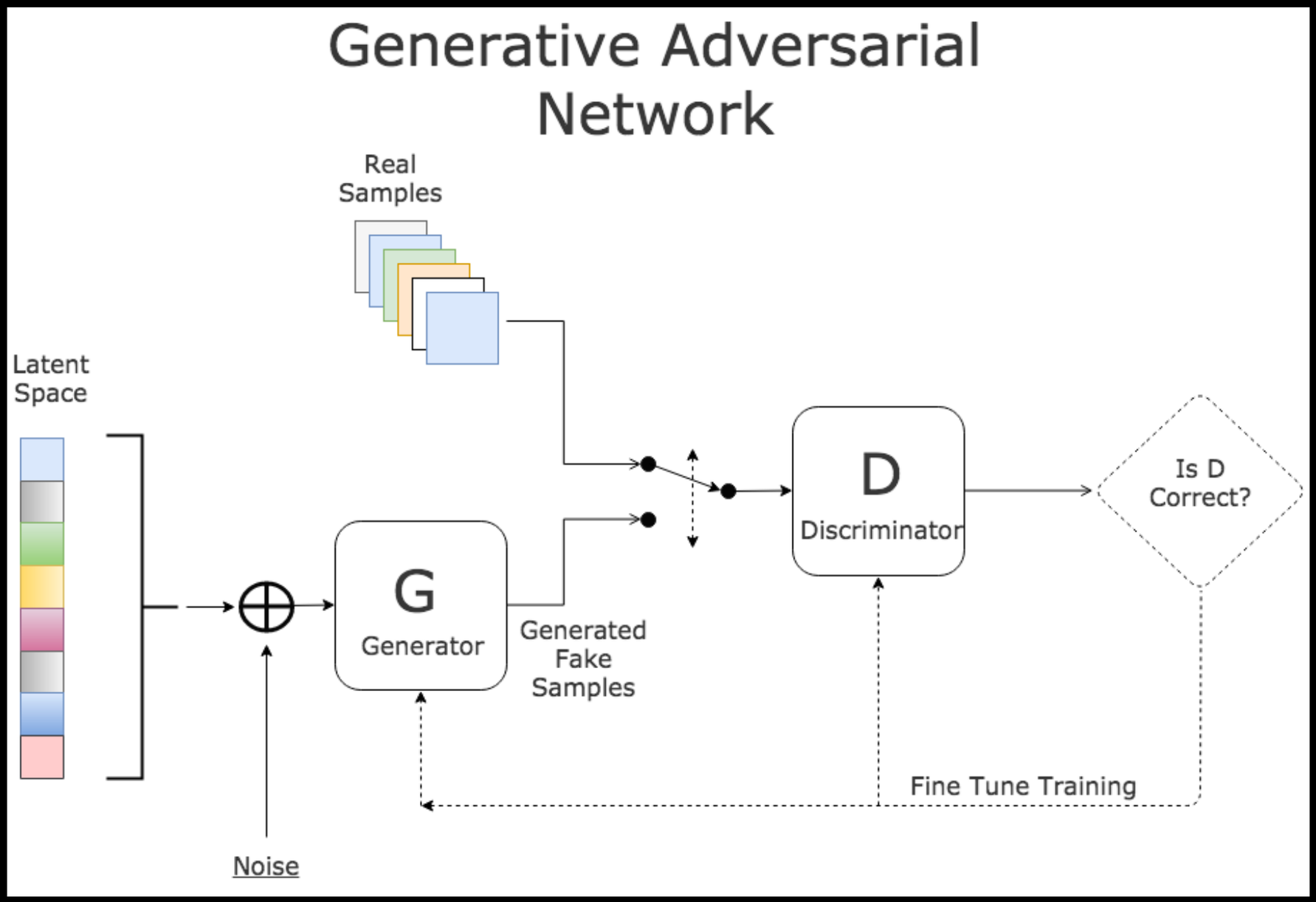
GANs special edition

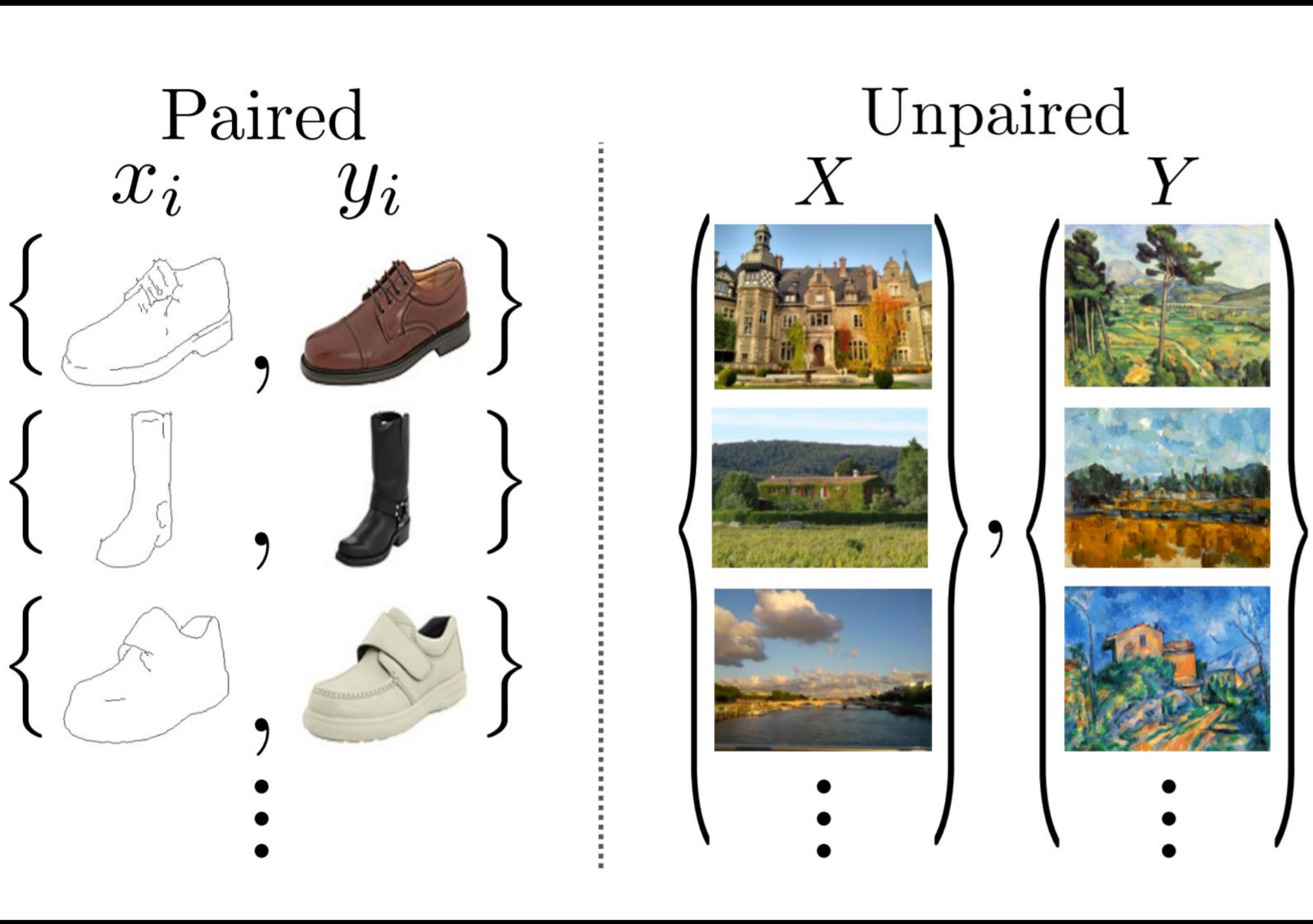
CGAN, pix2pix, cyclegan

Mikhail Usvyatsov
21.10.2018

CGAN


Generative Adversarial Network
Real Samples
Latent Space
G
Generator
Generated Fake Samples
D
Discriminator
Is D Correct?
Noise
Fine Tune Training

Pix2Pix

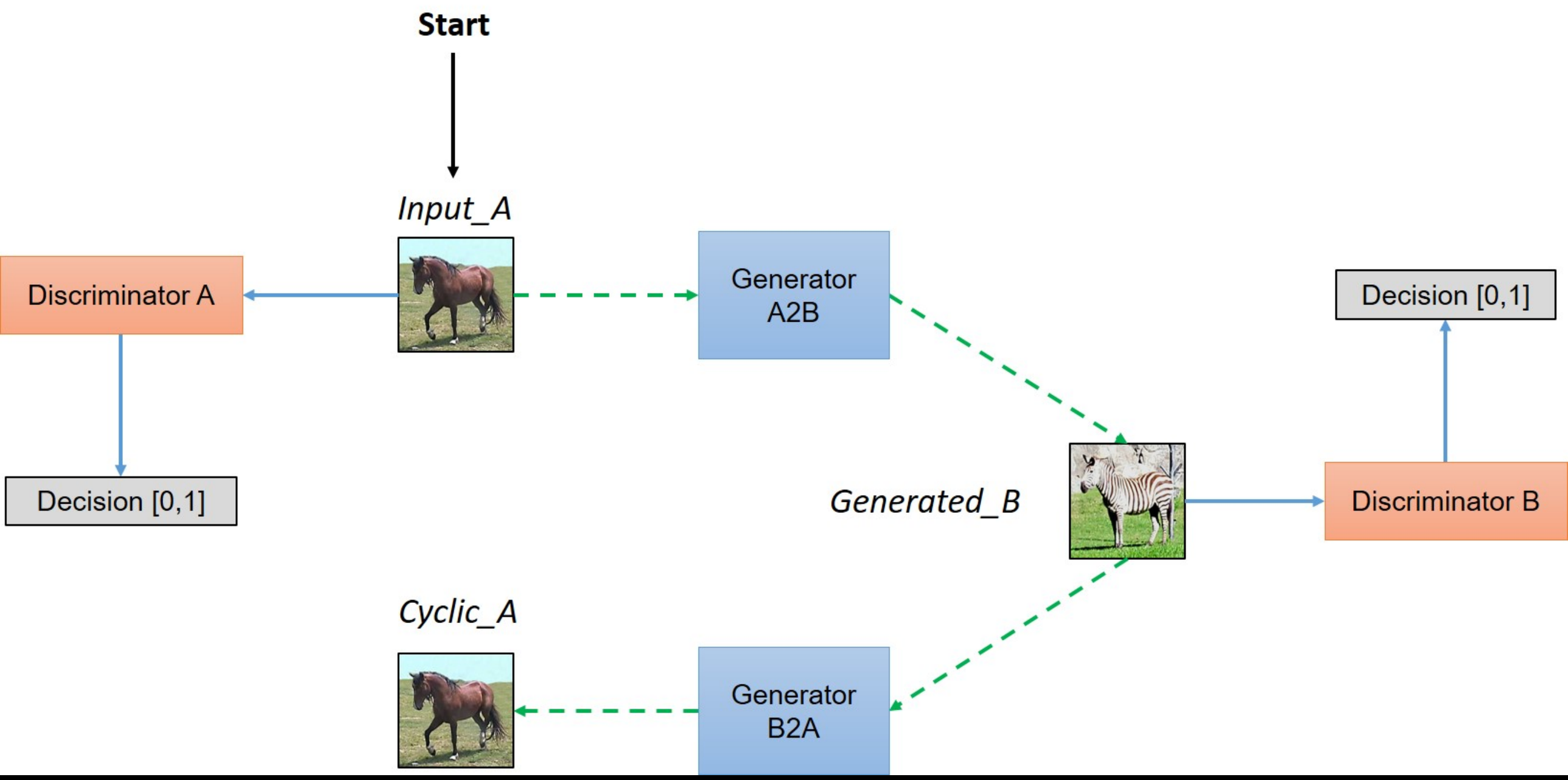


Pix2Pix

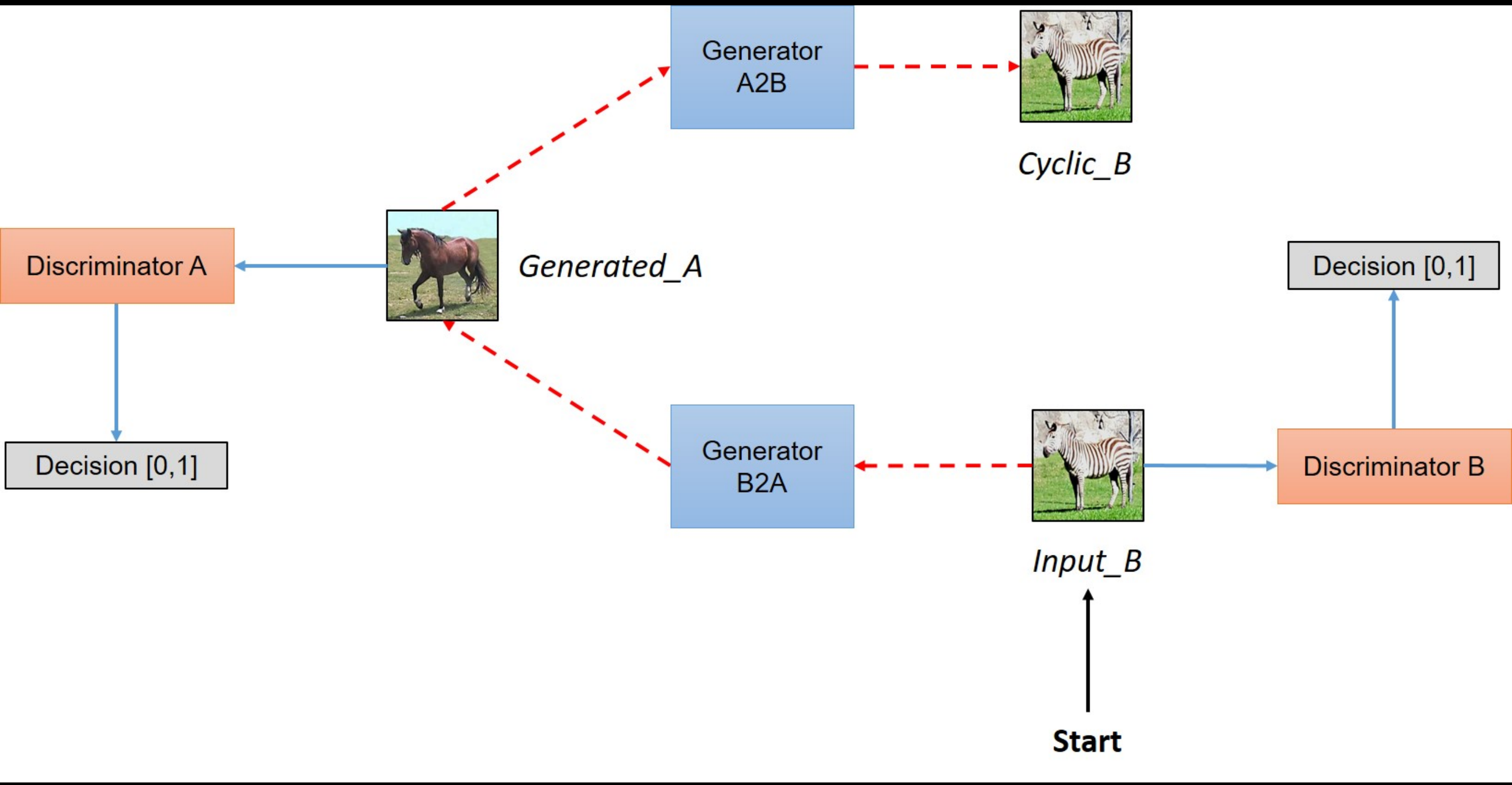
$$L_{GAN}(G, D) = E_y[\log D(y)] + E_{x,z}[\log(1 - D(G(x, z)))]$$

$$L_1(G) = E_{x,y,z}[||y - G(x, z)||_1]$$

CycleGAN


Start
Input_A
Discriminator A
Decision [0,1]
Generator A2B
Generated_B
Decision [0,1]
Discriminator B
Cyclic_A
Generator B2A

CycleGAN

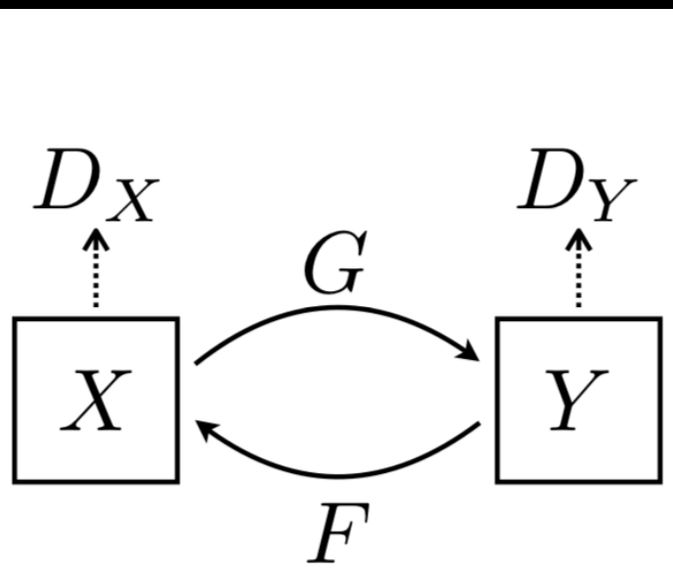

Generator
A2B
Cyclic_B
Discriminator A
Generated_A
Decision [0,1]
Decision [0,1]
Generator
B2A
Discriminator B
Input_B
Start

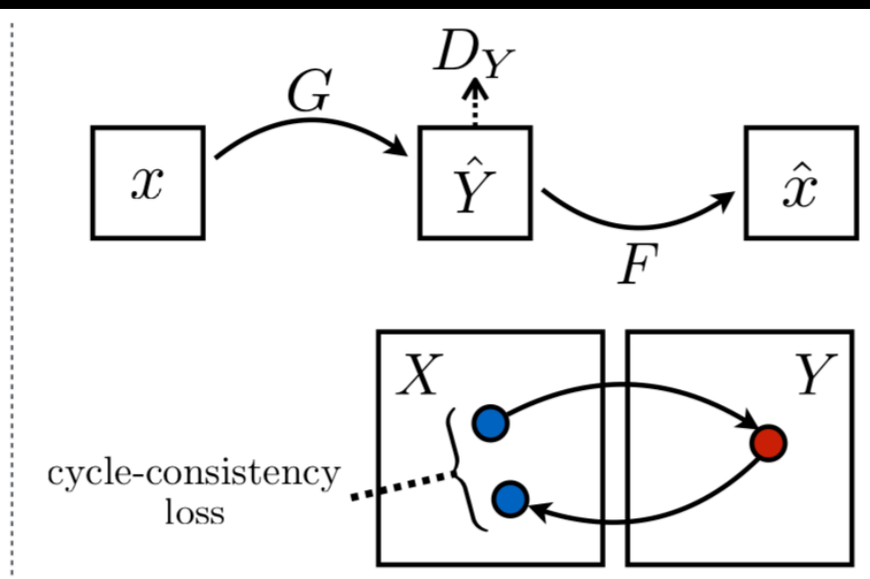
CycleGAN

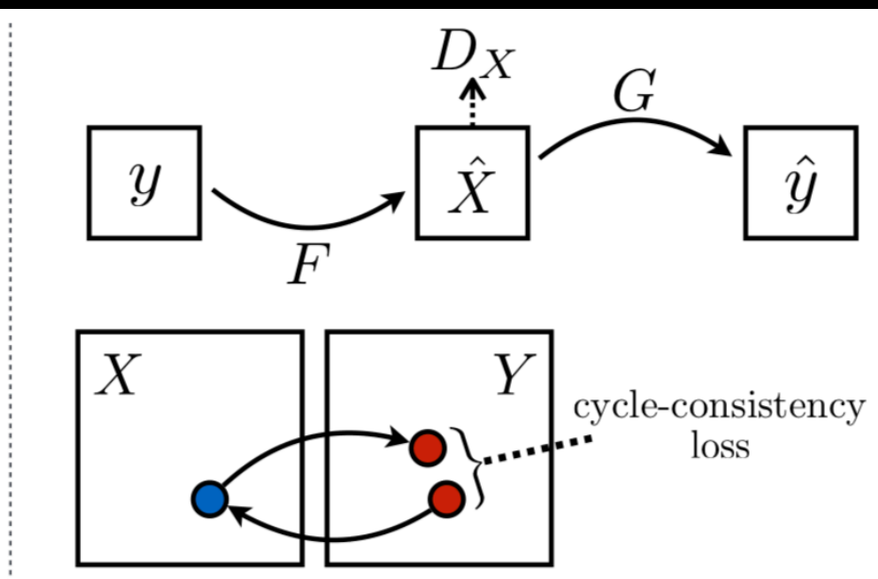
$$L_{GAN}(G, D_y, X, Y) = E_{y \sim p_{data}(y)}[\log D_y(y)] + E_{y \sim p_{data}(x)}[\log(1 - D_y(G(x)))]$$

$$L_{cyc}(G, F) = E_{y \sim p_{data}(y)}[||G(F(y)) - y||_1] + E_{y \sim p_{data}(x)}[||F(G(x)) - x||_1]$$

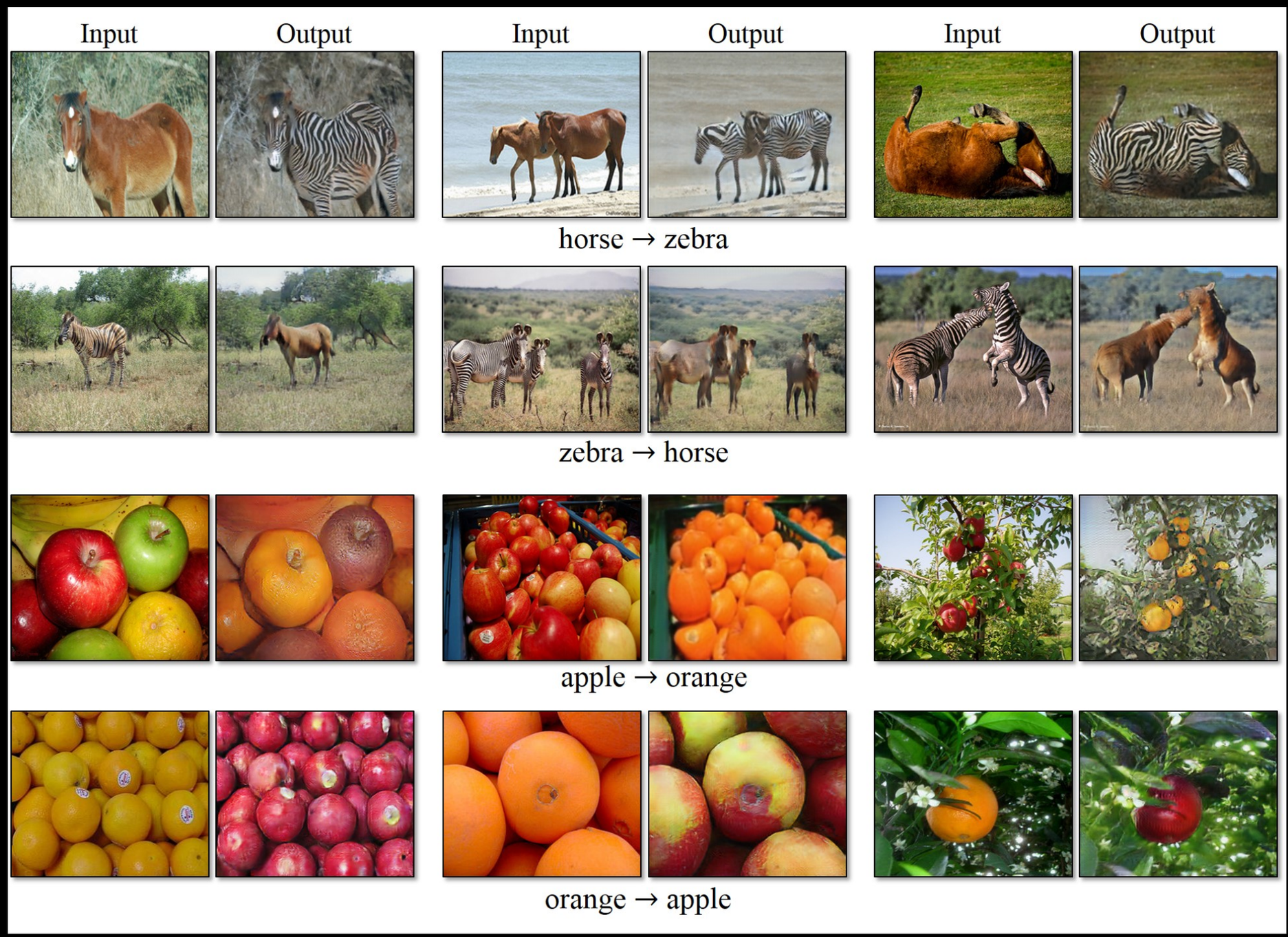
CycleGAN


D_X
D_Y
G
X
Y
F


D_Y
G
x
$\hat{Y}$
$\hat{x}$
F
X
Y
cycle-consistency
loss


D_X
G
y
$\hat{X}$
$\hat{y}$
F
X
Y
cycle-consistency
loss

CycleGAN


Input
Output
Input
Output
Input
Output
horse → zebra
zebra → horse
apple → orange
orange → apple