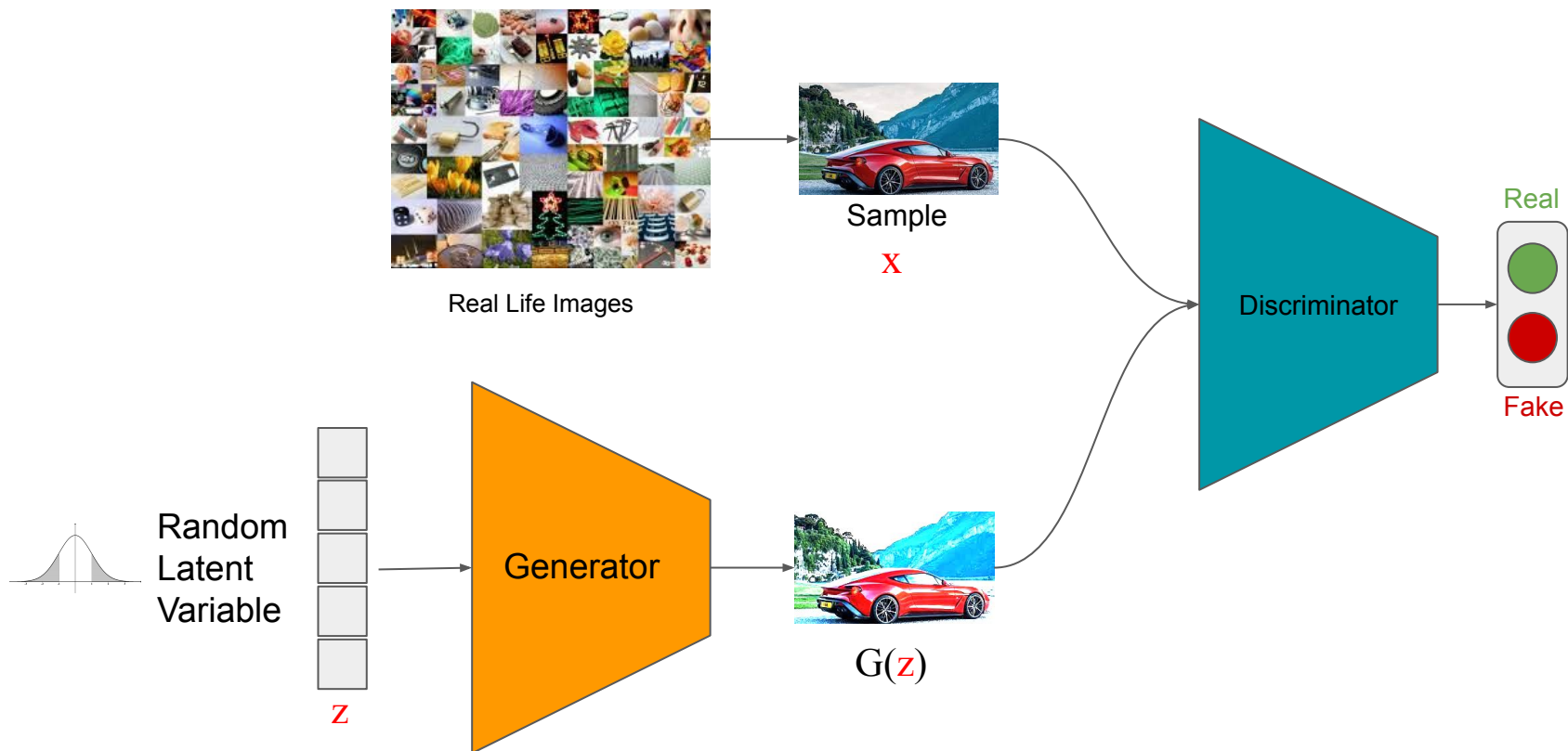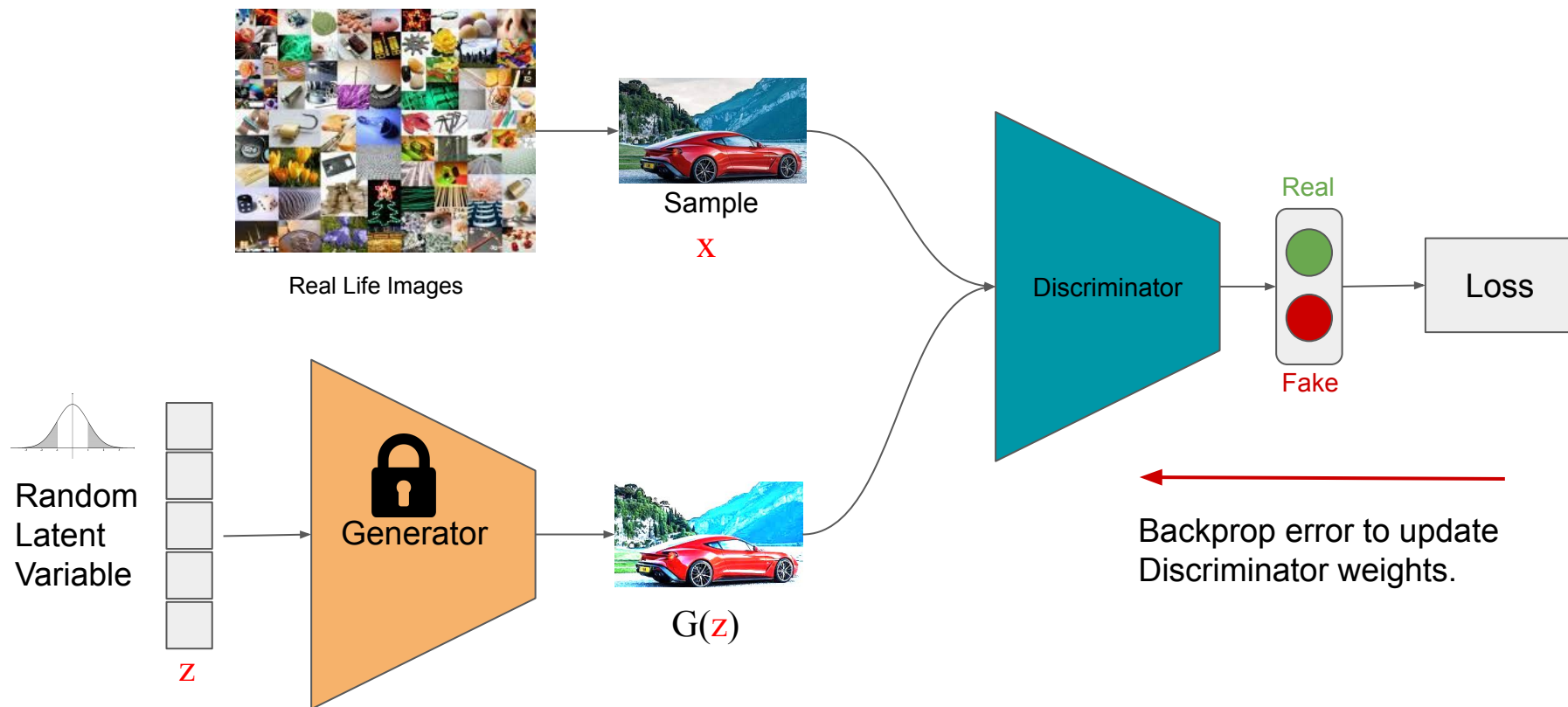# Machine Learning

Lecture 7

GANs

- Generative
  - Learn a generative model
- Adversarial
  - Trained in an adversarial setting
- Networks
  - Use Deep Neural Networks
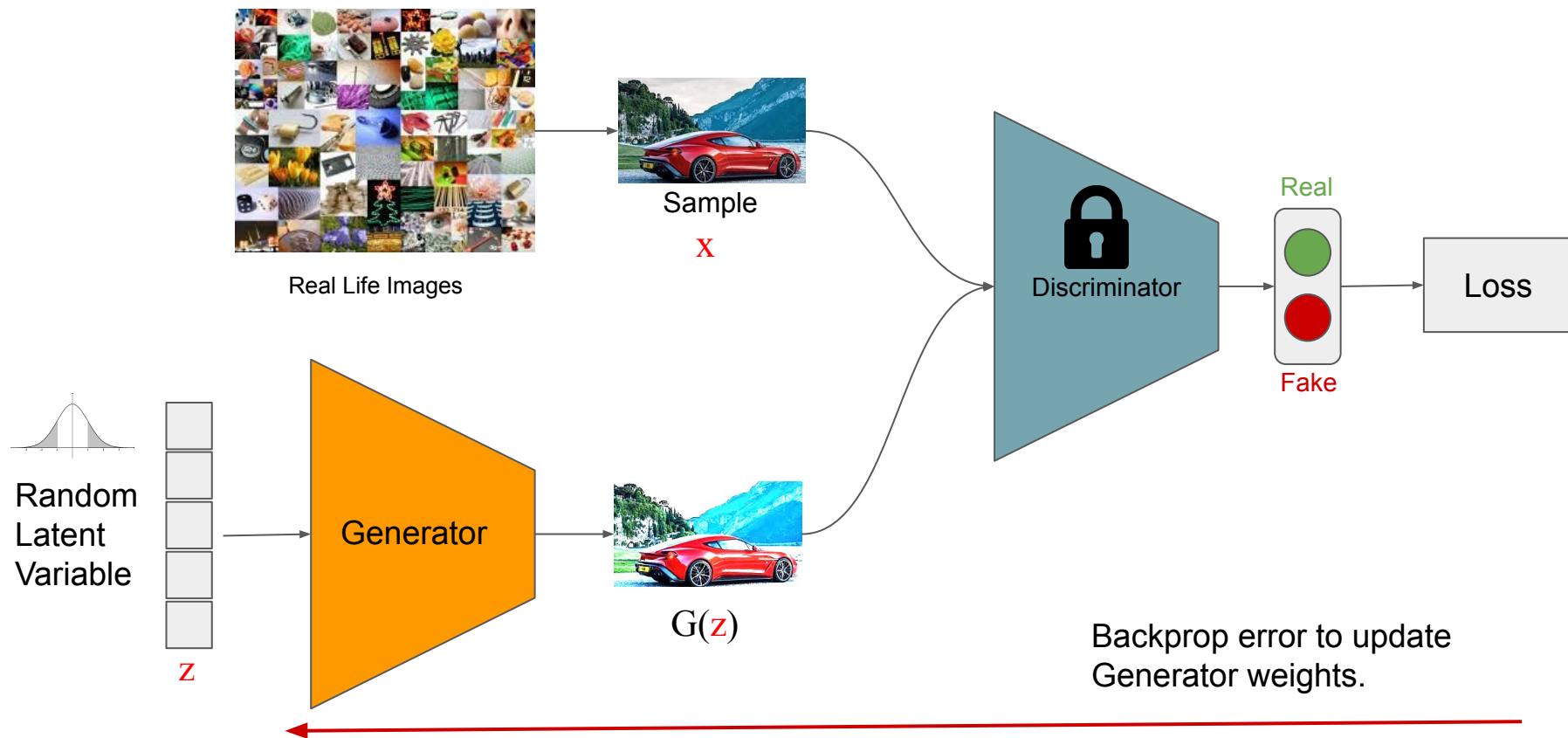
GANs

Training GANs

Real Life Images

Sample

x

Random Latent Variable

Generator

G(z)

z

Discriminator

Real

Fake

Loss

Backprop error to update Discriminator weights.

Training GANs

Real Life Images

Sample

x

Random
Latent
Variable

z

Generator

G(z)

Discriminator

Real

Fake

Loss

Backprop error to update
Generator weights.

GAN Formulation

$$\min_{G} \max_{D} V(D, G)$$
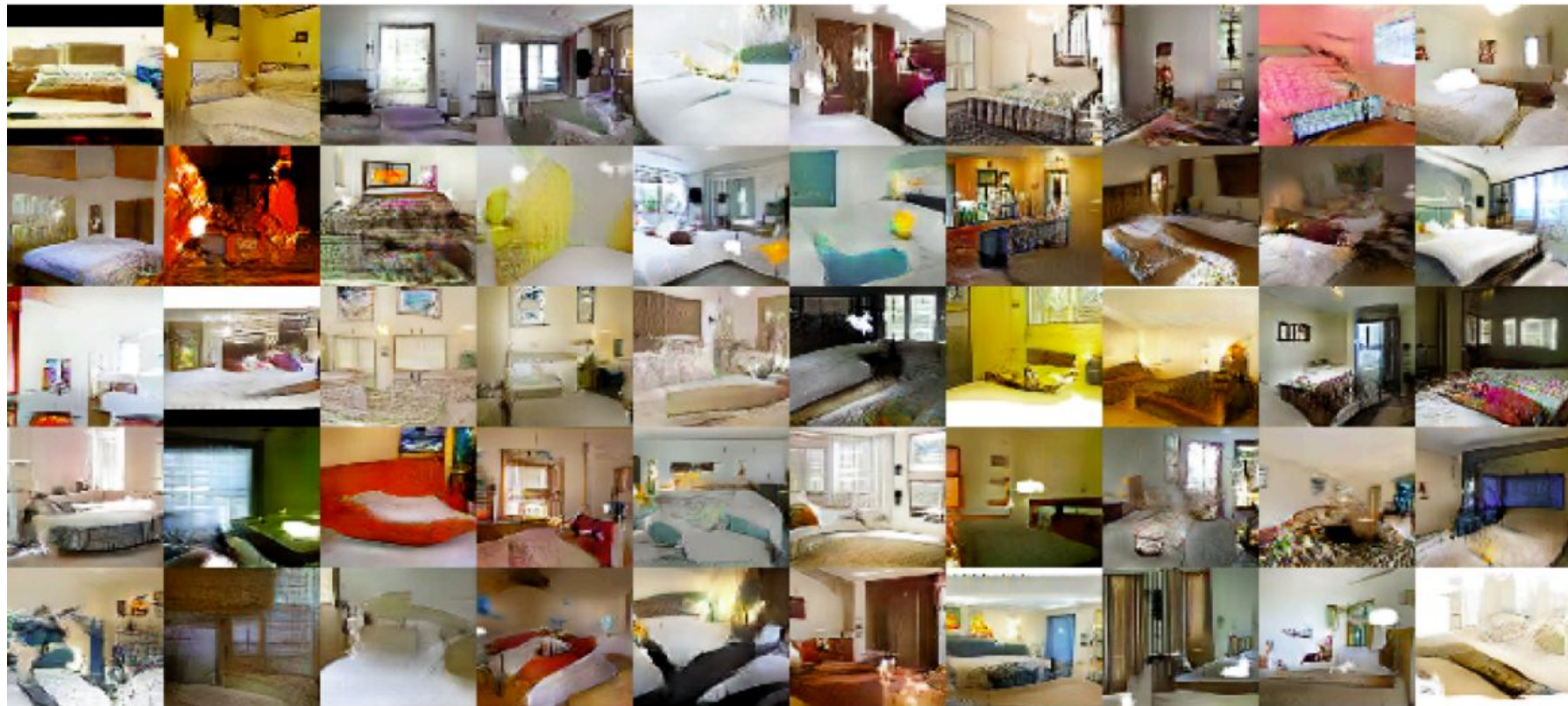
It is formulated as a minimax game, where:

- The Discriminator is trying to maximize its reward $V(D,G)$
- The Generator is trying to minimize Discriminator's reward (or maximize its loss)

$$V(D, G) = \mathbb{E}_{x \sim p(x)}[log D(x)] + \mathbb{E}_{z \sim q(z)}[log(1 - D(G(Z)))]$$

GAN Output

GAN Output

GAN Output

GAN Output