Deep Generative Models

Chapter 4: Generative Adversarial Networks

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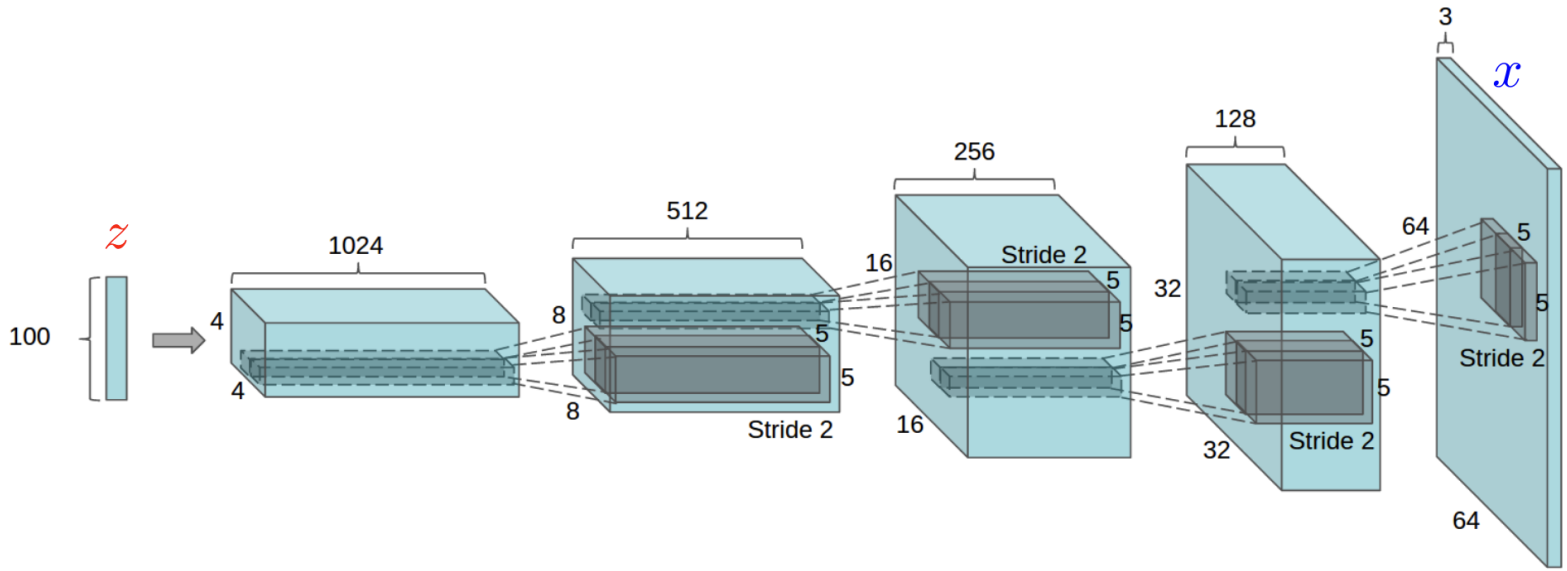
Deep Convolutional GAN: *Generator*

DCGAN was one of basic architectures with a deep CNN generator[1]



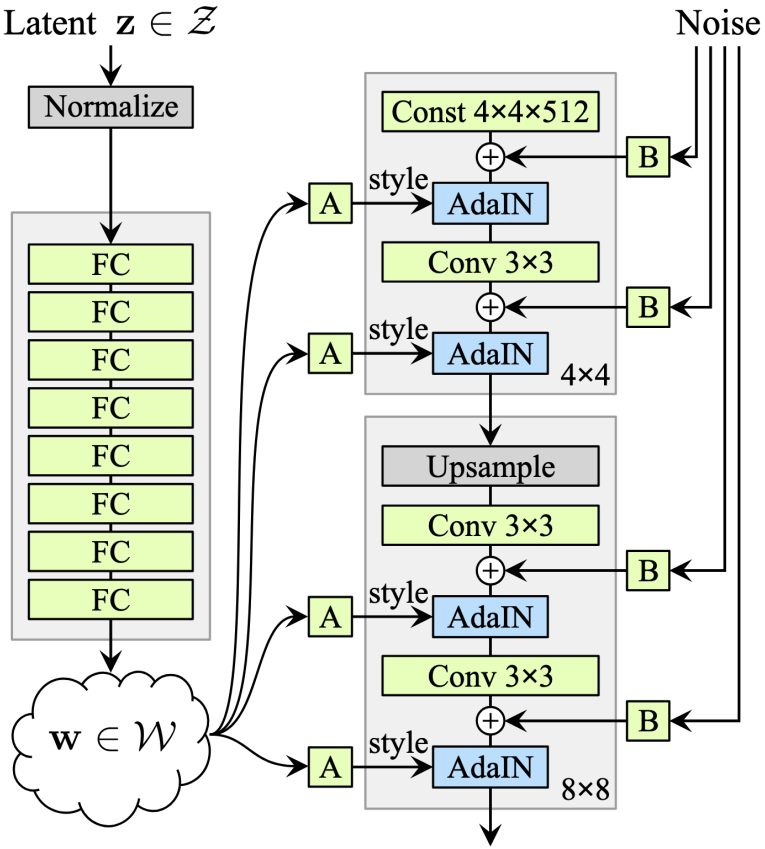
- *It uses vanilla GAN to train*
- *A CNN discriminator is used with Sigmoid output*

[1] Proposed in 2016

DCGAN: *Sample Outputs*

Style GAN: *Generator*

Style GAN uses a more advanced generator[2]

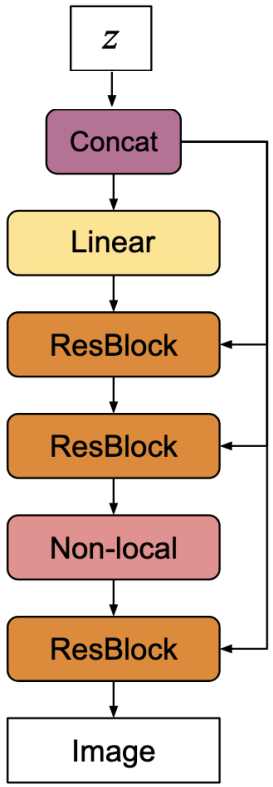


[2] Proposed in 2018

Style GAN: *Sample Outputs*

BigGAN: *Generator*

BigGAN uses residual blocks to build deeper generator[3]

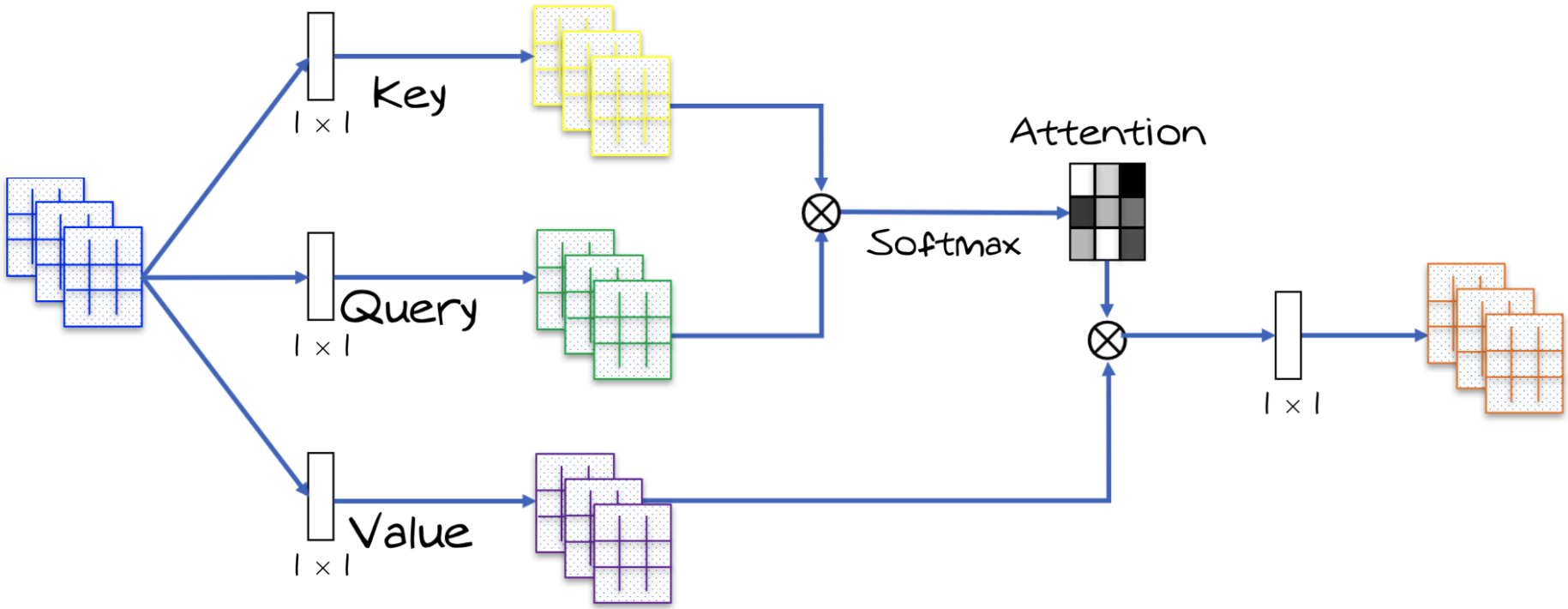


[3] Proposed in 2019

BigGAN: *Sample Outputs*

SAGAN: *Generator*

Self-Attention GAN uses attention mechanism at generator[4]



[4] Proposed in 2019

SAGAN: *Sample Outputs*

Wrap Up

GANs use adversarial networks for generation

- *Sampling is similar to flow-based models*
  - ↳ *It is very fast and simple*
  - ↳ *Latent is typically Gaussian*
- *For training, we solve a min-max game*
  - ↳ *Vanilla min-max ≡ implicit MLE*
  - ↳ *Wasserstein min-max ≡ implicit Wasserstein distance minimization*

GANs have been a real breakthrough

- *They are still being state-of-the-art*
- *They are pretty straightforward to implement*

Next Stop: Indirect distribution learning by variational inference