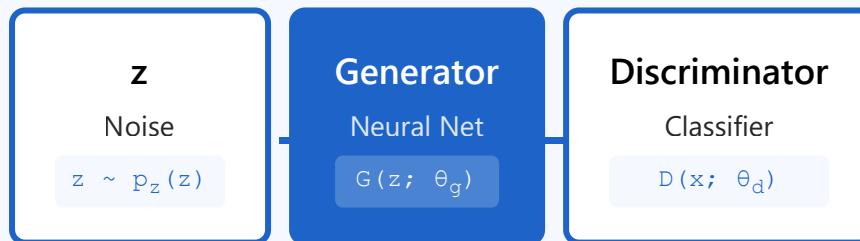


Mathematical Definition of GAN

Minimax Objective

$$\min_G \max_D V(D, G)$$

Two-Player Game Architecture



Generator G

Maps noise to data space

Discriminator D

Outputs probability $[0,1]$

Training

Alternating optimization

Solution

Nash equilibrium

Value Function $V(D, G)$

$$V(D, G) = \mathbb{E}_{x \sim p_{\text{data}}} [\log D(x)] + \mathbb{E}_{z \sim p_z} [\log(1 - D(G(z)))]$$

Real Data Term

D classifies real as real

Fake Data Term

D classifies fake as fake