Generative Adversarial Networks
Models That Create

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kaggle

#ODSC

WHAT IS A GAN?

Generative vs Discriminative Models

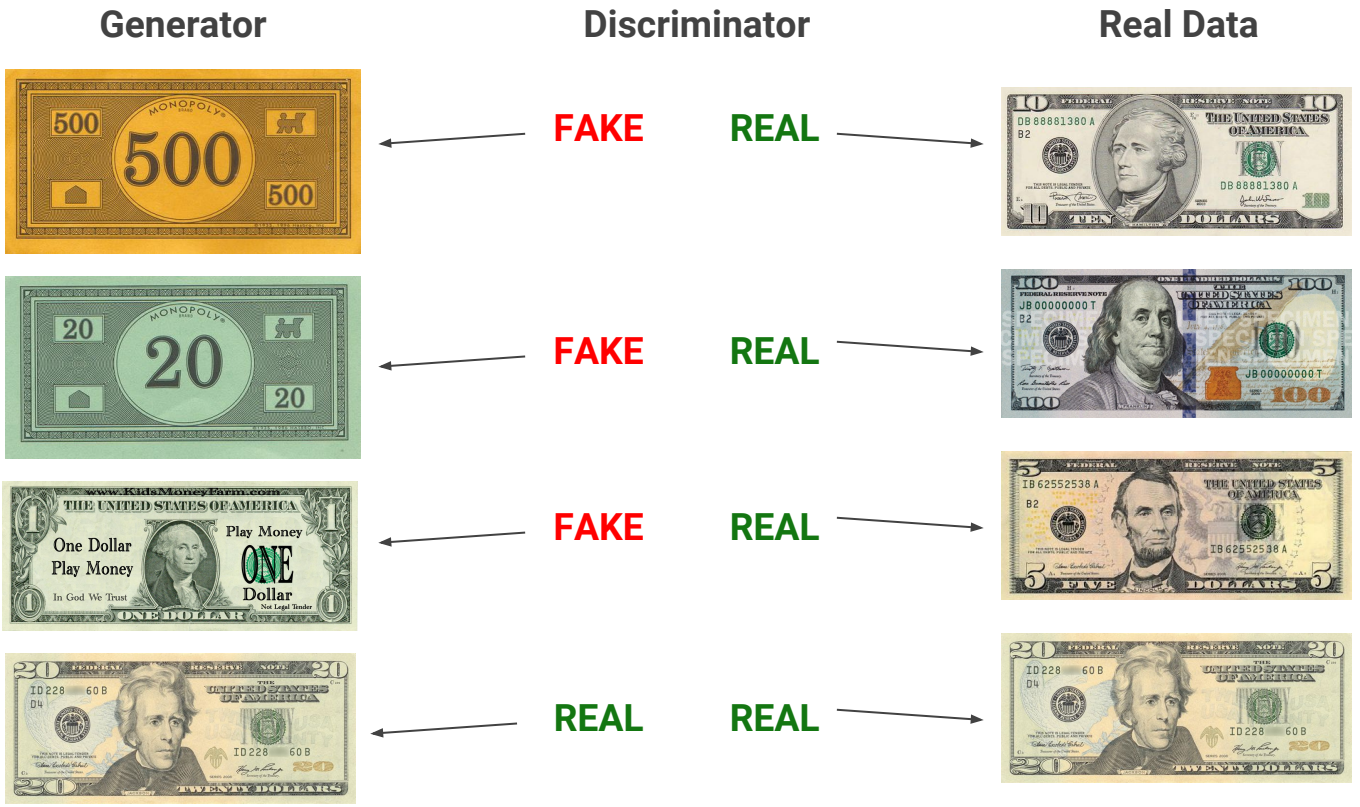
D:

A dog

G:

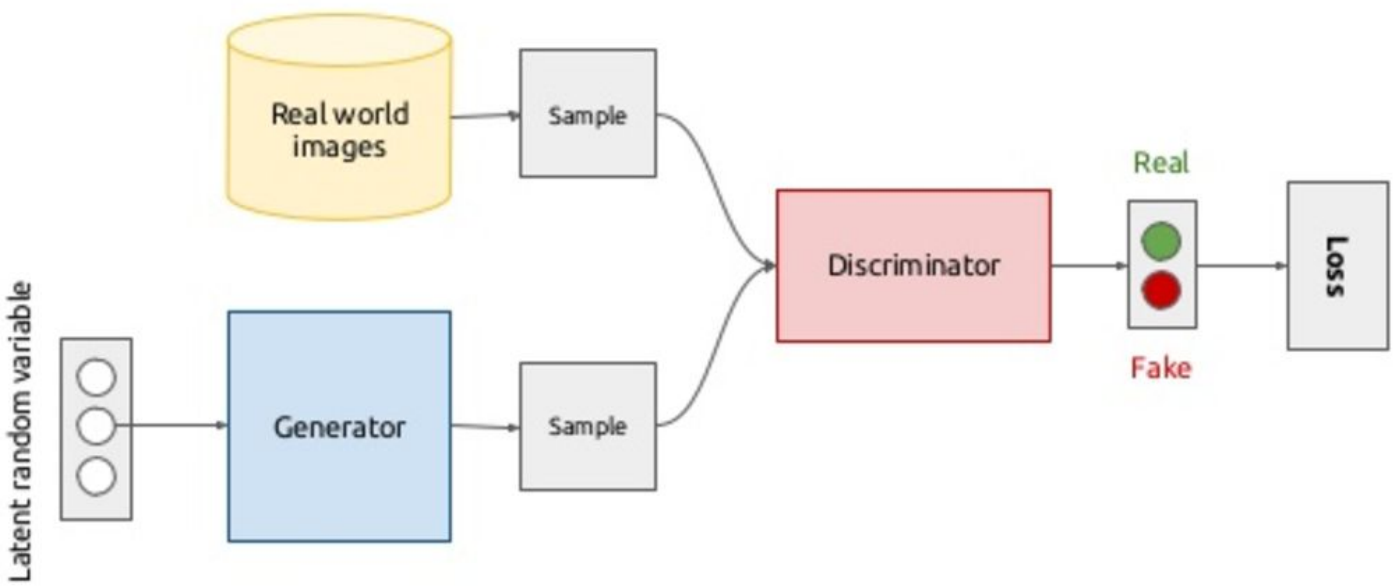
A dog

Intuition for GANs

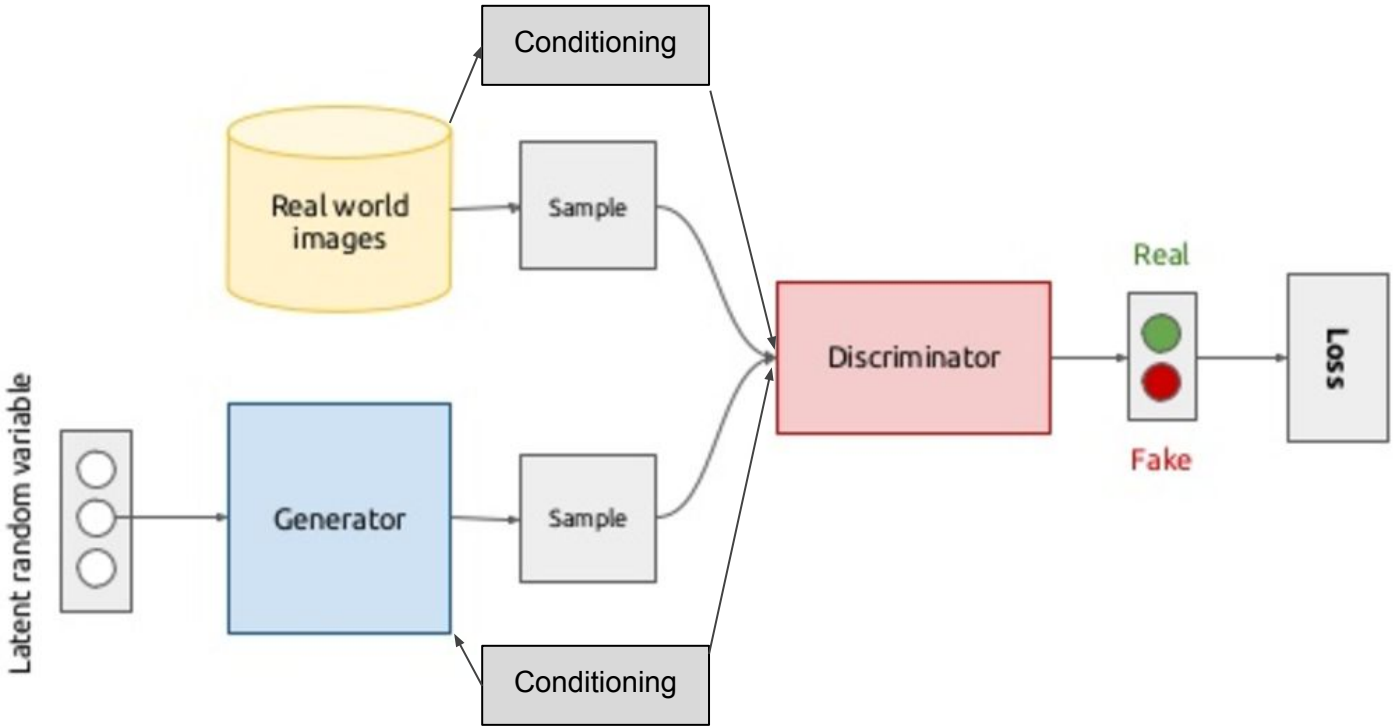


GAN Structure

- Data distribution
- Noise distribution
- Generator
- Discriminator



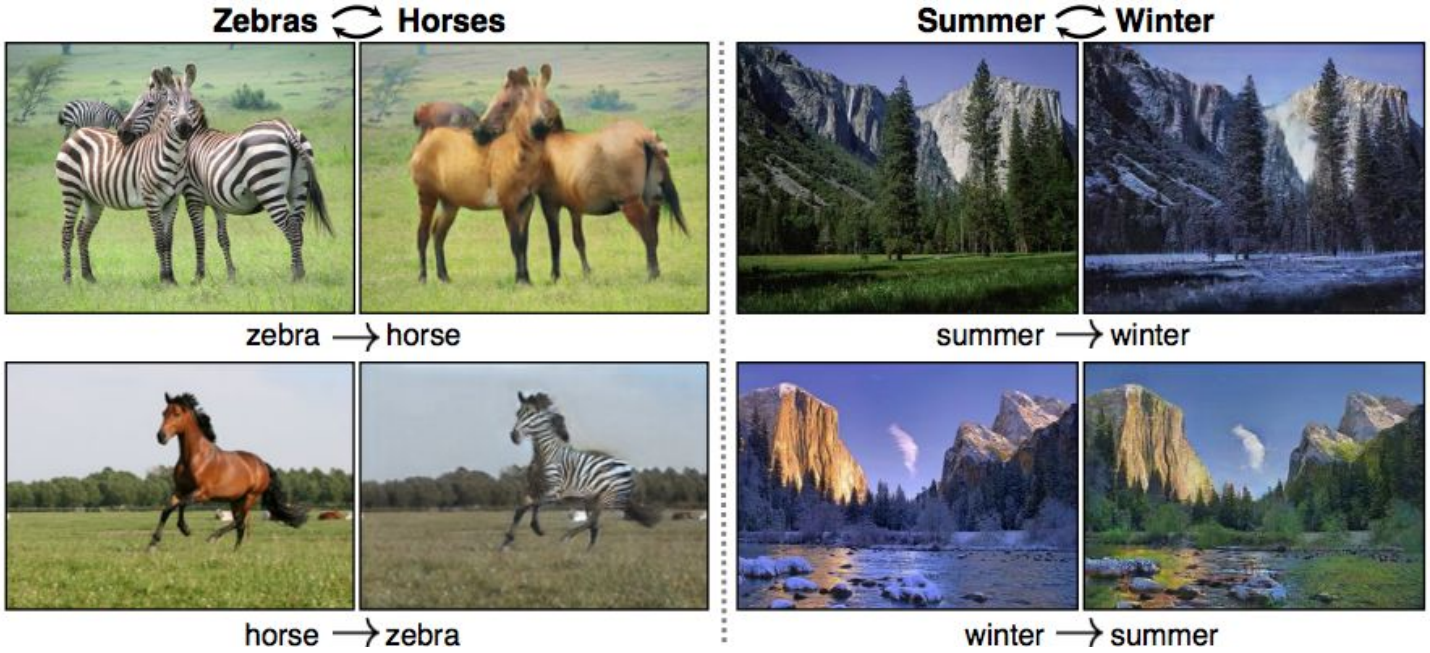
Conditional GANs



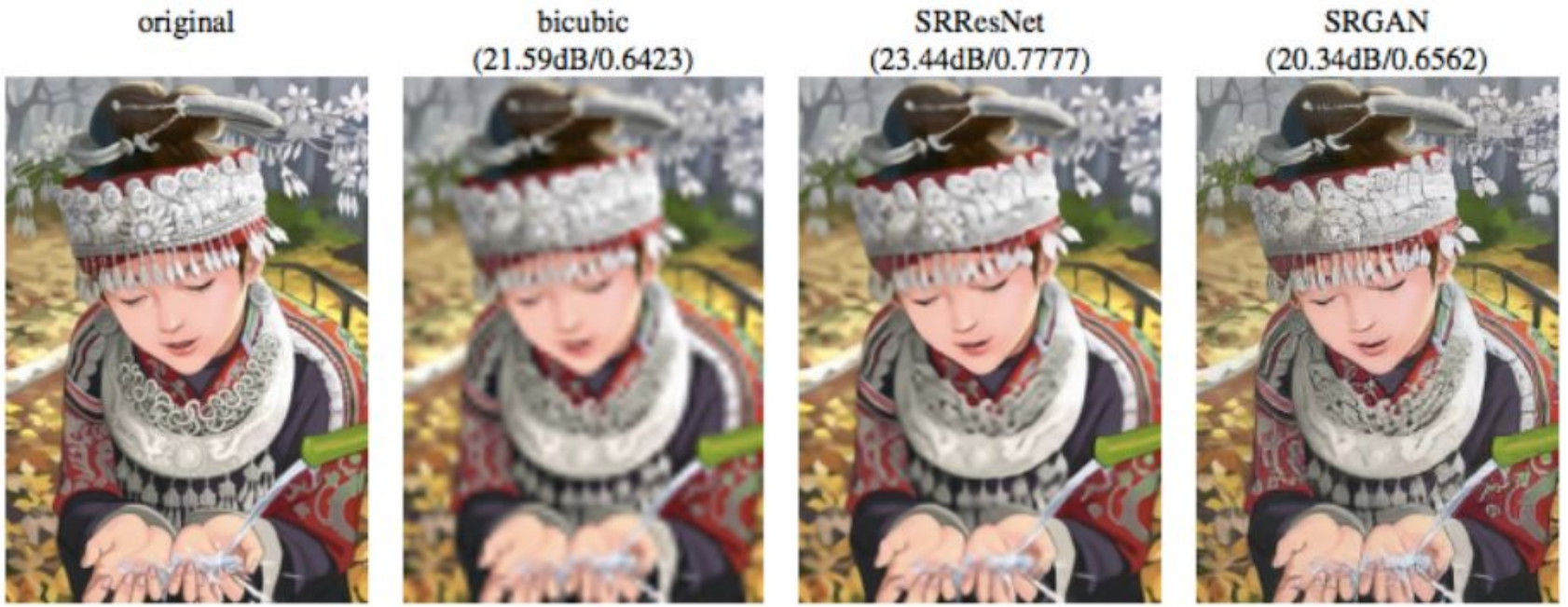
EXAMPLE APPLICATIONS

Image to Image Translation (Isola et al, 2016)

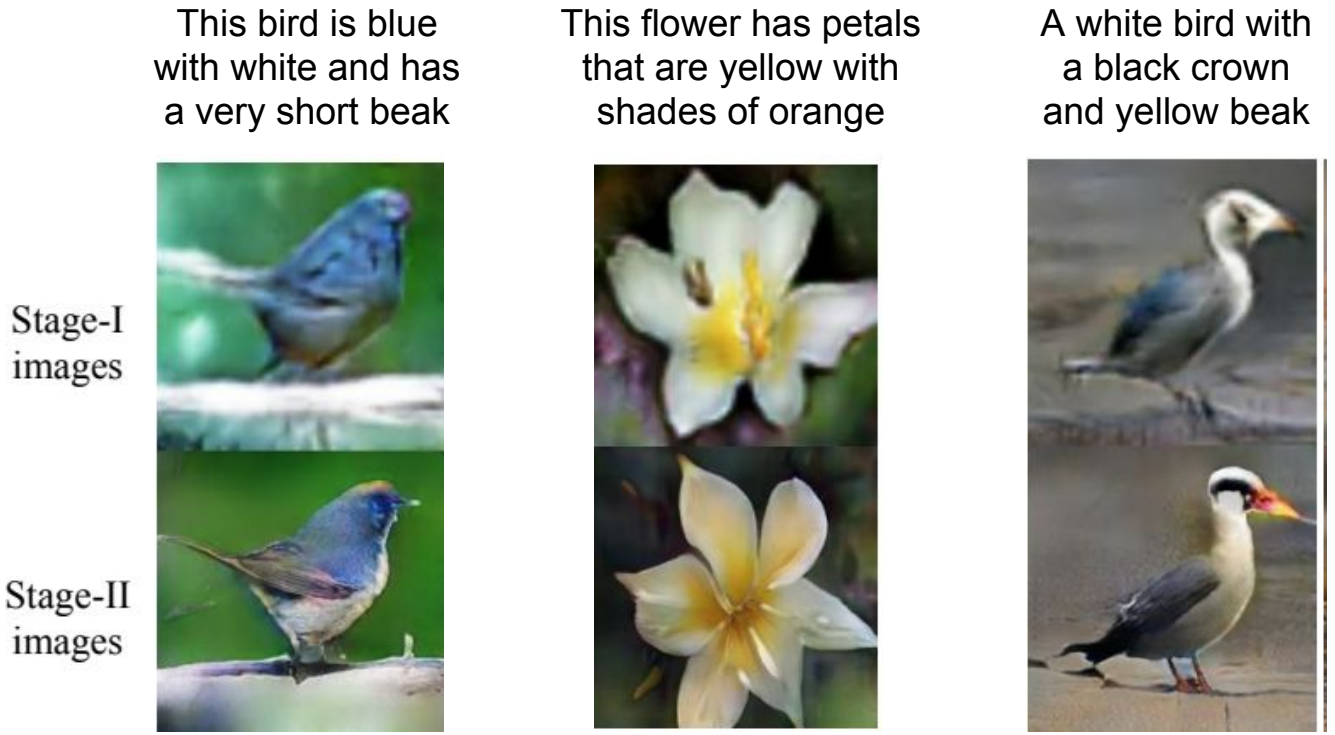
Unpaired Image Translation (Zhu et al, 2017)



Superresolution (Ledig et al, 2016)



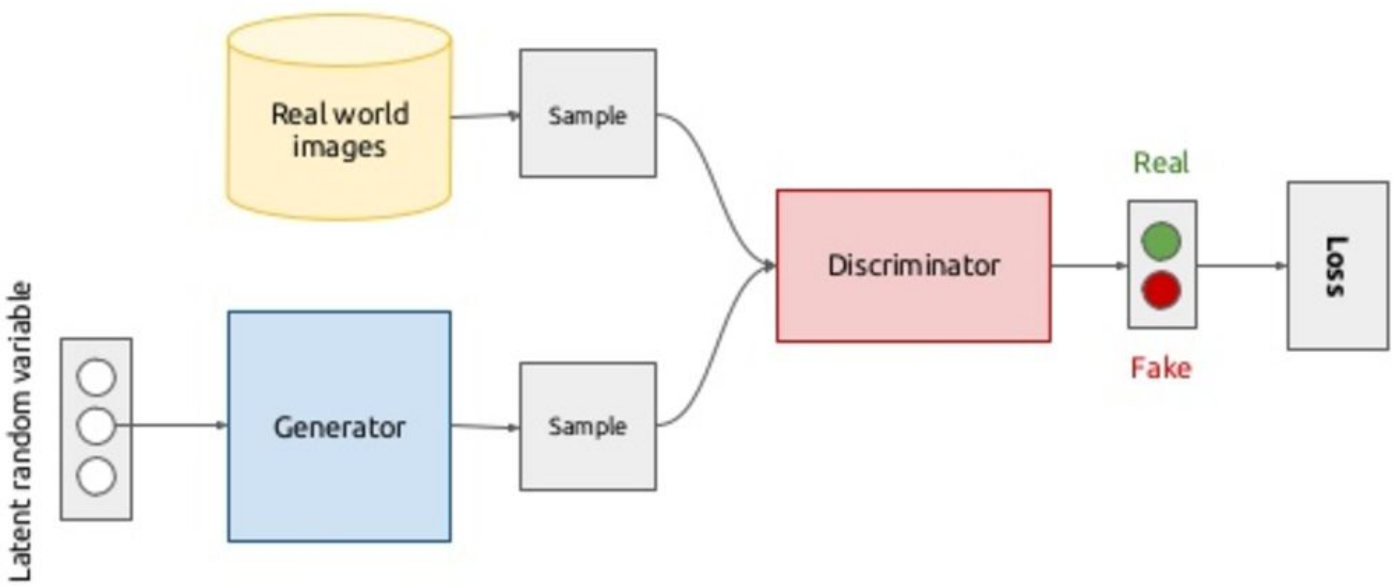
Text-to-image Synthesis (Zhang et al, 2016)



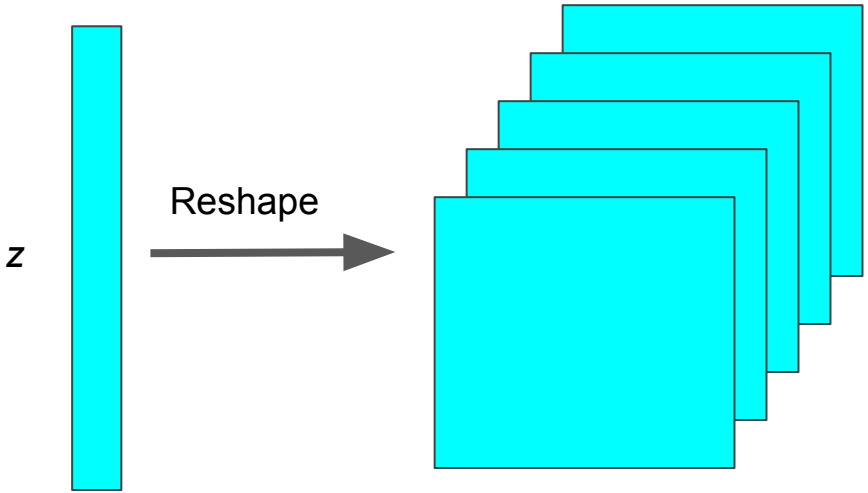
Google Photos Demo (2017)

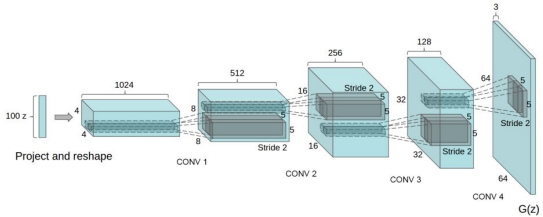
THE GENERATOR

GAN Structure

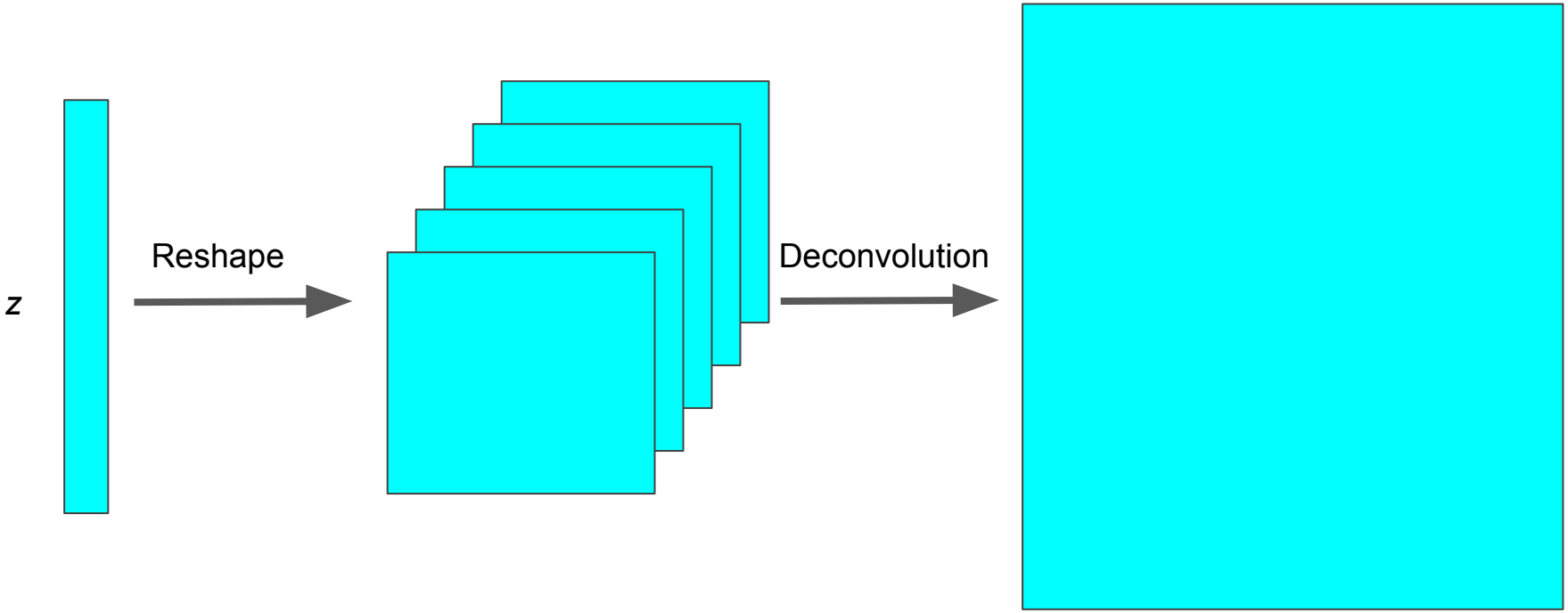


Deconvolutions and The Generator

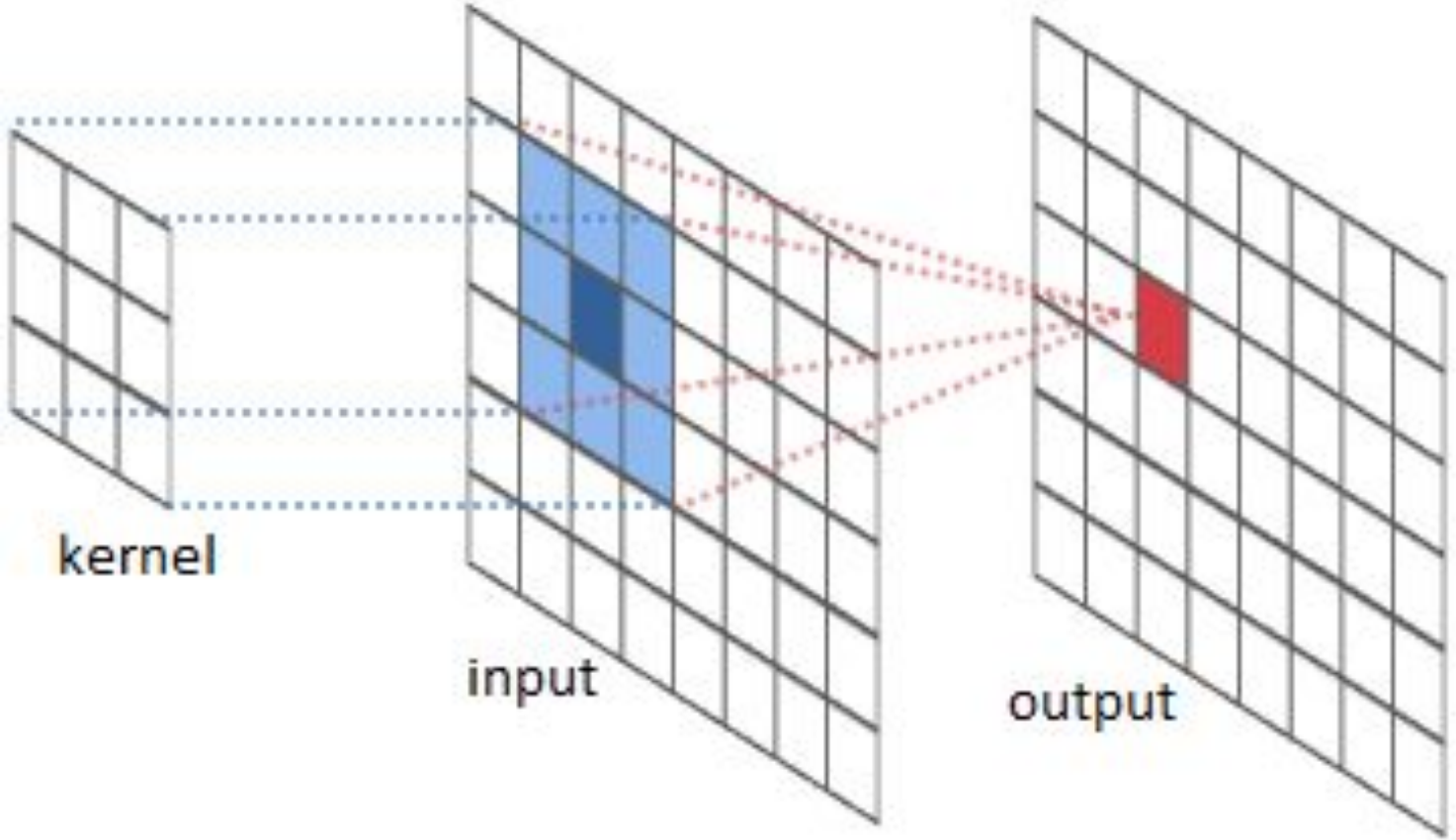




Deconvolutions and The Generator



Convolution Review



Convolution Review

Image

200	**200**	**...**	**...**	**...**
0	**0**	**...**	**...**	**...**
...	**...**	**...**	**...**	**...**
...	**...**	**...**	**...**	**...**
...	**...**	**...**	**...**	**...**

Convolution

1.5	1.5
-1.5	-1.5

Output

600	?
?	?

Deconvolution (Transposed Convolution)

Image

200	...	...	...	...
...	...	...	...	...
...	...	...	...	...
...	...	...	...	...
...	...	...	...	...

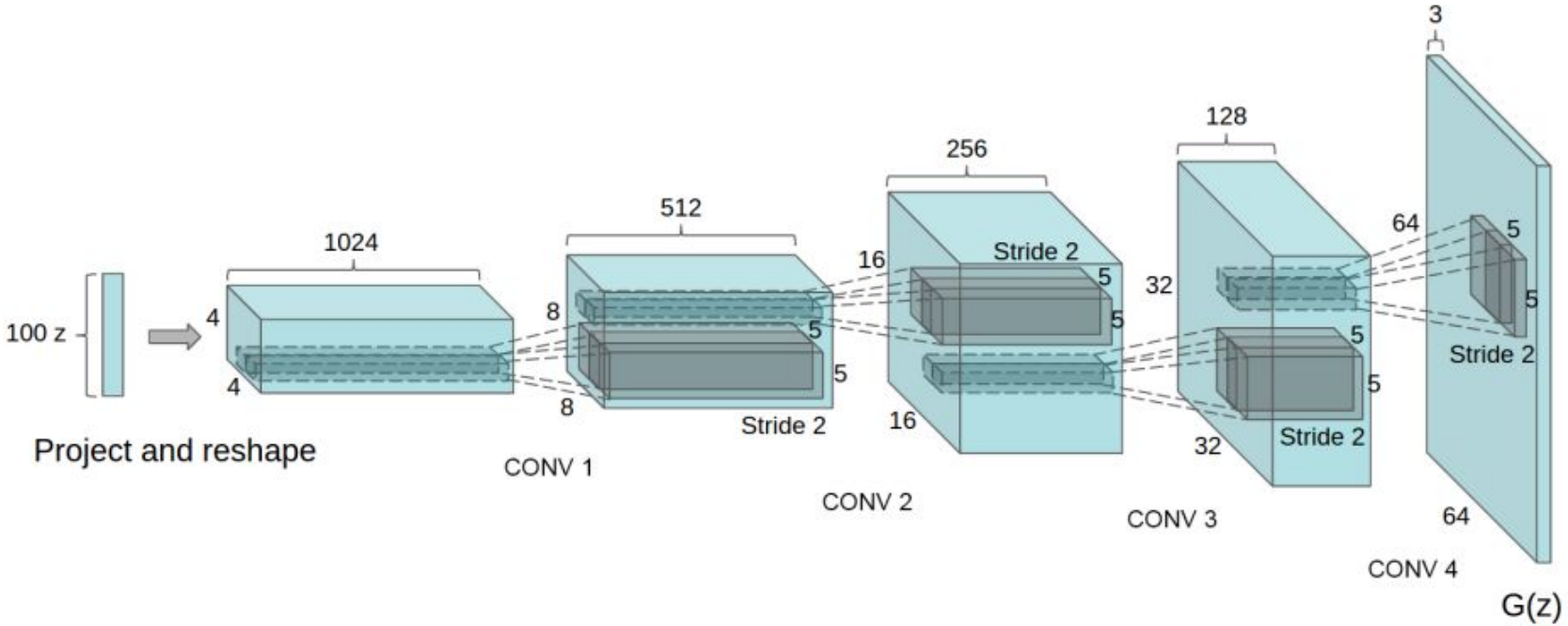
Convolution

1.5	1.5
-1.5	-1.5

Output

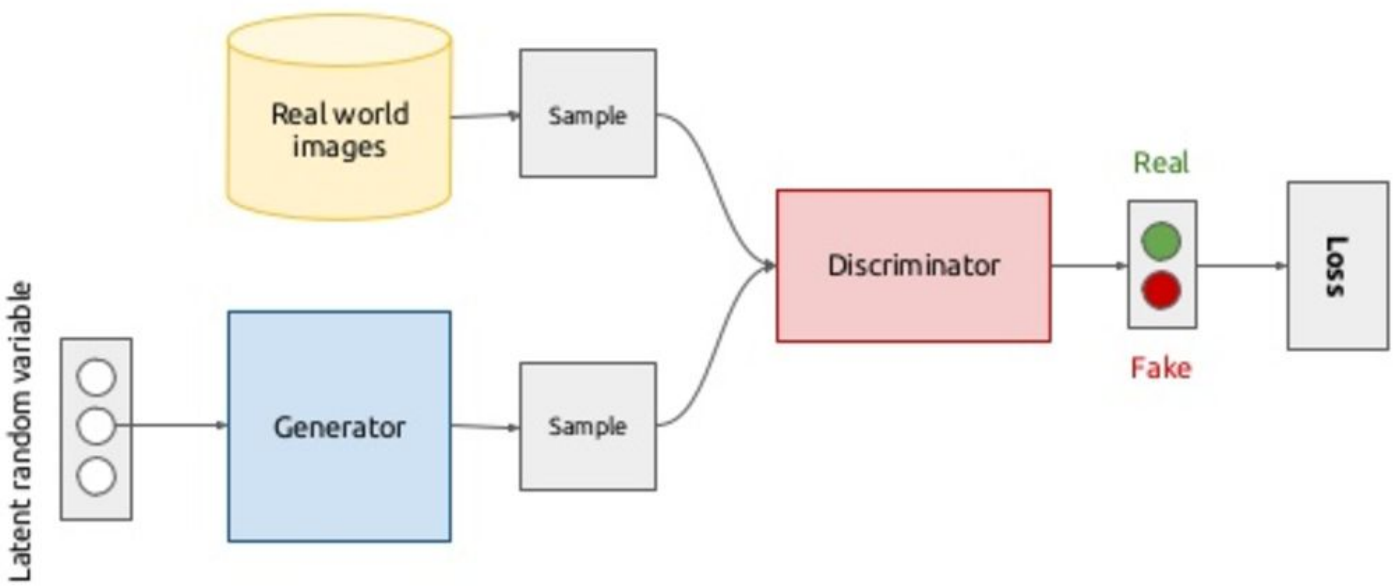
300	300	?
-300	-300	?
?	?	?

Generator (Radford et al, 2015)



THE DISCRIMINATOR

GAN Structure



Discriminator

- Standard classifier architecture

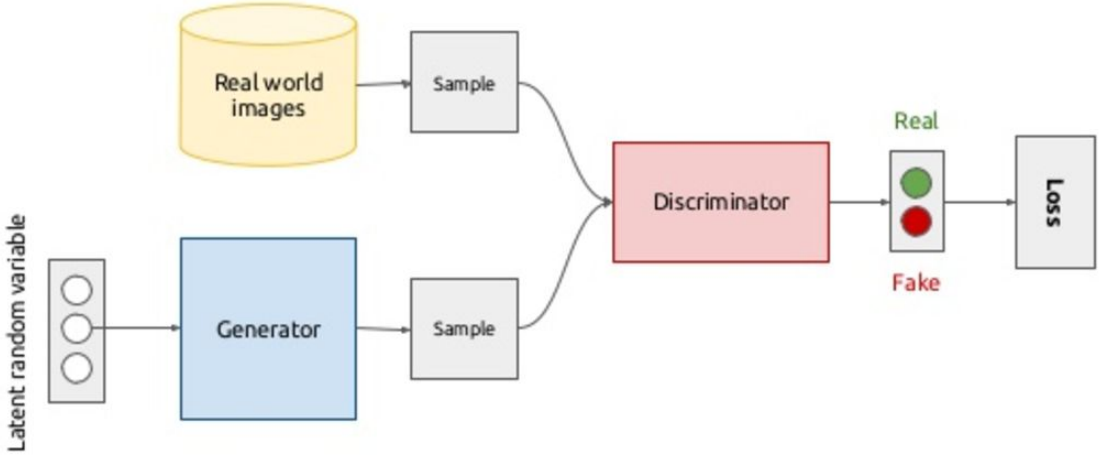
- Perceptual Quality

CODING

TFGAN - A Framework for Training GANs

You Specify

- Generator and Discriminator Models
- Real data and random noise
- Loss Functions
- Optimizer Settings
- Training Sequence

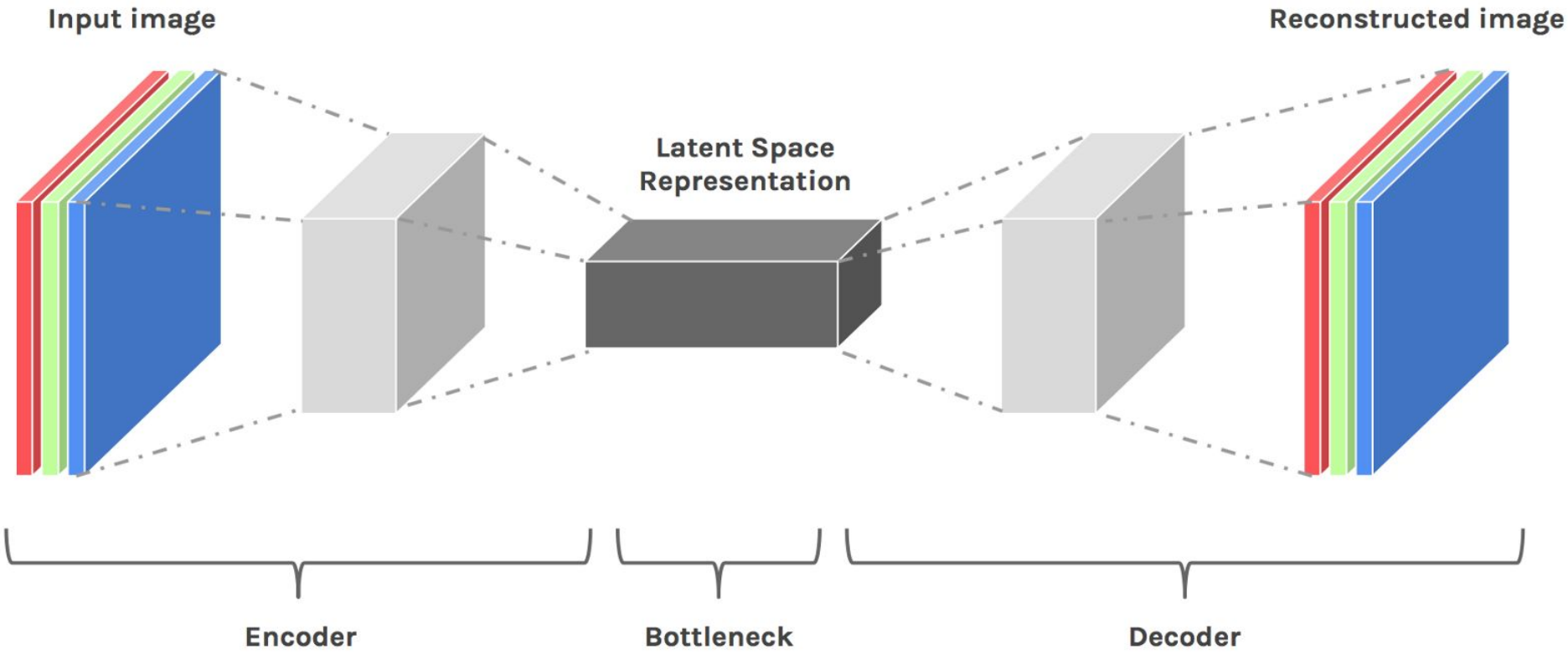


Hands-On Coding

- https://www.kaggle.com/dansbecker/running-your-first-gan
- https://www.kaggle.com/dansbecker/conditional-gans
- Pix2Pix

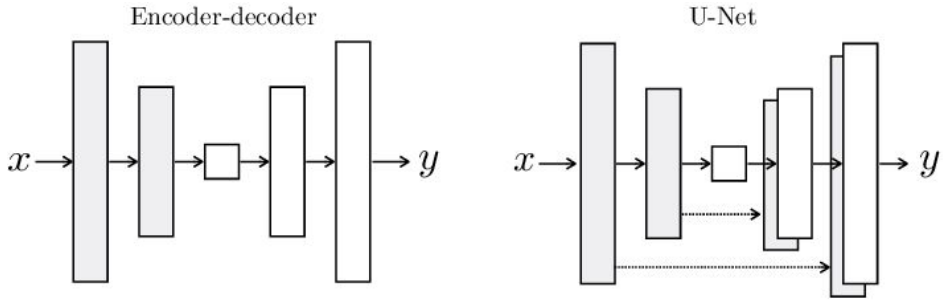
- https://github.com/Kaggle/learntools/tree/master/learntools/gans

Encoder-Decoder Framework



What Next

- Bigger Networks
- U-Net
- PatchGan



- CycleGan
- Creative/Interesting Applications

It's a fast-developing field. reddit.com/r/machinelearning is a good resource for new research