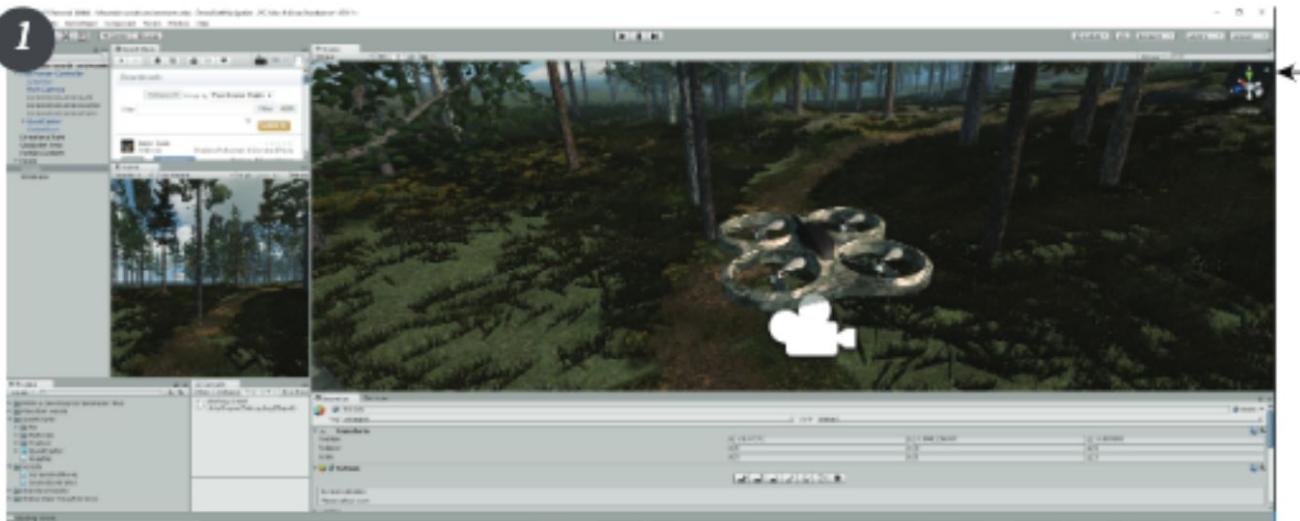


# Drone Forest Navigation

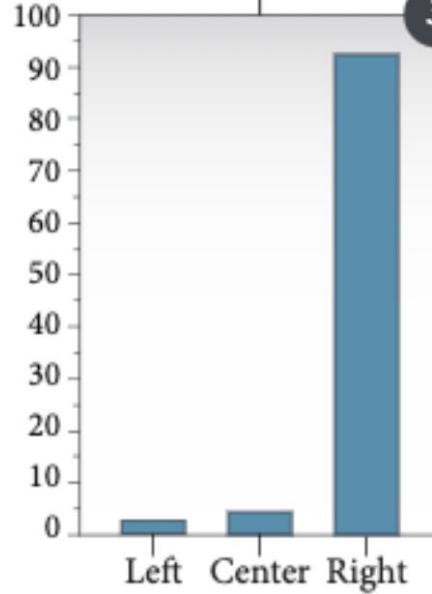
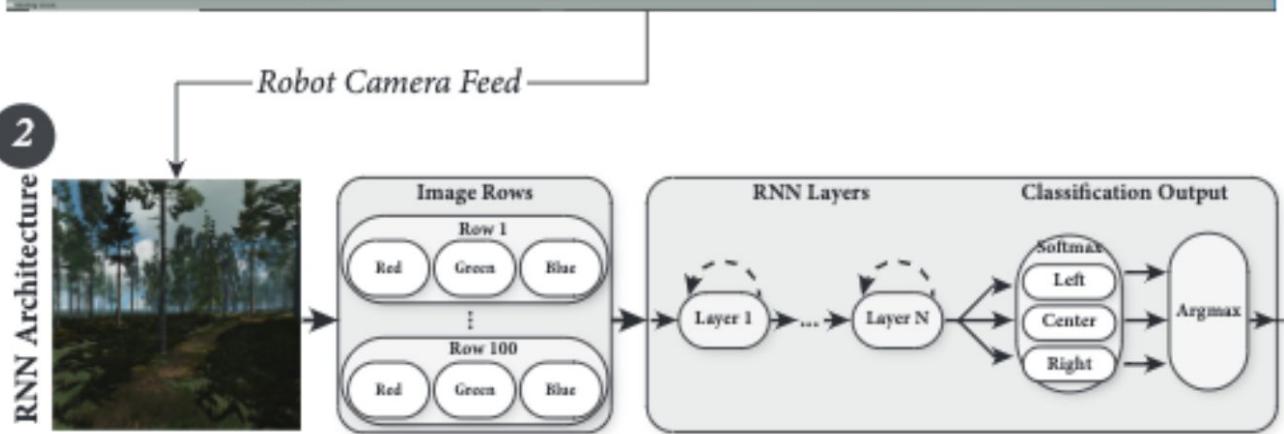
CycleGAN for simulation-to-real image transfer

# Goal

- Simulated data is cheap
- Real data is expensive
- Models trained on simulated data don't perform well on real data
- Therefore use Sim2Real model which takes in simulated data and makes it look realistic
- Now we infinite real data! (from infinite simulated data)
- Train a classification model on top of this simulated data



*Navigation Control*



*Classification Probabilities*

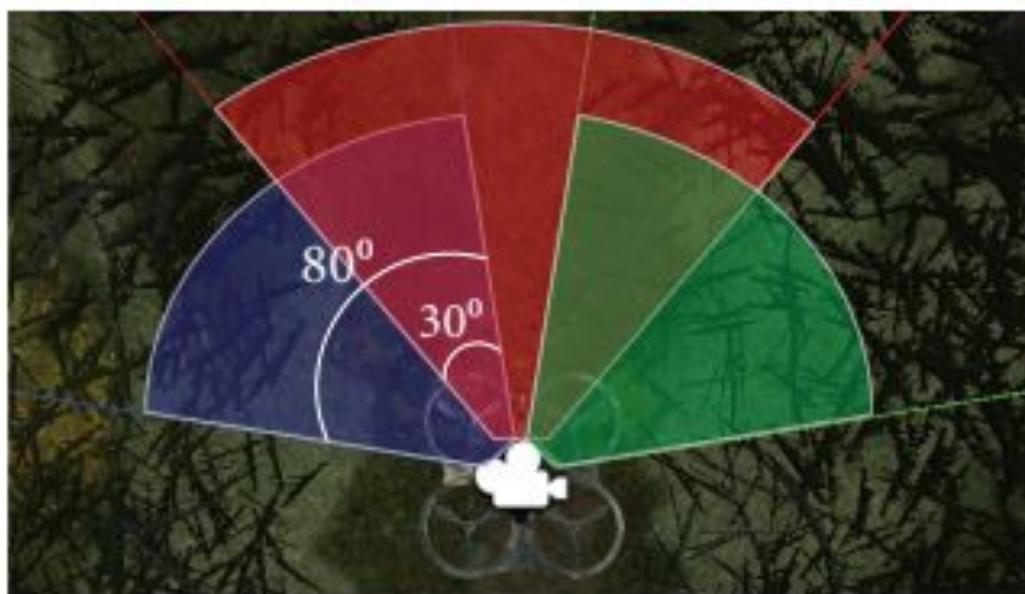
Left



Center



Right



# Dataset

Real-world Data?

Simulated (virtual-world) Data?

# Real-world Dataset



# Real-world Dataset



# Real-world dataset



# For Science!



# Verify Real-World Dataset

Dataset: train



Target: Right  
Prediction: Right



Target: Center  
Prediction: Center



Target: Left  
Prediction: Left



Target: Center  
Prediction: Center



Target: Center  
Prediction: Center

Dataset: valid



Target: Center  
Prediction: Center



Target: Left  
Prediction: Left



Target: Left  
Prediction: Left



Target: Right  
Prediction: Right



Target: Right  
Prediction: Right

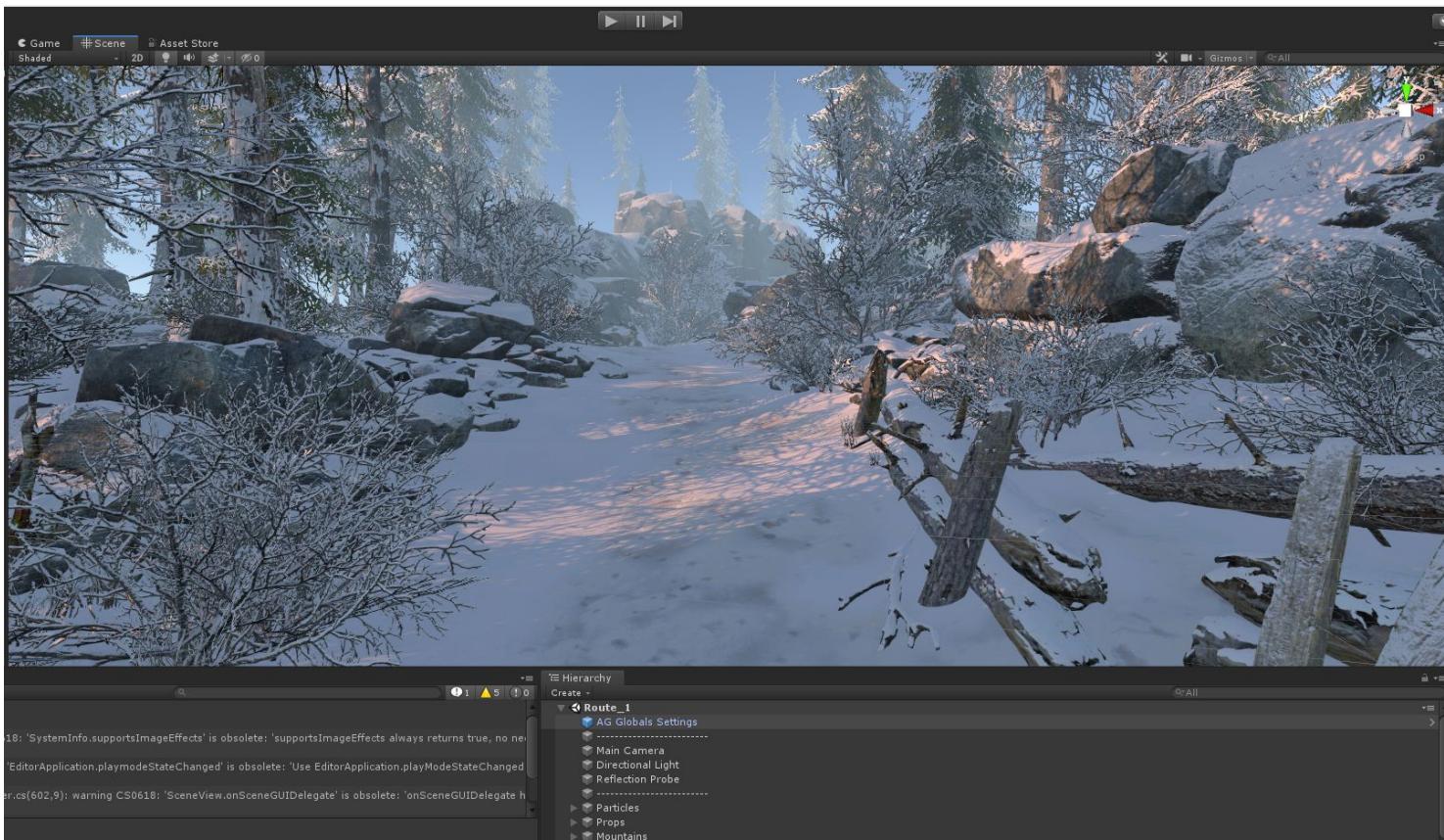
# Virtual-world Dataset



# Virtual-world Dataset



# Virtual-world Dataset



# Virtual-world Dataset

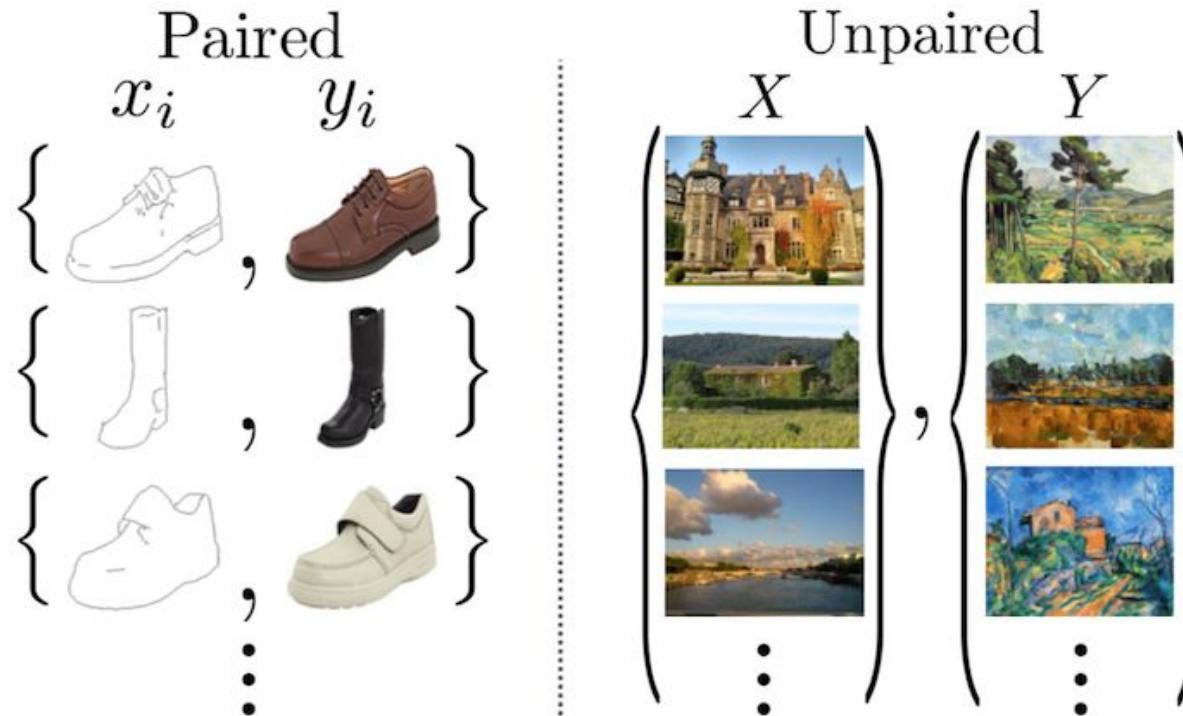


# Now we need to convert Virtual => Real



# CycleGAN

- GAN framework to convert unpaired images



Monet ↪ Photos



Monet → photo

Zebras ↪ Horses



zebra → horse

Summer ↪ Winter



summer → winter



photo → Monet



horse → zebra



winter → summer



Photograph

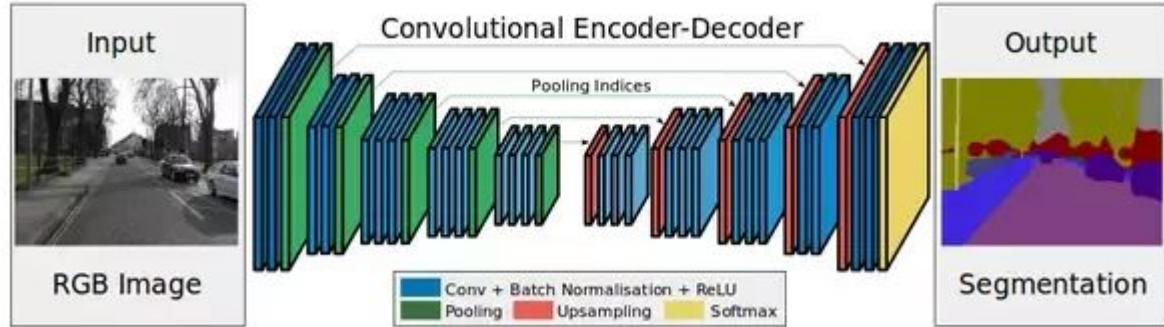
Monet

Van Gogh

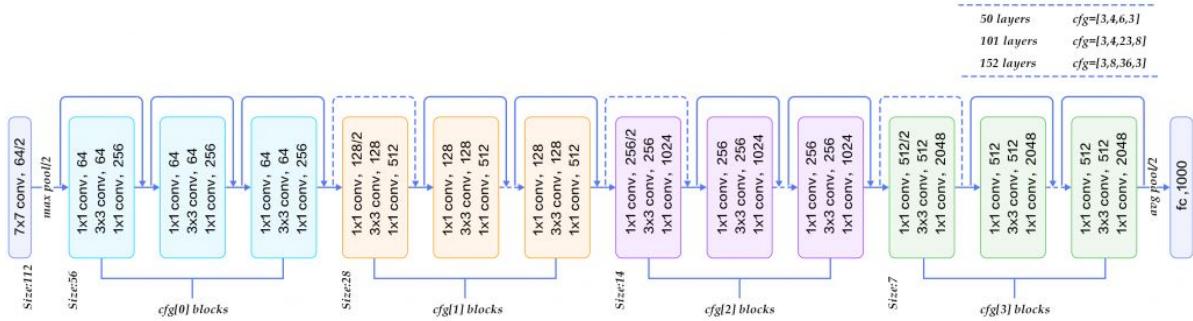
Cezanne

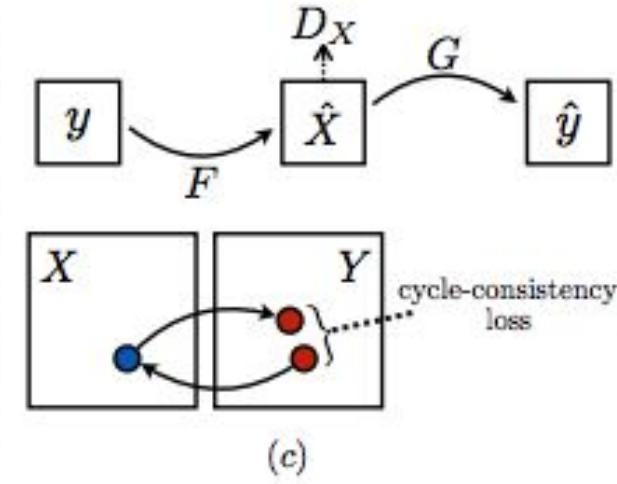
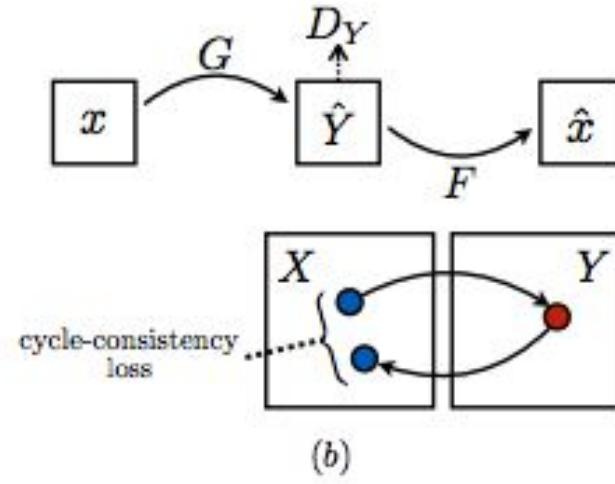
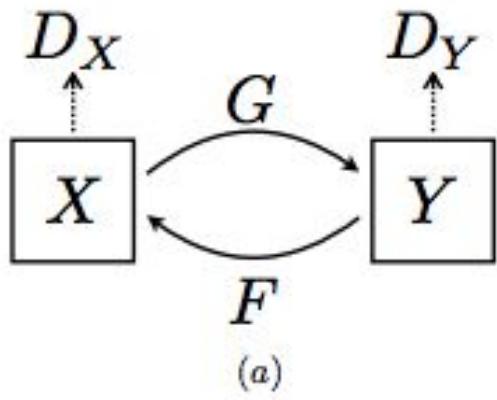
Ukiyo-e

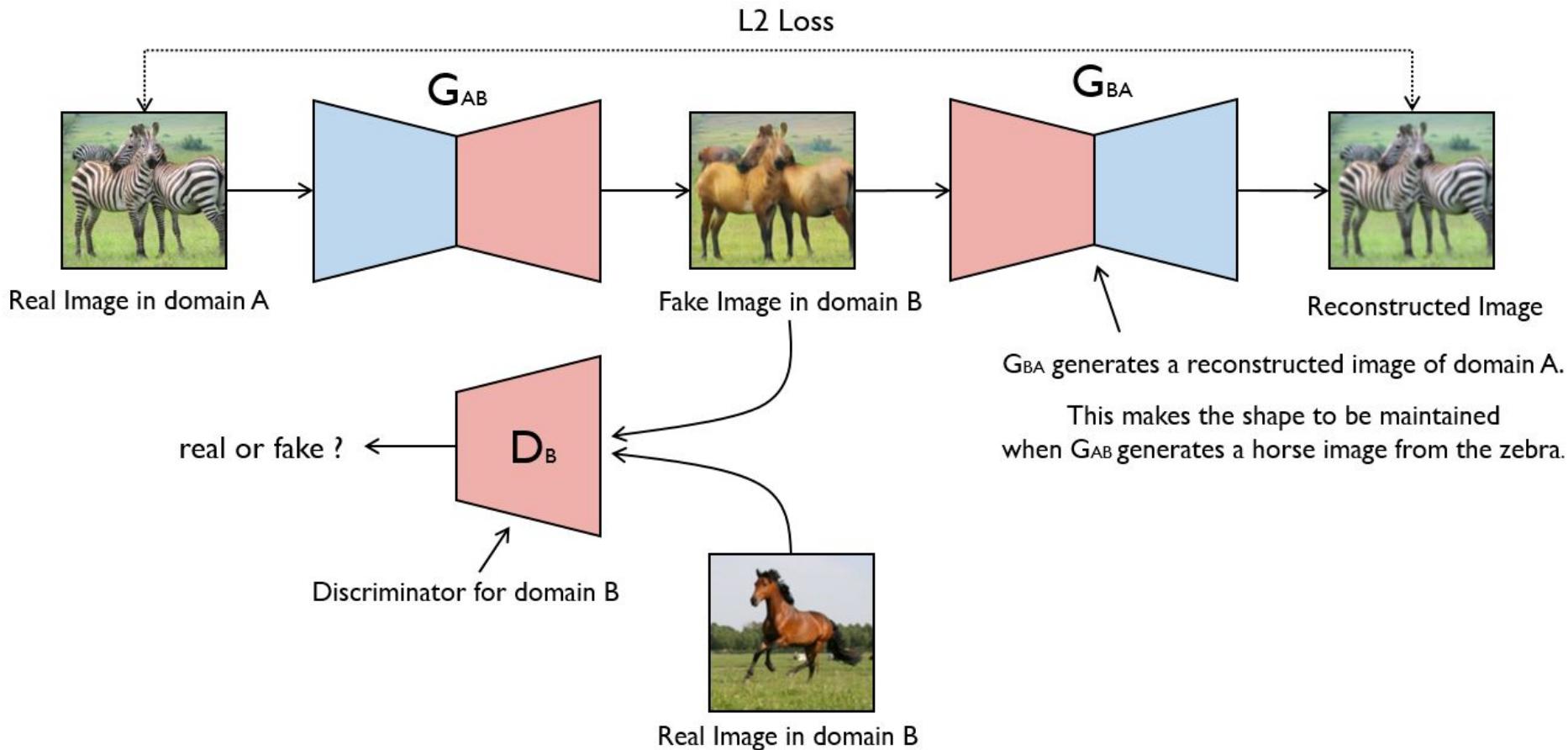
# Generator



# Discriminator







# Model Details

- No. of iterations: 1,000,000
- Training time: 5 days (only 70% completed)
- GPU: Nvidia Titan V
- 4 networks trained parallelly
- Image size 256x256

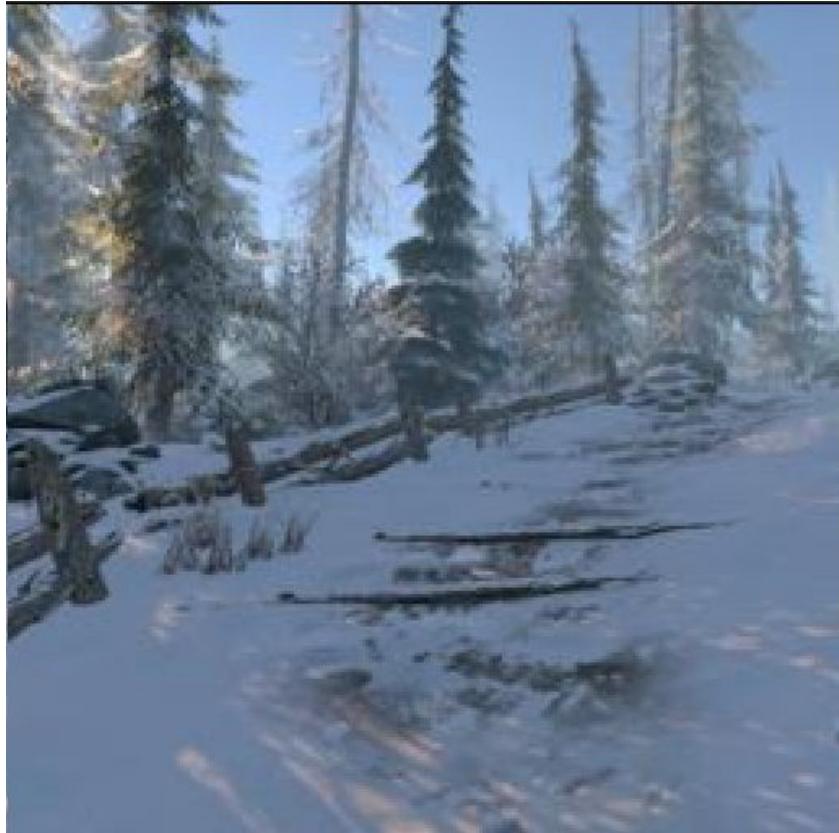
# Results: Real => Virtual



# Results: Real => Virtual



# Results: Virtual => Real



# Results: Virtual => Real



# Results: Virtual => Real



# Next Steps

- Use Simulated-to-Real generator to generate a bunch of real images
- Train a ResNet on these images to find accuracy