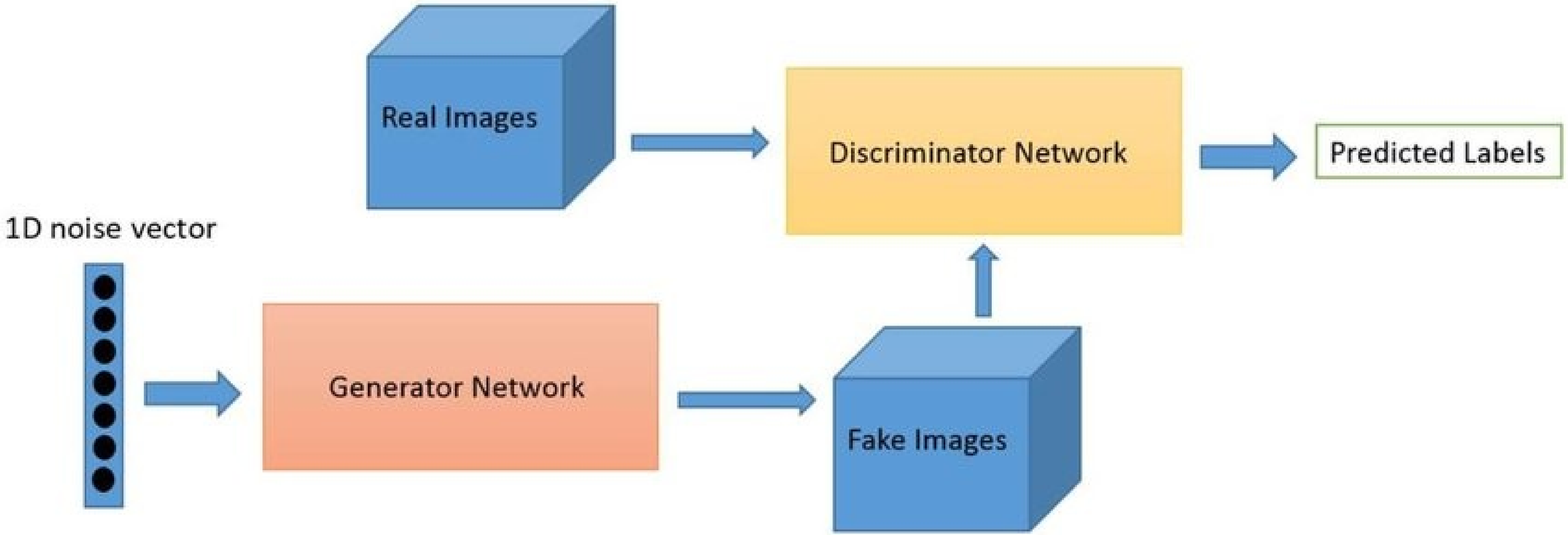
Photo manipulation: simulated face aging, feature transfer

Security and fraud detection

Deep fakes

Style transfer

Generative Adversarial Network Schematic



Why are generative models hard to train?

Instability – the generator and discriminator parameters diverge

“Mode collapse” – the generator only learns some features of the dataset

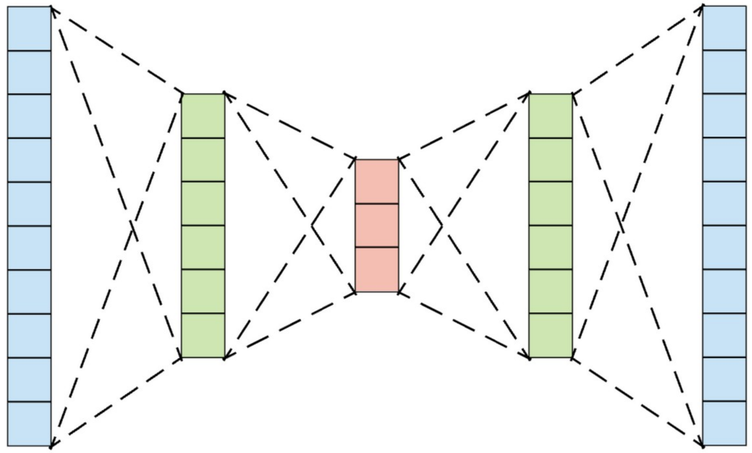
Weak gradients – the gradient descent algorithm breaks down

How do generative models intersect with neural networks?

Neural autoencoders

Generating synthetic images

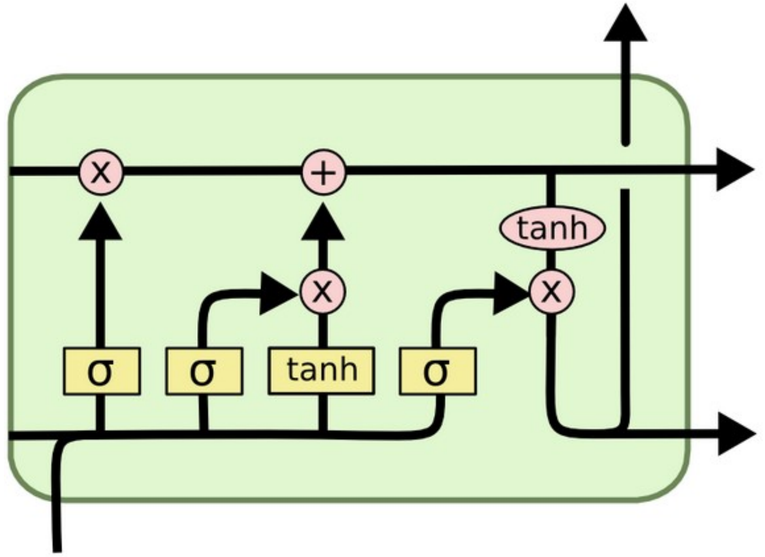
Automated language translation



Recursive and convolutional networks

Generating synthetic text

Image manipulation and augmentation



Resources and References

Articles and guides

- Tour of various GAN architectures
- Recommended intermediate reference

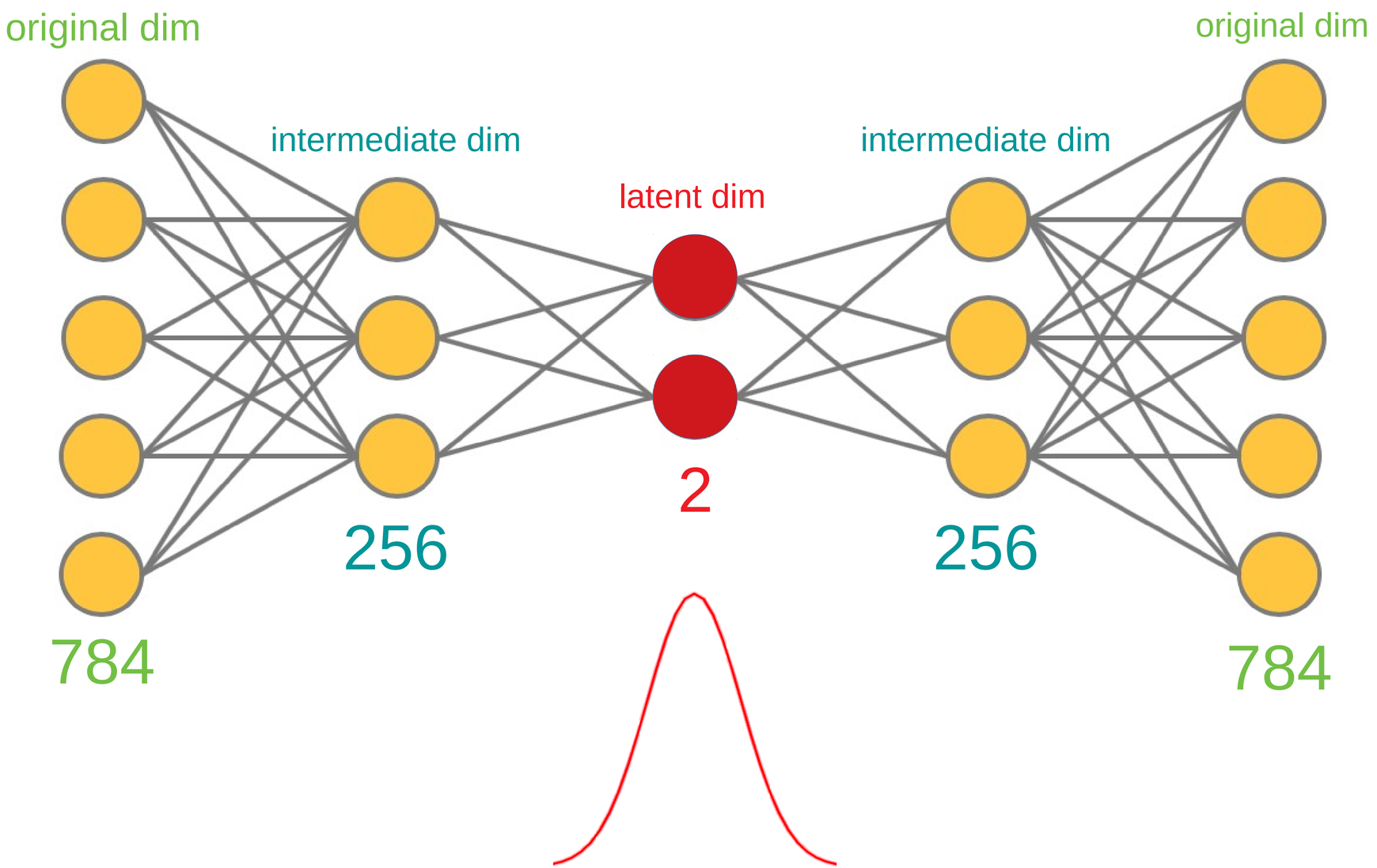
Academic papers

- Review paper of GANs from an academic lens
- Paper on training GANs

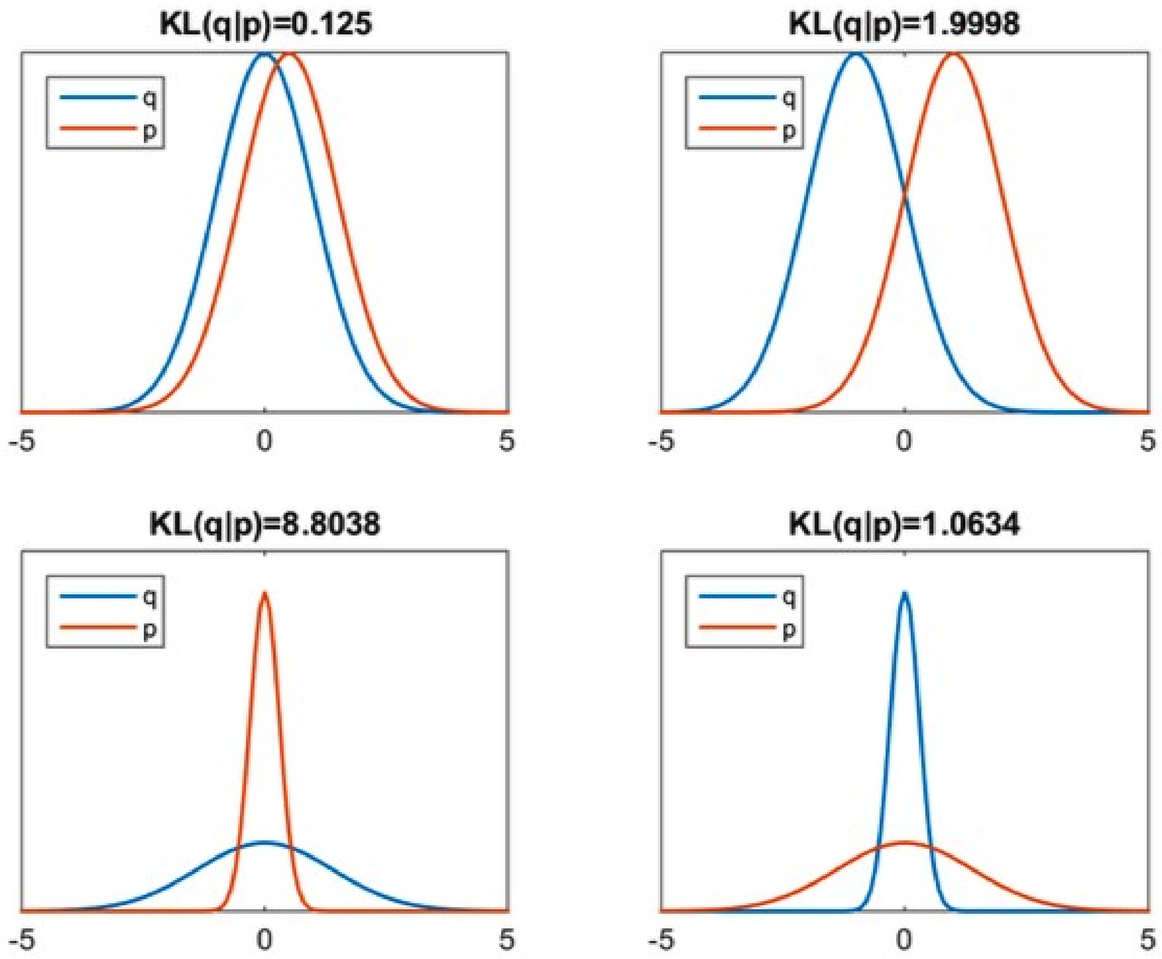
Tools and training

- GANLab: an interactive tool to learn about GANs
- GAN Dissection: MIT's interactive GAN painting tool

DEMO – Variational Autoencoder



DEMO – Variational Autoencoder

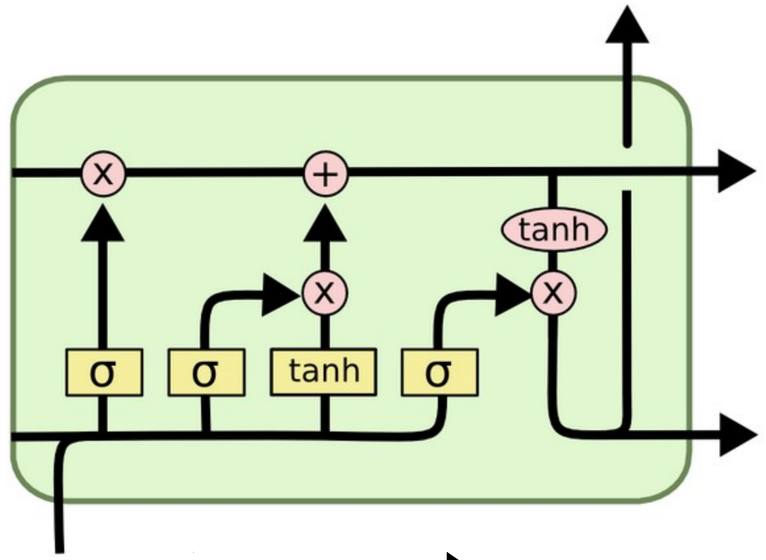


DEMO – Text Generation

Feed a sequence of letters into an LSTM network to generate text

time

one_letter_at_a
ne_letter_at_a_
e_letter_at_a_t
_letter_at_a_ti
letter_at_a_tim



prediction

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Thanks!

https://github.com/ChristopherGruber/Generative_Models