



Diffusion

Diffusion is the algorithm that is used by (most) modern AI systems to produce images. In this chapter we are going to explore a specific instance of that task: generate pictures of trees from the “tree photo distribution”

We are going to assume that we have access to a dataset with many photos of trees.



Here's the full workflow for a diffusion model that we are going to cover:

1. **Forward process:** Slowly add Gaussian noise to images until they turn into pure noise.
2. **Reverse process:** Train a neural network to predict the mean $\mu_{t-1}(x_t)$ and remove noise step-by-step.
3. **Image generation:** Start with random noise and run the neural network in reverse T times to generate a realistic image.

This elegant approach combines simple Gaussian noise with the power of deep learning to generate stunning results!

Add noise