# *Deep Learning: Theory and Practice*

## Advanced Topics in Deep Learning

14-5-2020

Supervised $\underline{x} \xrightarrow{NN} y \; t$

$\downarrow L(y, t)$

Unsupervised $\underline{x}$

→ Generate new data

→ Can I combine unsupervised with supervised small data

# Deep Unsupervised Learning

Active learning

$\{x_i\}^N$

Test data $x \}^M_1$

Resources to label "n"

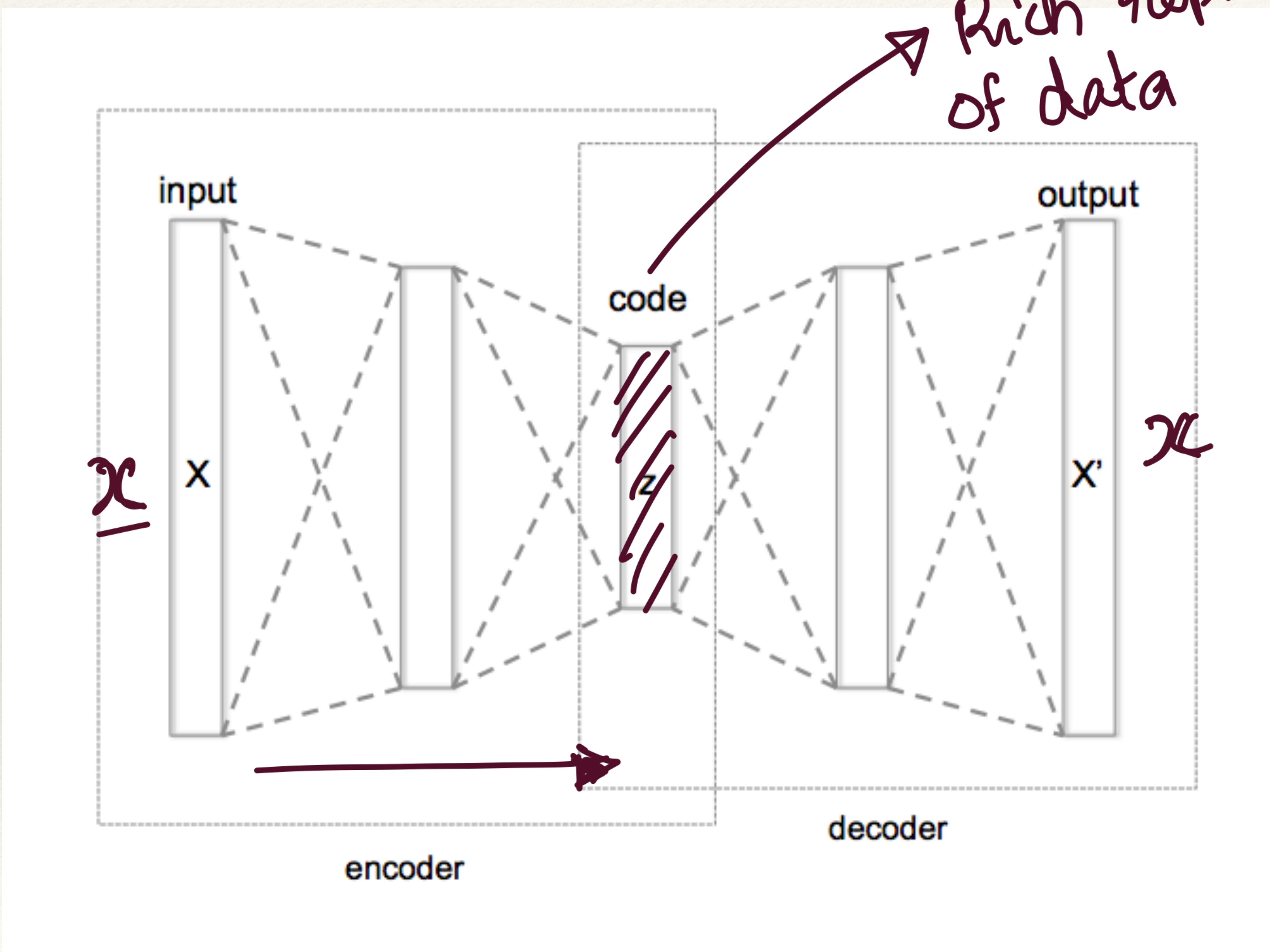
$n << N$

$N = 100,000$

$n = 1,000$

# Autoencoders

Rich representation of data

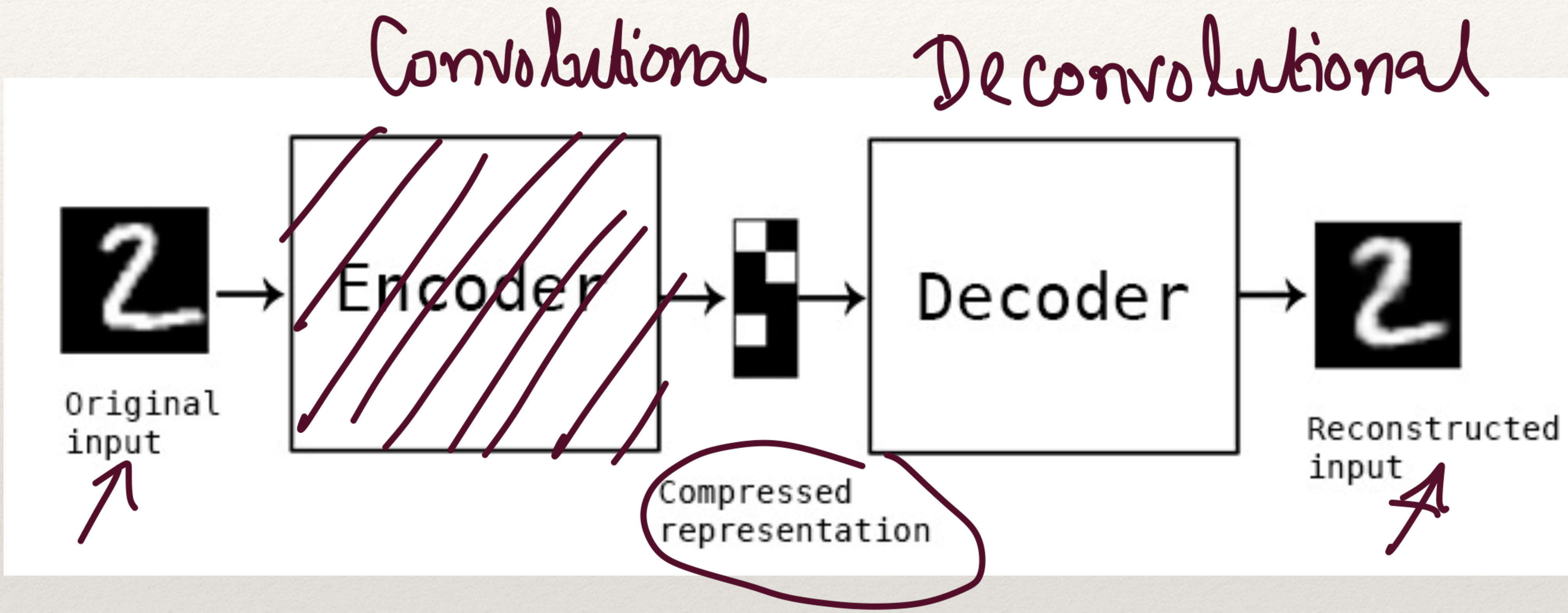



$x = I x$

Training loss

**Avoid Identity Mapping**

# Autoencoders

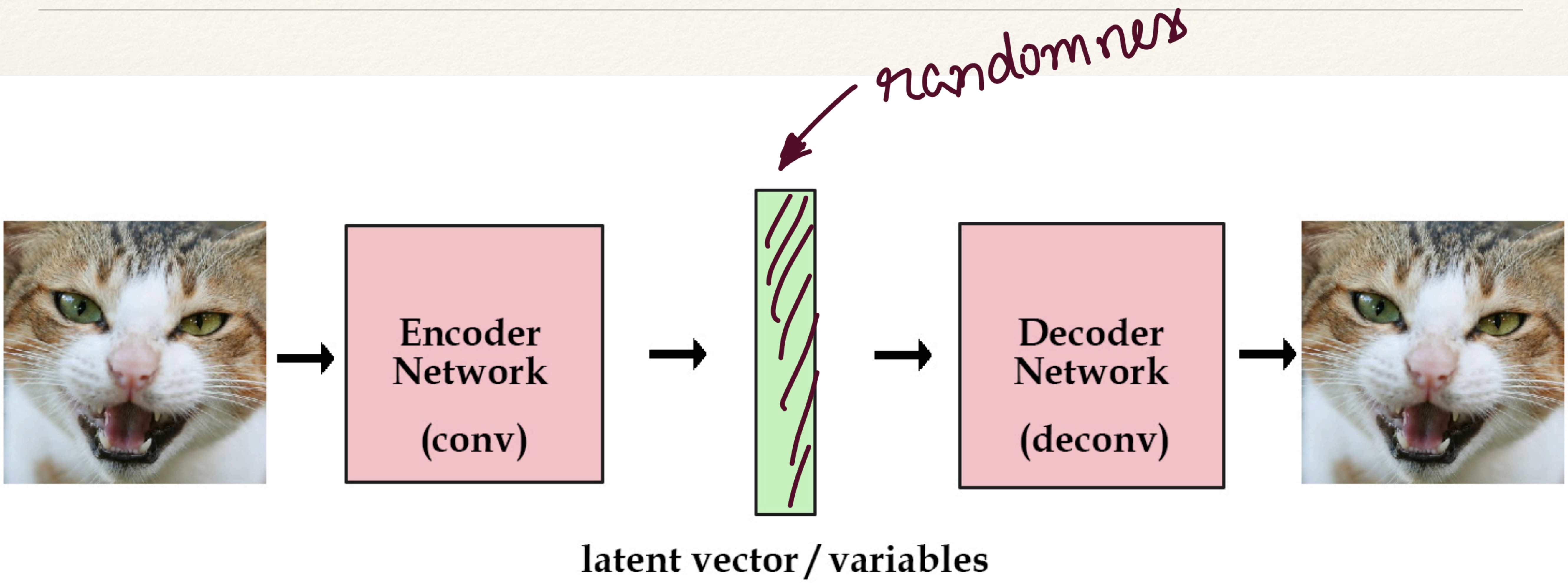



Encoder → LSTMs sequence to vector

Decoder → LSTMs. vector to sequence

WWW.BLOGS.KERAS.IO

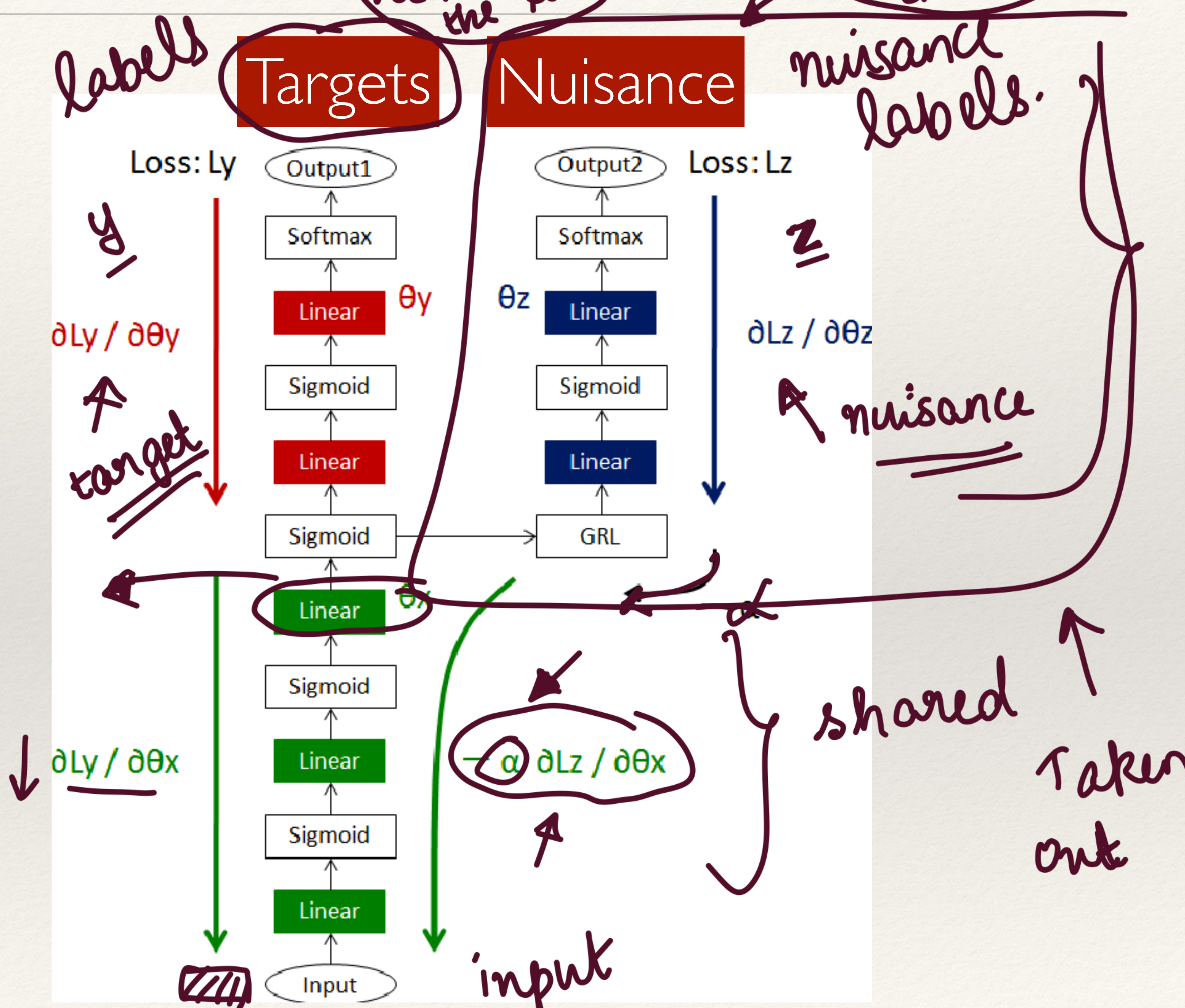
# Convolutional Autoencoders




**The latent vectors can form deep features for other supervised tasks.**

# Supervised Adversarial Learning

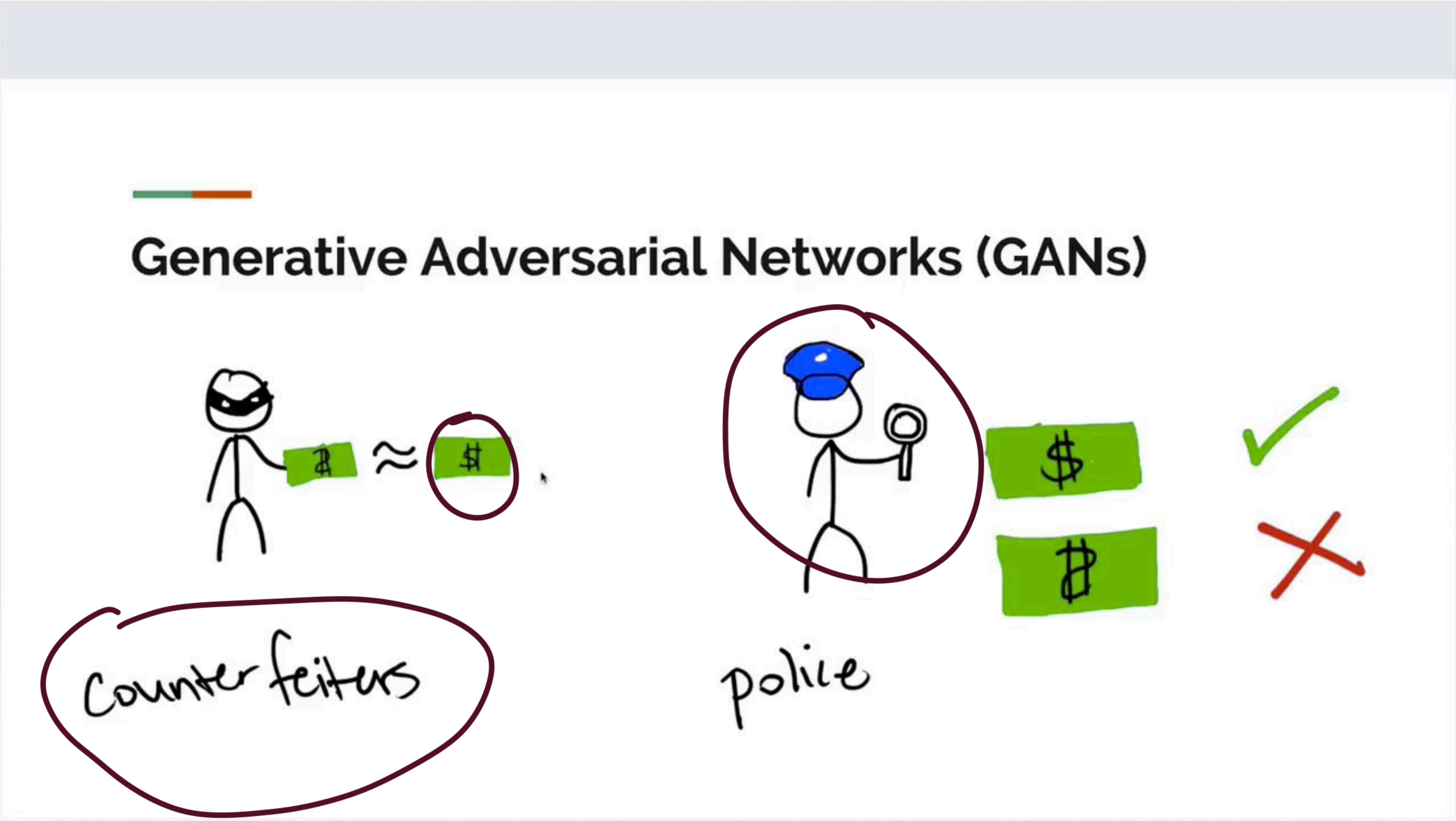
- The target can be learned
  - using original gradient.
  - domain adversarial gradient.
- Model will learn to be domain invariant



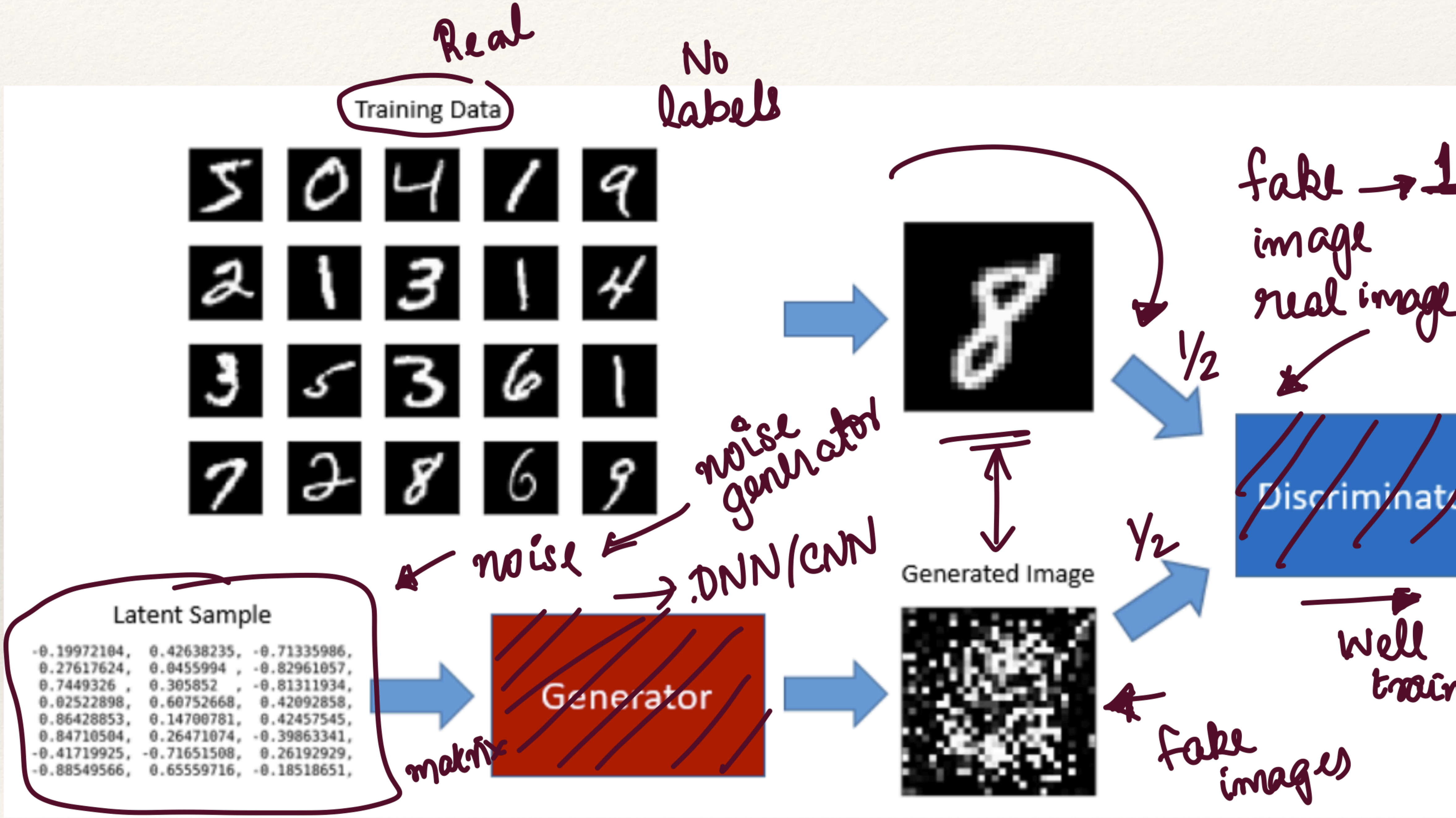

**[Shinohara et al. 2017]**

# Generative Adversarial Networks

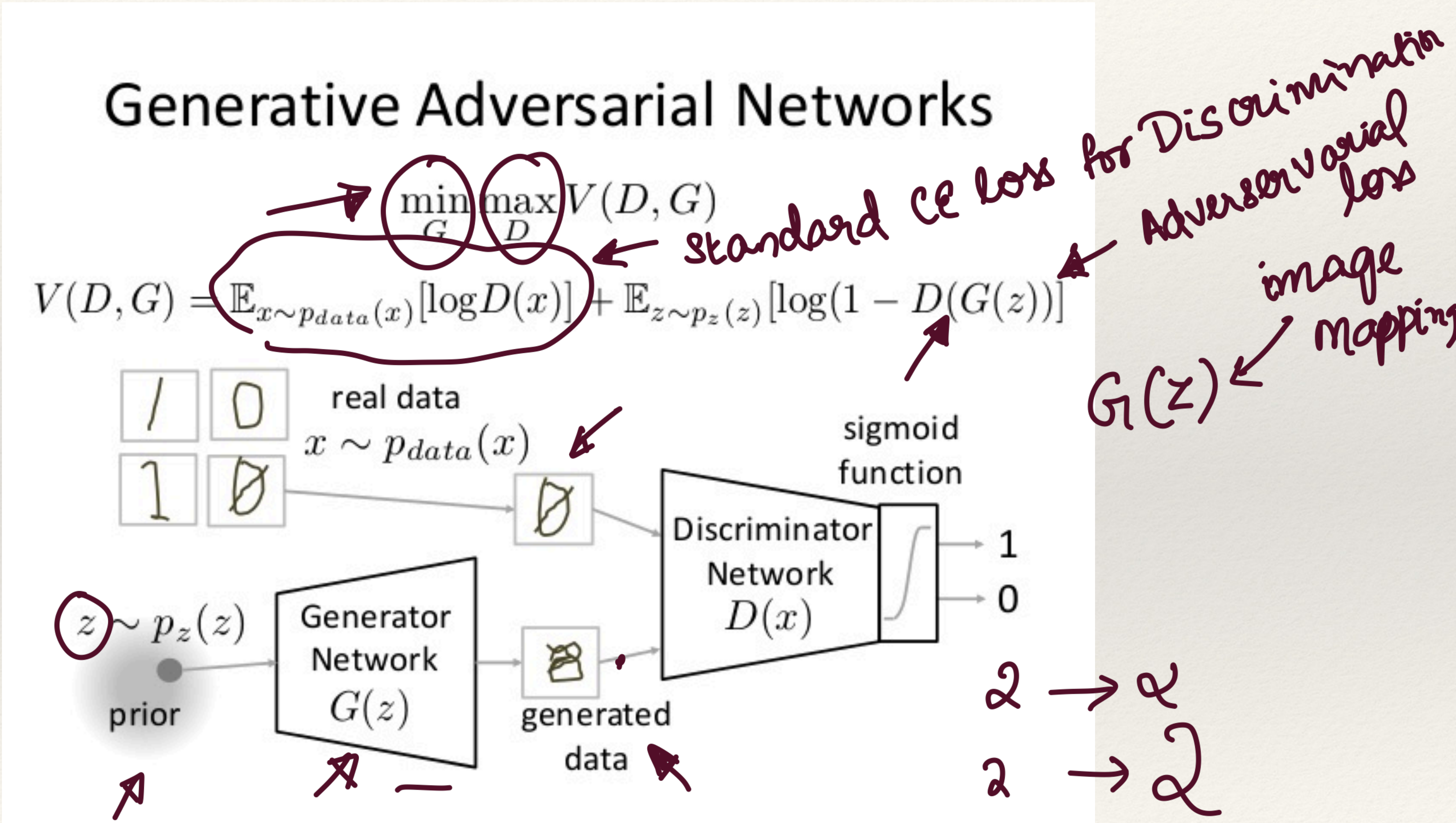
600 x 400



# Generative Adversarial Networks



# Generative Adversarial Networks

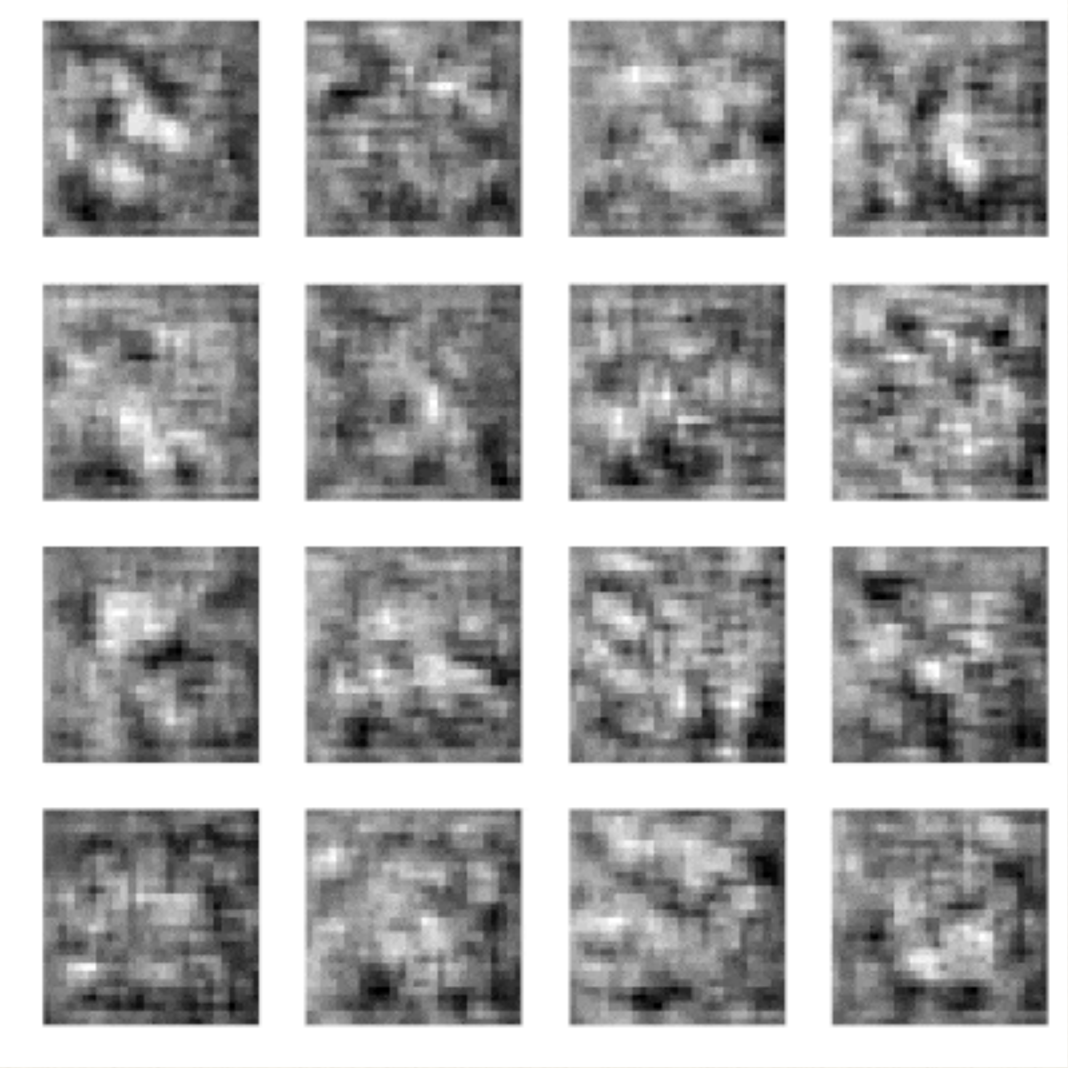


June 4th

Usual class time

6:00pm

# Generative Adversarial Networks



**DCGANs**