# Least Squares Generative Adversarial Networks

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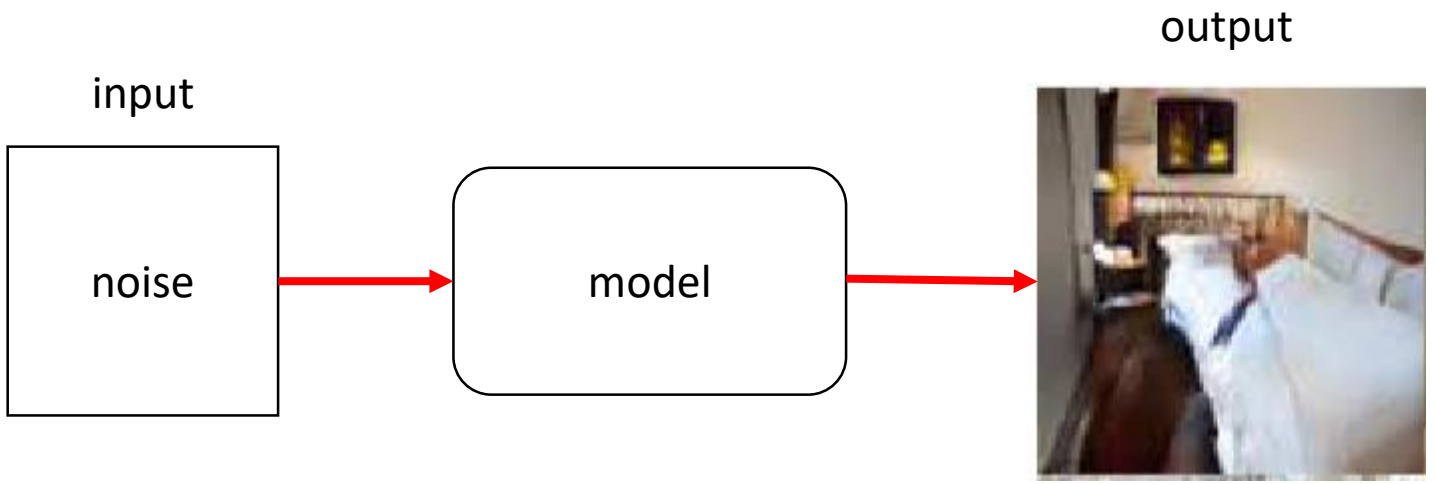
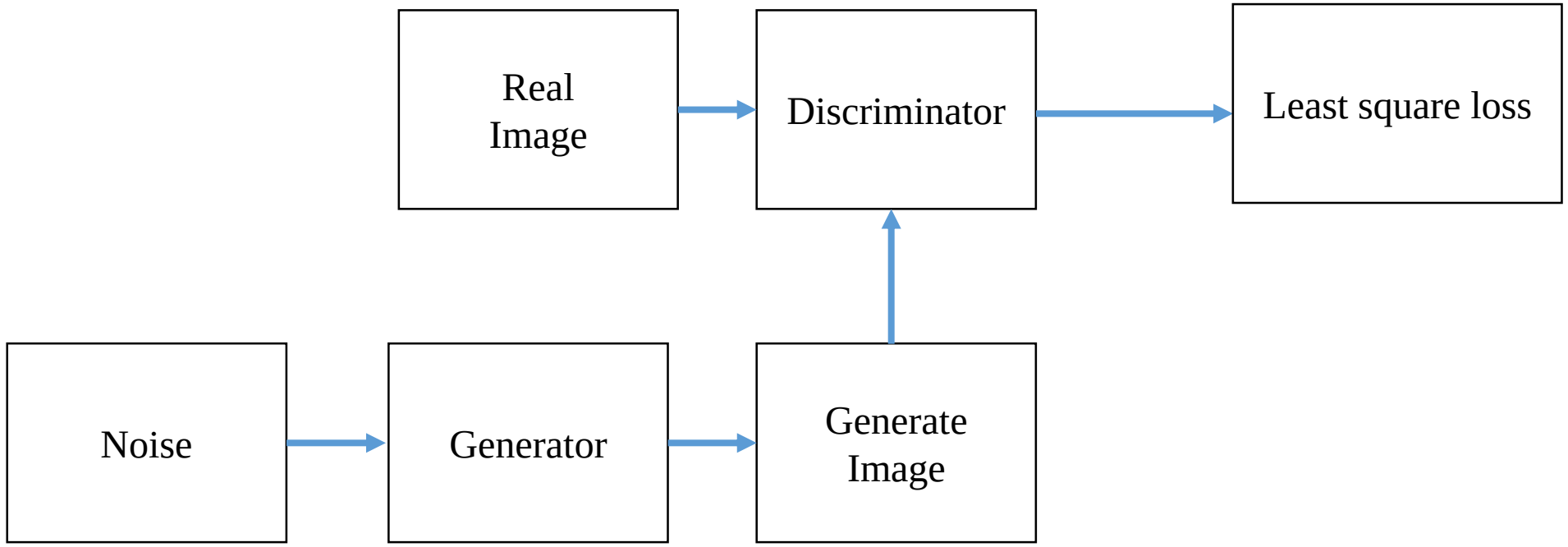
# Introduction

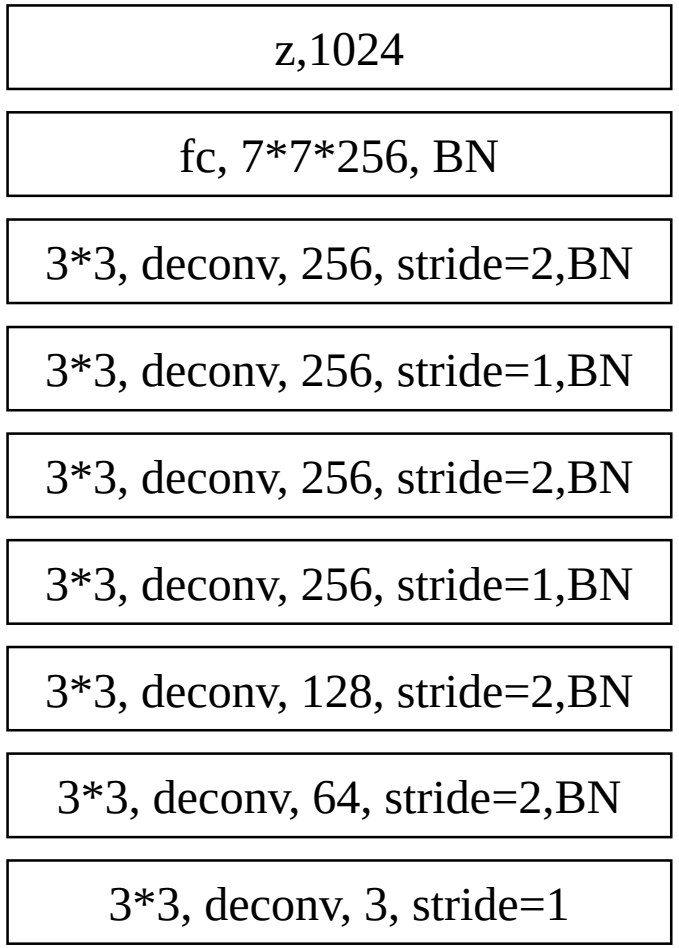
- Input : noise(z) from a uniform or Gaussian distribution
- Target : Generate images

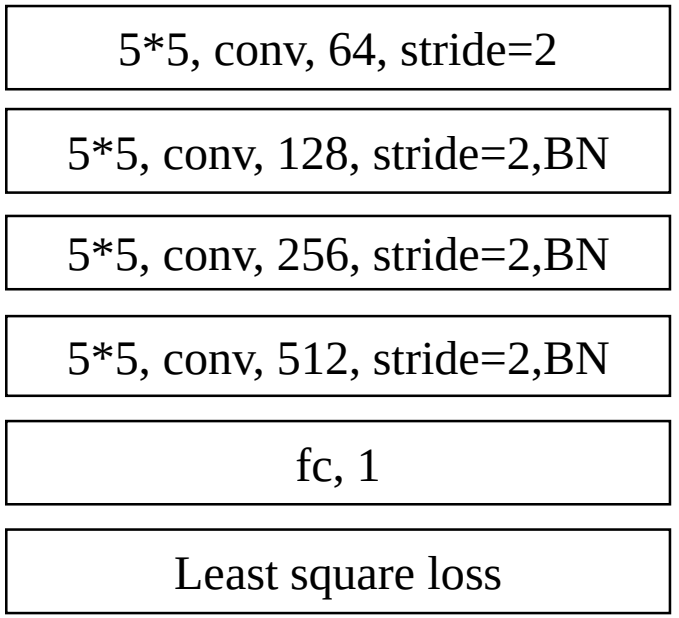


# Architecture



# Generator & Discriminator architecture




- Generator model architecture  Discriminator model architecture

# Least Square Loss Function

- $\min_D V_{LSGAN}(D) = \frac{1}{2}\mathrm{E}_{x\sim p_{data}(x)}[(D(x)-b)^2] + \frac{1}{2}\mathrm{E}_{z\sim p_z(z)}\left[\left(D\left(G(z)\right)-a\right)^2\right]$
- $\min_G V_{LSGAN}(G) = \frac{1}{2}\mathrm{E}_{z\sim p_z(z)}[(D(G(z))-c)^2]$

D：Discriminator, G：Generator

$x\sim p_{data}(x)$：x from $p_{data}$ distribution

a and b：the label for fake data and real data

c：the value that G wants D to believe for fake data

# Least Square Loss Function

- $\min_D V_{LSGAN}(D) = \frac{1}{2}\mathrm{E}_{x\sim p_{data}(x)}[(D(x)-1)^2] + \frac{1}{2}\mathrm{E}_{z\sim p_z(z)}\left[\left(D\left(G(z)\right)-0\right)^2\right]$
- $\min_G V_{LSGAN}(G) = \frac{1}{2}\mathrm{E}_{z\sim p_z(z)}[(D(G(z))-1)^2]$

# Result(DCGAN & LSGAN)

Generate images by DCGAN(112*112)




Generate images by LSGAN(112*112)




# Reference


- [1] Generative adversarial nets
- [2] Unsupervised Representation Learning with Deep Convolutional Generative Adversarial Networks