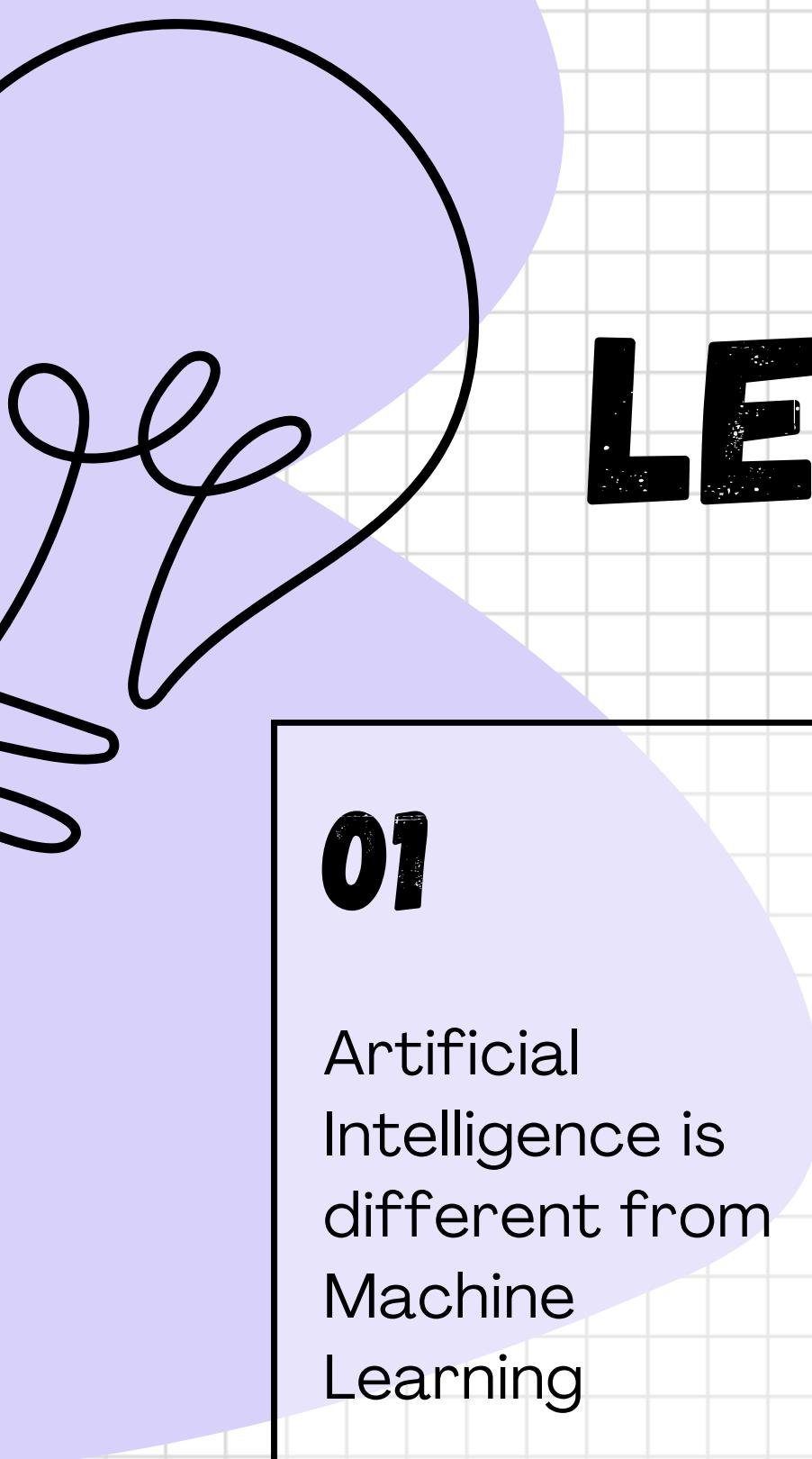


# **INTRODUCTION to GENERATIVE AI**

Cristina Rodriguez  
WWCSF 2024

# AGENDA

- 
1. What is AI?
  2. What is Generative AI?
  3. Is Generative AI magic?
  4. What is Stable Diffusion?
  5. How to train Stable Diffusion
  6. How to use it in a Project



# LEARNING OBJECTIVES

**01**

Artificial  
Intelligence is  
different from  
Machine  
Learning

**02**

Generative AI is  
a subset of  
Deep Learning

**03**

Stable Diffusion  
is a Generative  
AI foundation  
model

**04**

You can fine-tune  
your own model  
using Python  
and other freely  
available tools  
on the internet.

AI field

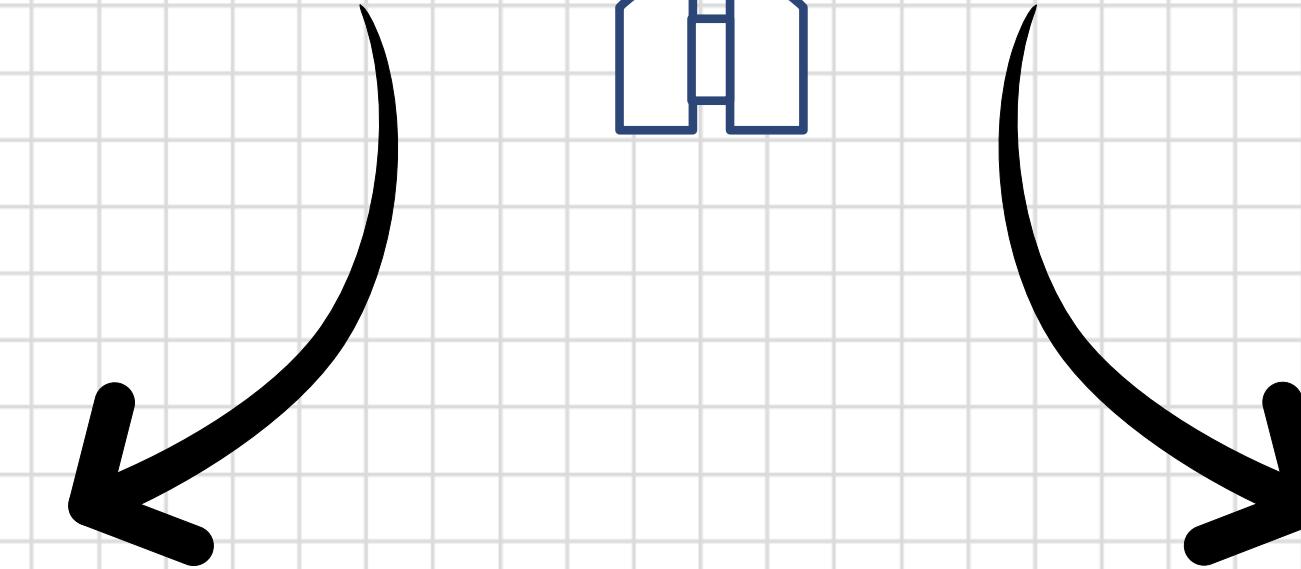
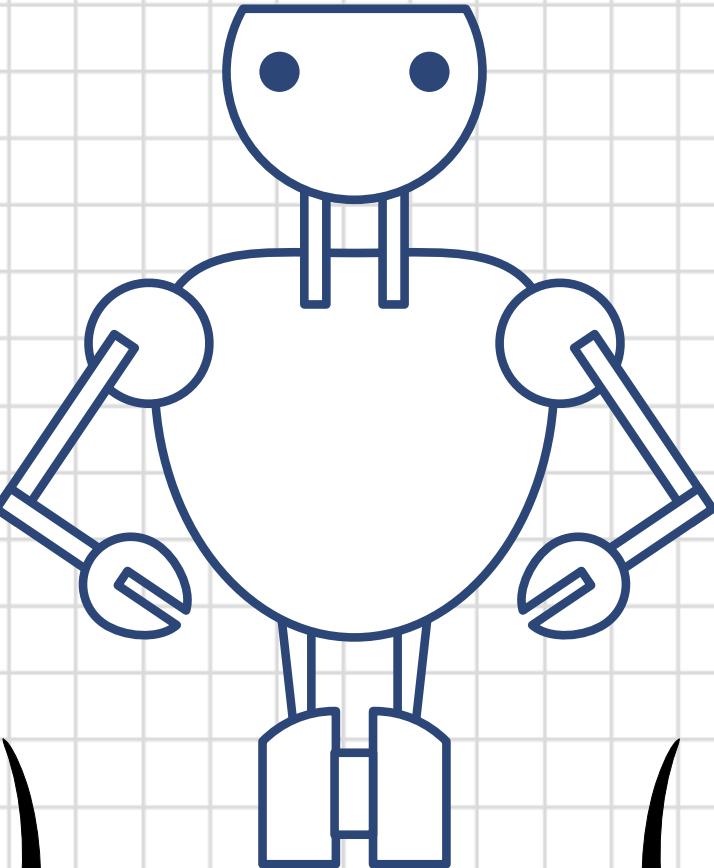
# WHAT IS AI ?

AI is a discipline branch of computer science that deals with creating systems (intelligent agents) that can act autonomously.

ML

# WHAT IS ML ?

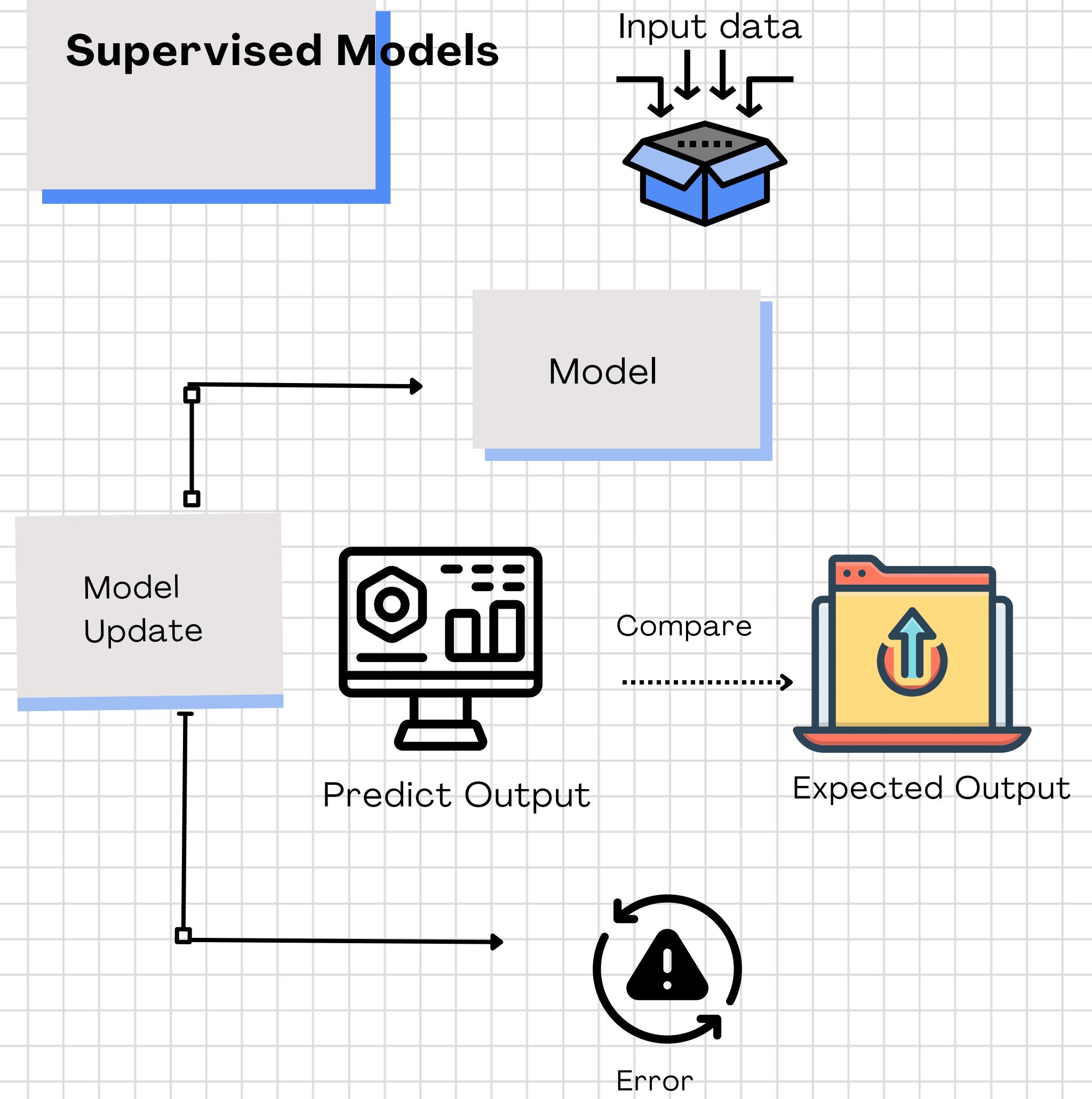
Machine learning (ML) is the field of study that focuses on programs or systems designed to train models for making predictions based on input data



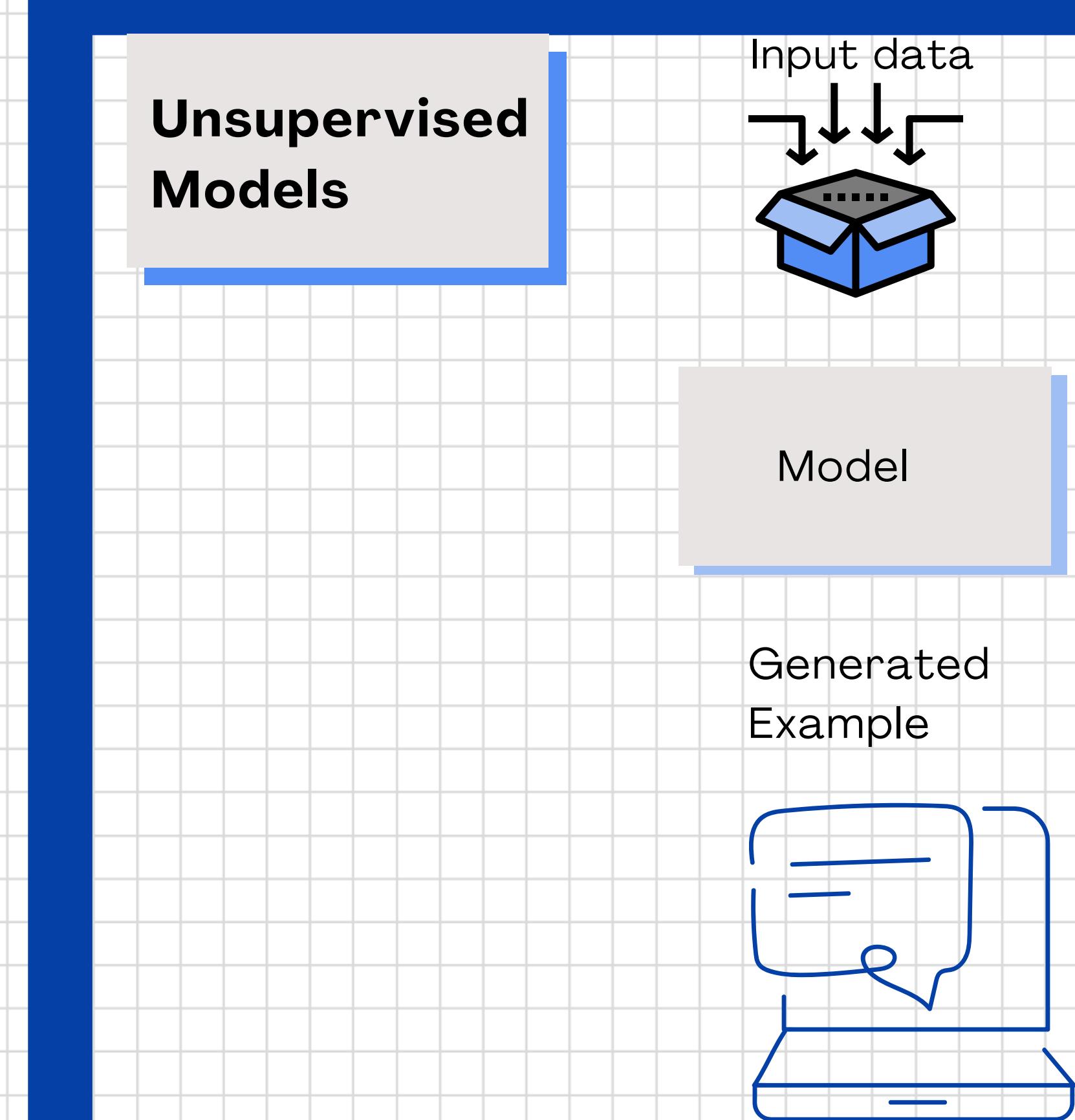
Supervised Models

Unsupervised Models

## Supervised Models



## Unsupervised Models



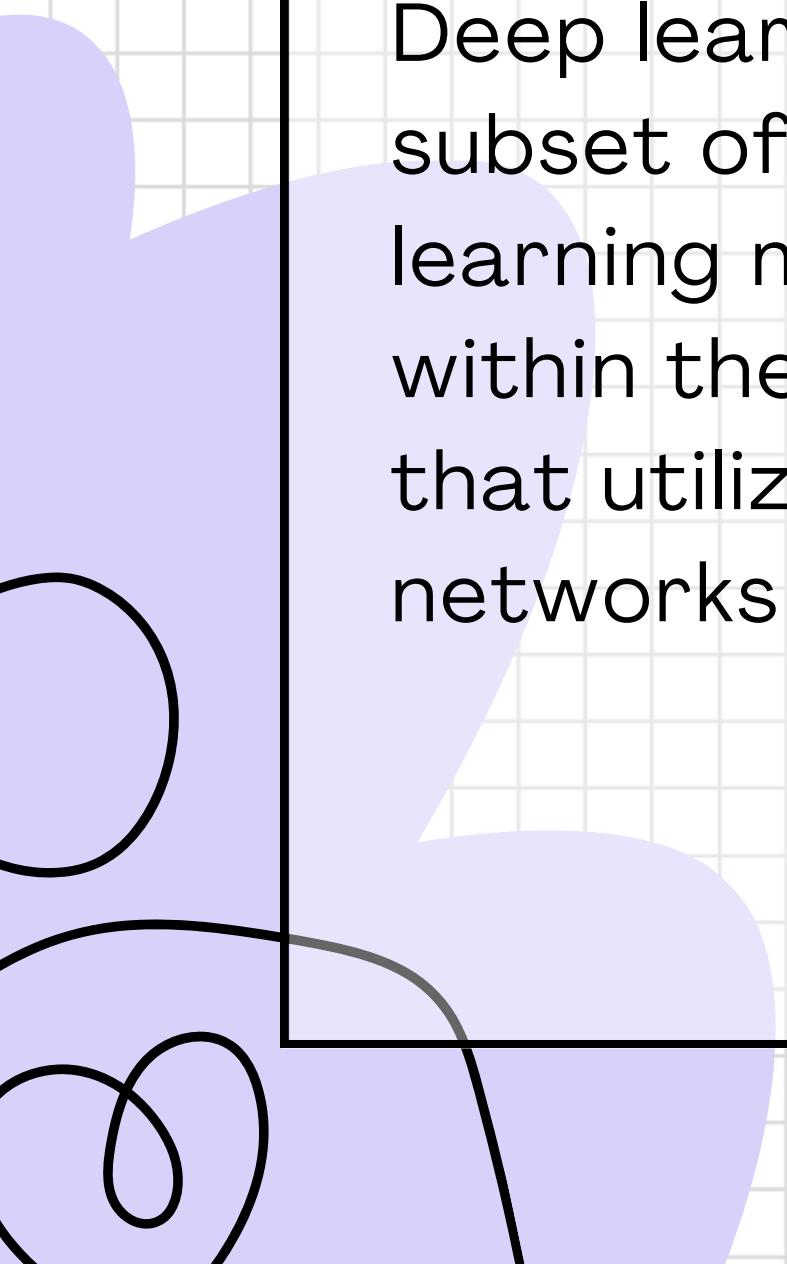
# **WHAT IS DL ?**

Deep learning is a subset of machine learning methods within the AI field that utilize neural networks

AI field

ML

DL

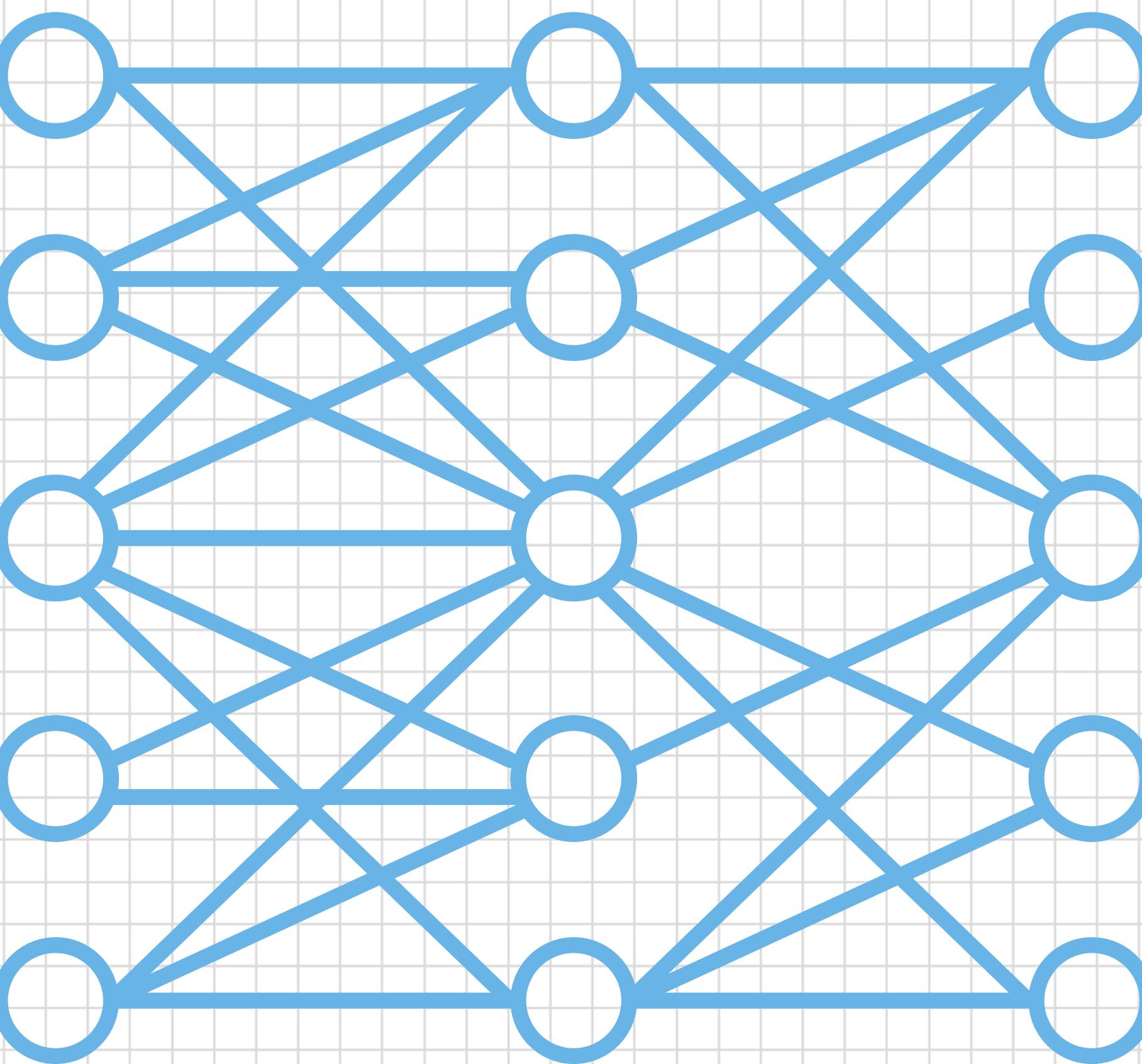


# Neural Networks

Input layer

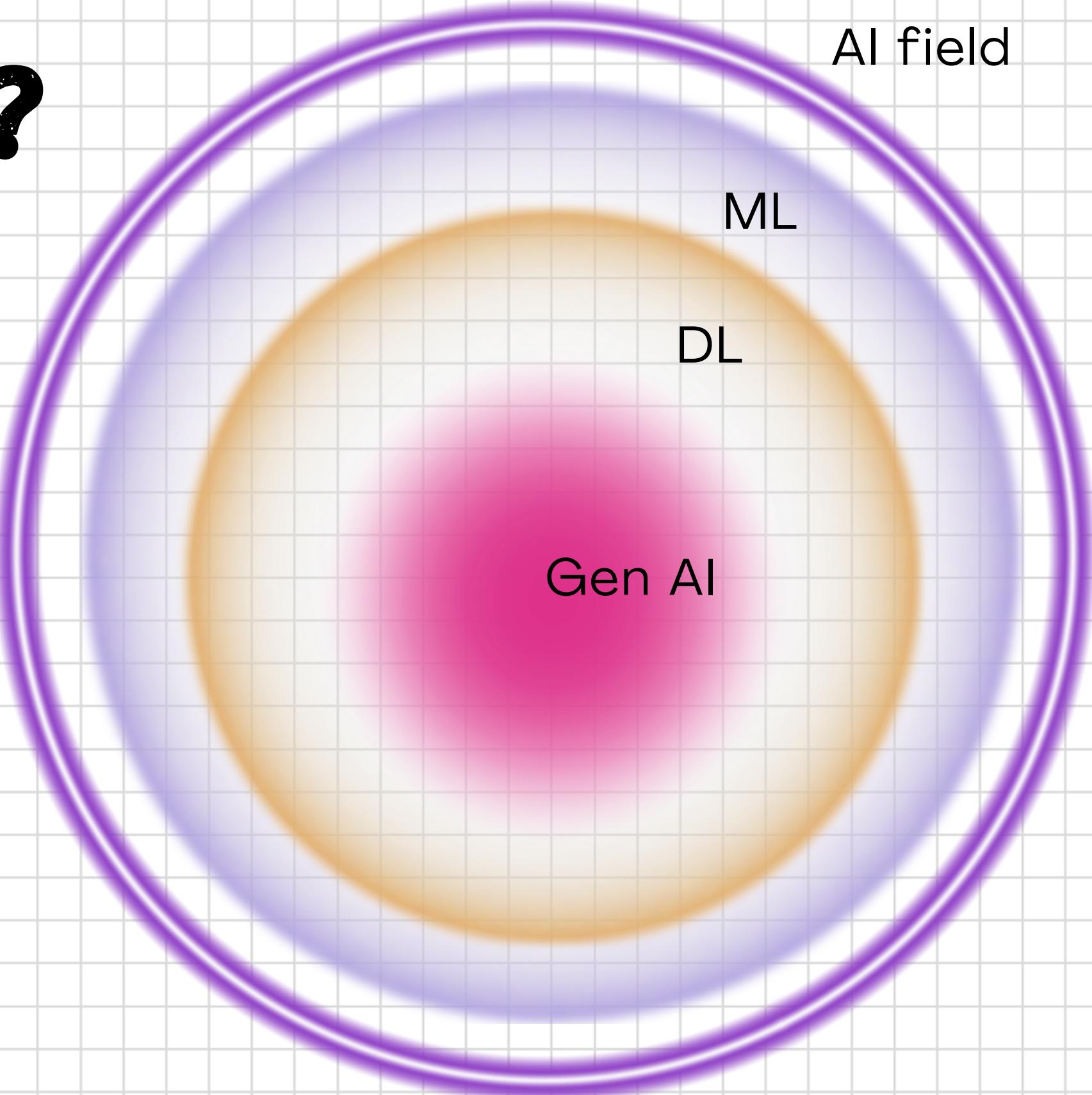
Model Layer

Output Layer



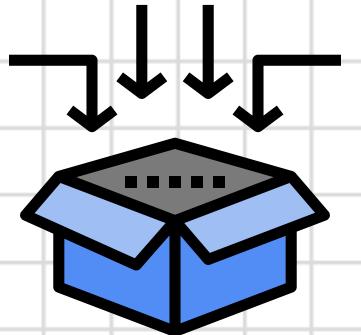
# WHAT IS GEN AI ?

Gen AI process can take training code, labeled data, and unlabeled data of all data types and build a foundation model.



# Gen AI Foundation model

Unstructured  
Content



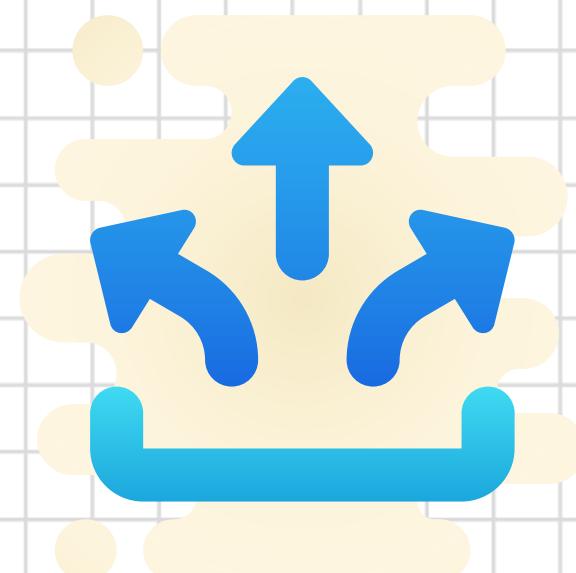
Input

Model



Output

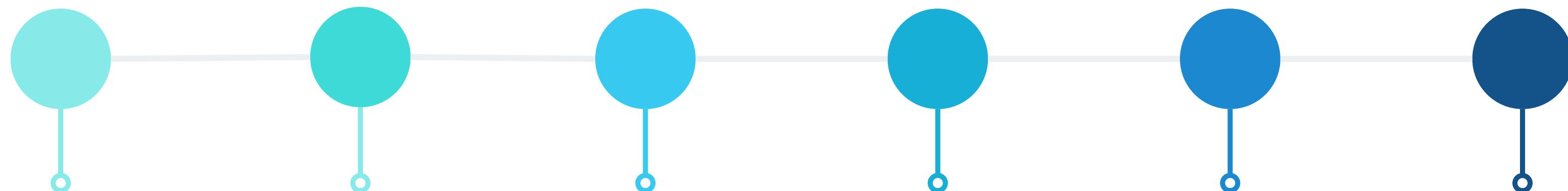
Stable Diffusion



New Content

# OVERVIEW ARTIFICIAL INTELLIGENCE

A brief history



## PRE - 1950

Statistical methods are discovered and refined.

## 1950

Pioneering machine learning research is conducted using simple algorithms.

## 1960

Bayesian methods are introduced for probabilistic inference in machine learning.[1]

## 1970

'AI winter' caused by pessimism about machine learning effectiveness

## 1980

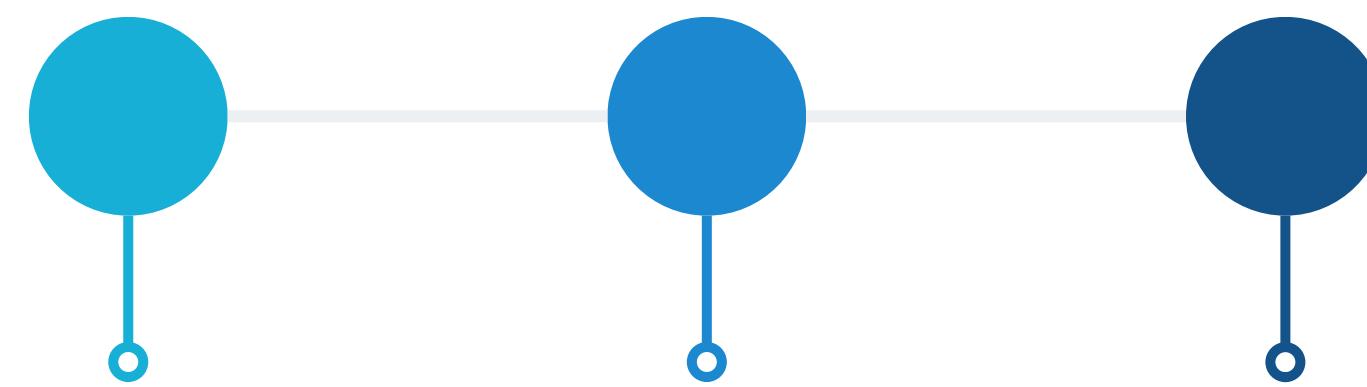
Rediscovery of backpropagation causes a resurgence in machine learning research.

## 1990

Work on Machine learning shifts from a knowledge-driven approach to a data-driven approach.

# OVERVIEW ARTIFICIAL INTELLIGENCE

A brief history



**2000S**

Support-Vector  
Clustering[5] and other  
kernel methods[6] and  
unsupervised machine  
learning methods  
become widespread

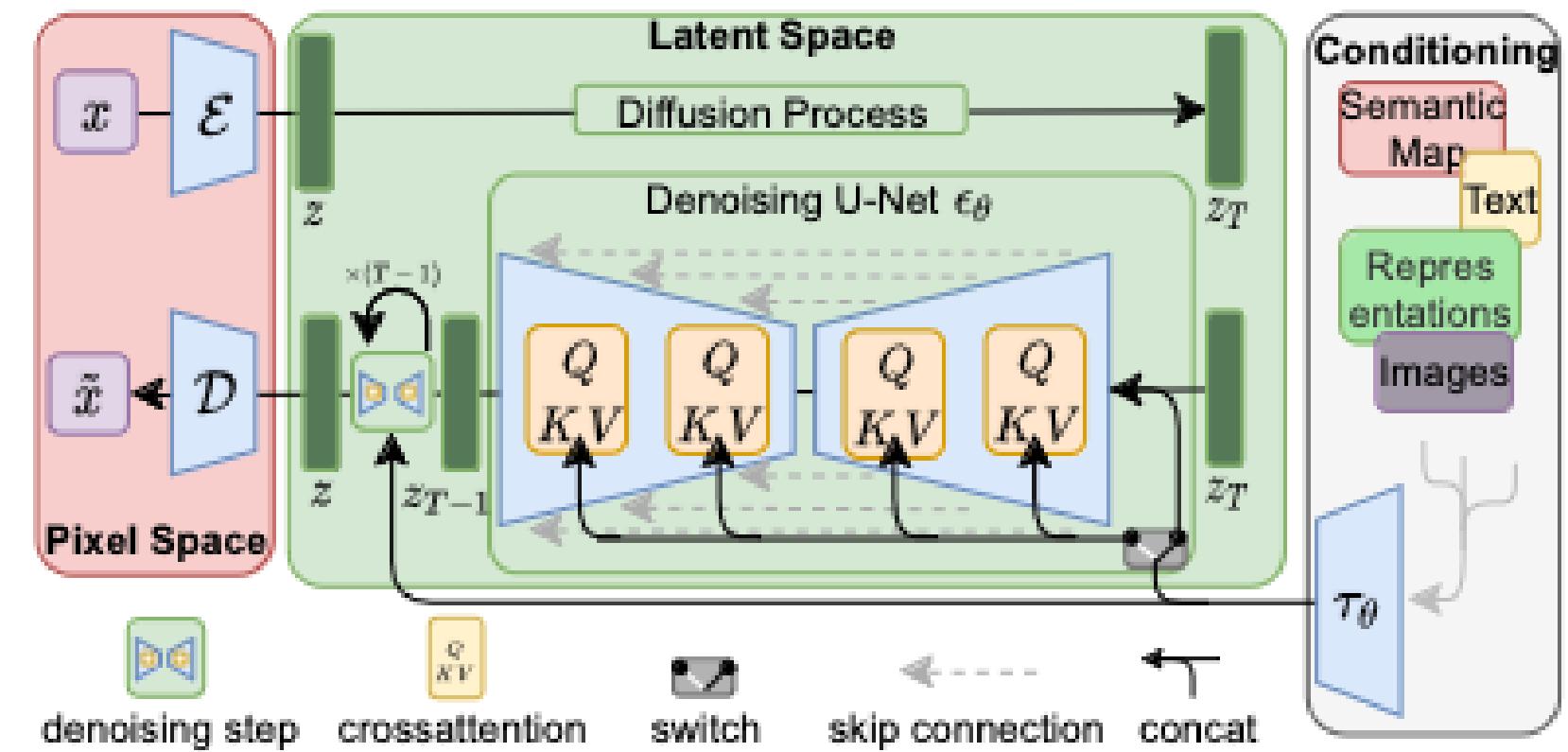
**2010**

Deep learning  
becomes feasible,  
which leads to  
machine learning  
becoming integral to  
many widely used  
software services and  
applications.

**2020**

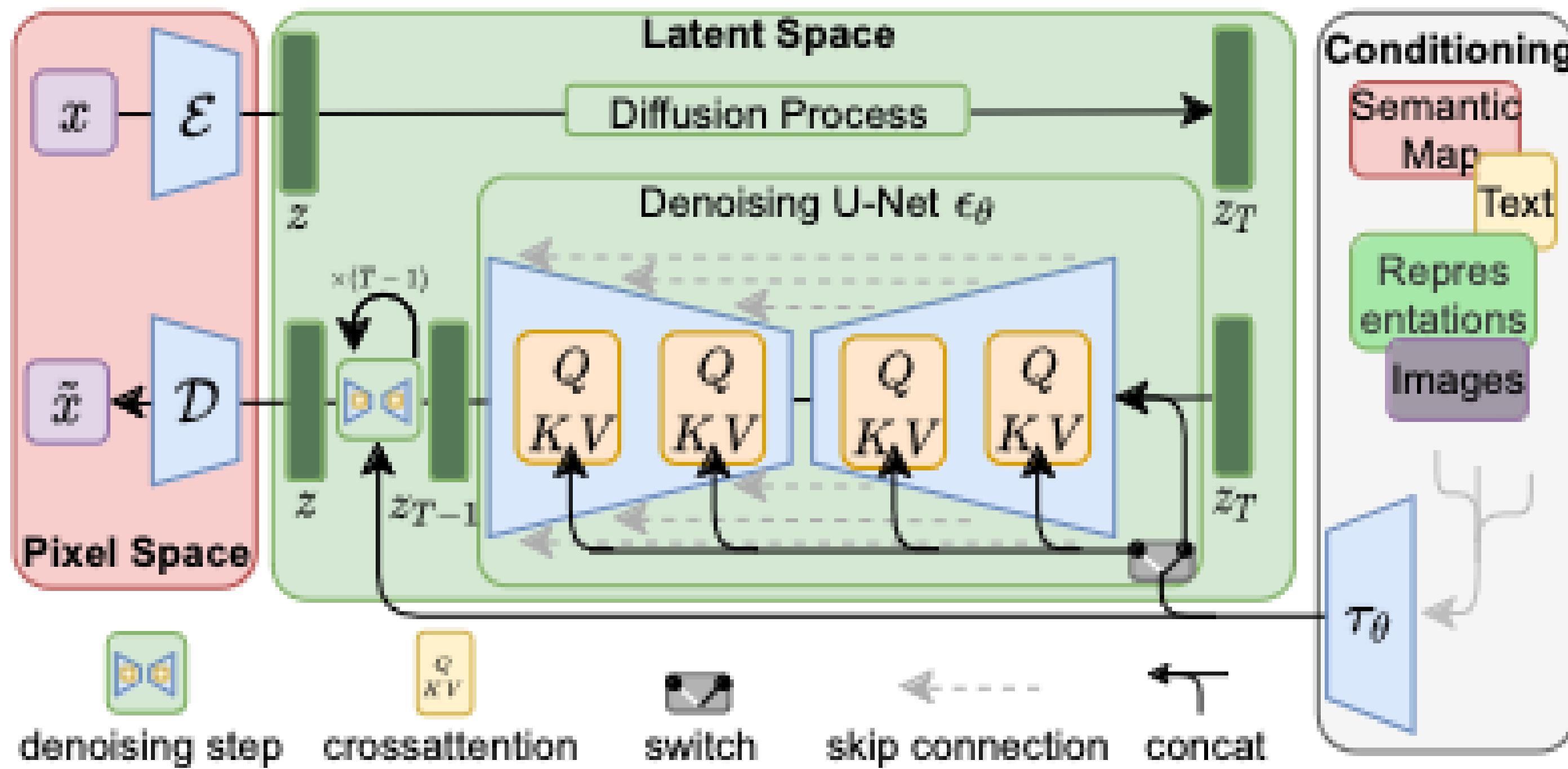
Generative AI leads to revolutionary  
models, creating a proliferation of  
foundation models both proprietary  
and open source, notably enabling  
products such as ChatGPT (text-  
based) and Stable Diffusion (image  
based)

# HOW DOES STABLE DIFFUSION WORK?

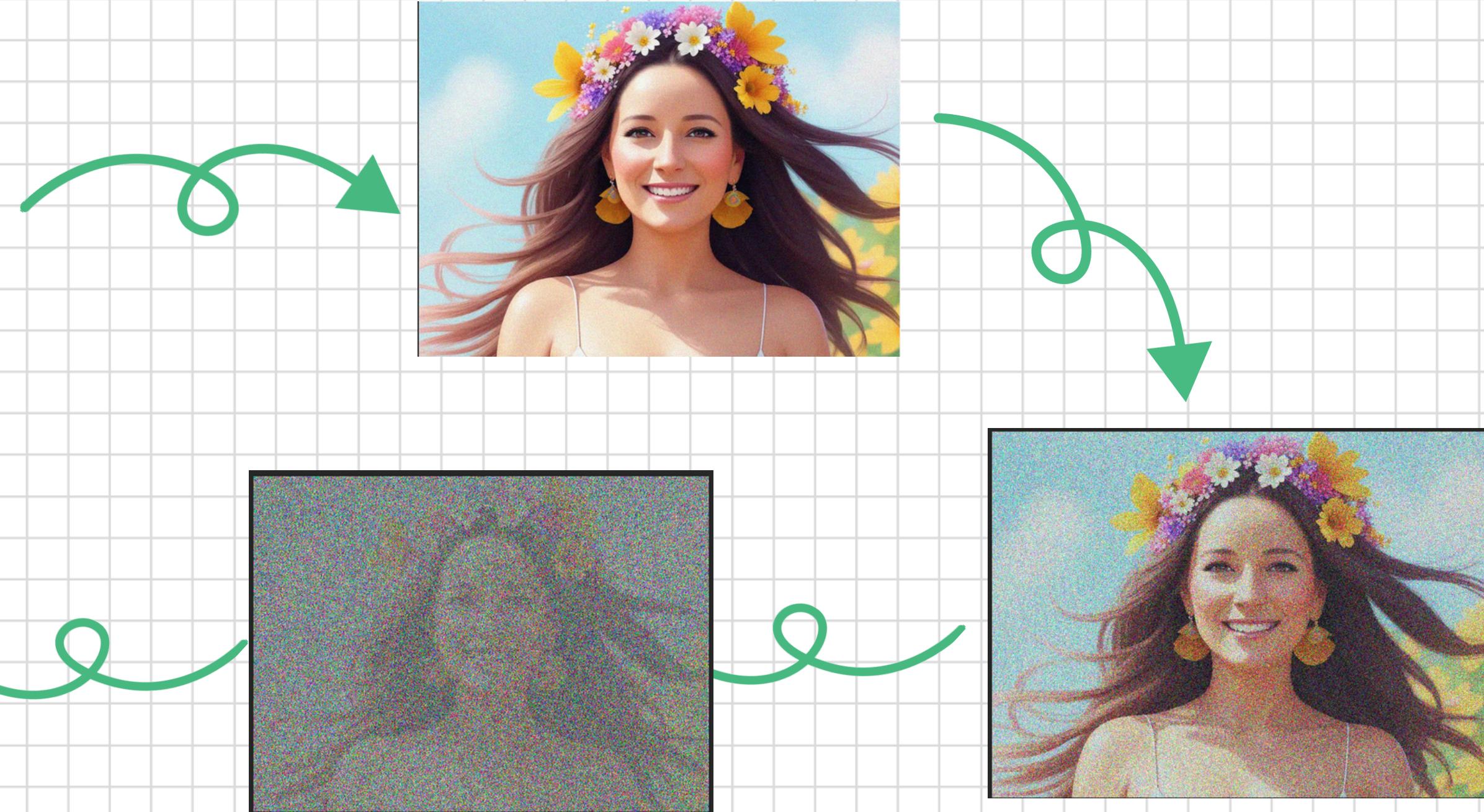


Diffusion models rely on the fact that we have powerful computer vision models. Given a large enough dataset, these models can learn complex operations.

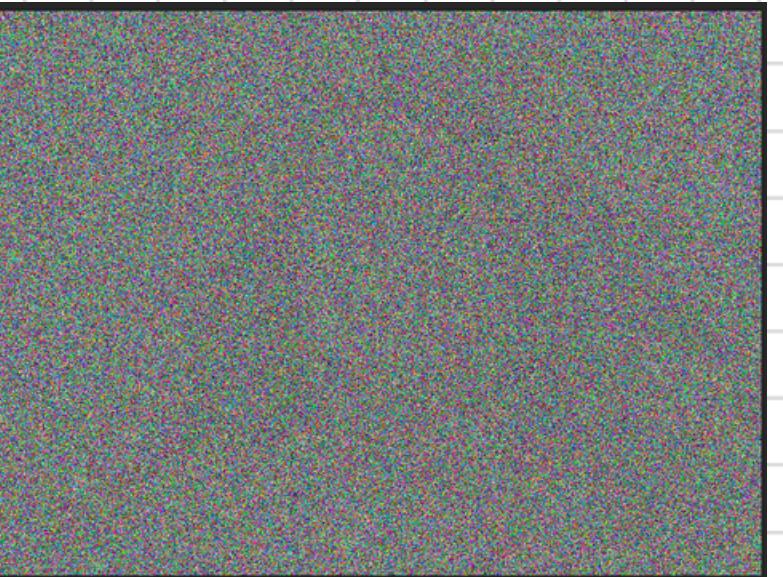
# HOW DOES STABLE DIFFUSION WORK?



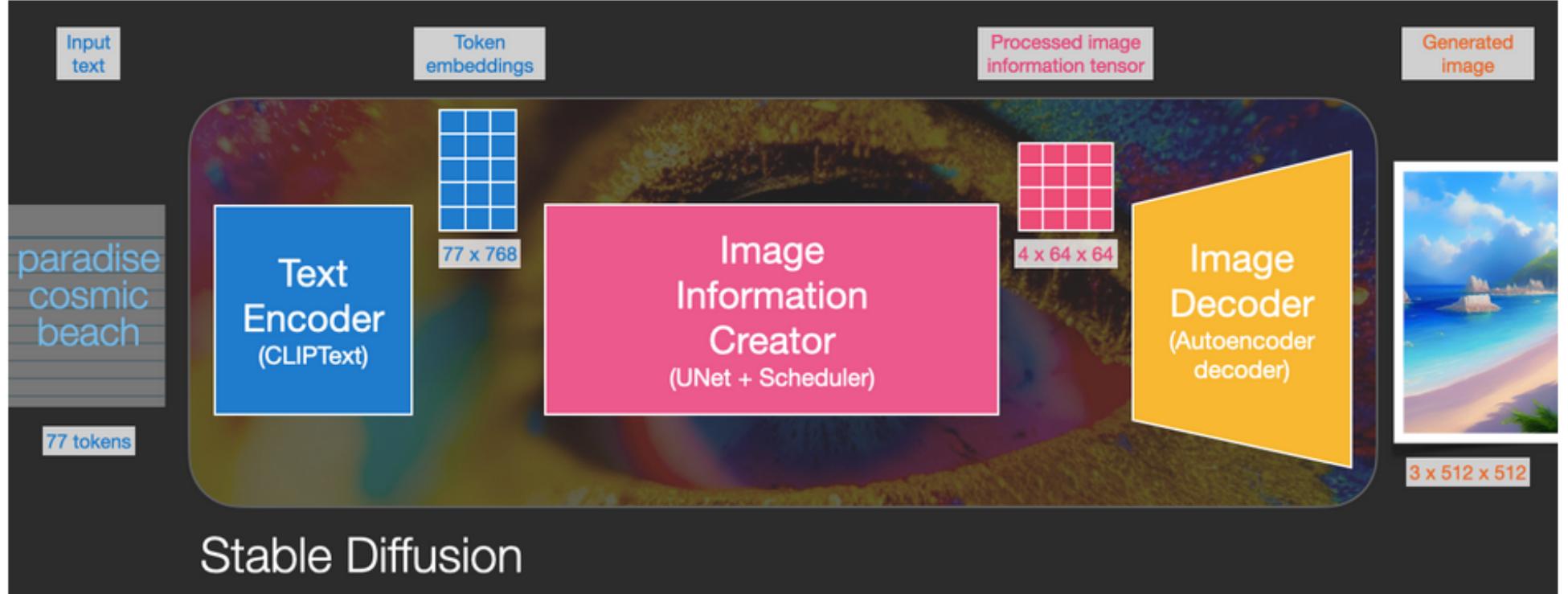
# HOW DOES STABLE DIFFUSION WORK?



# HOW DOES STABLE DIFFUSION WORK?



# WHY STABLE DIFFUSION?



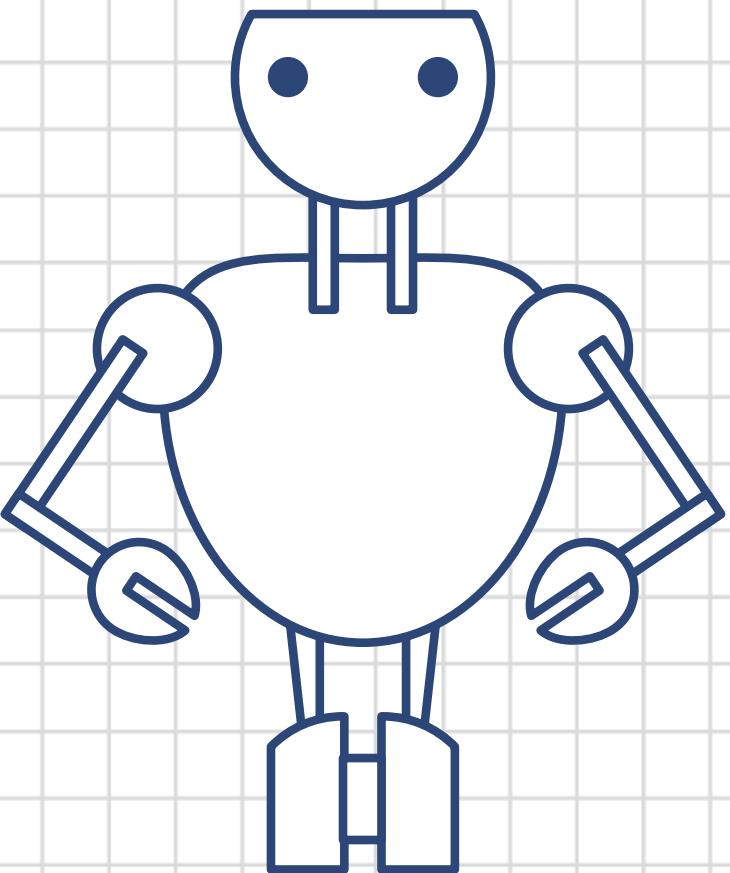
## 1 Is Free (\*)

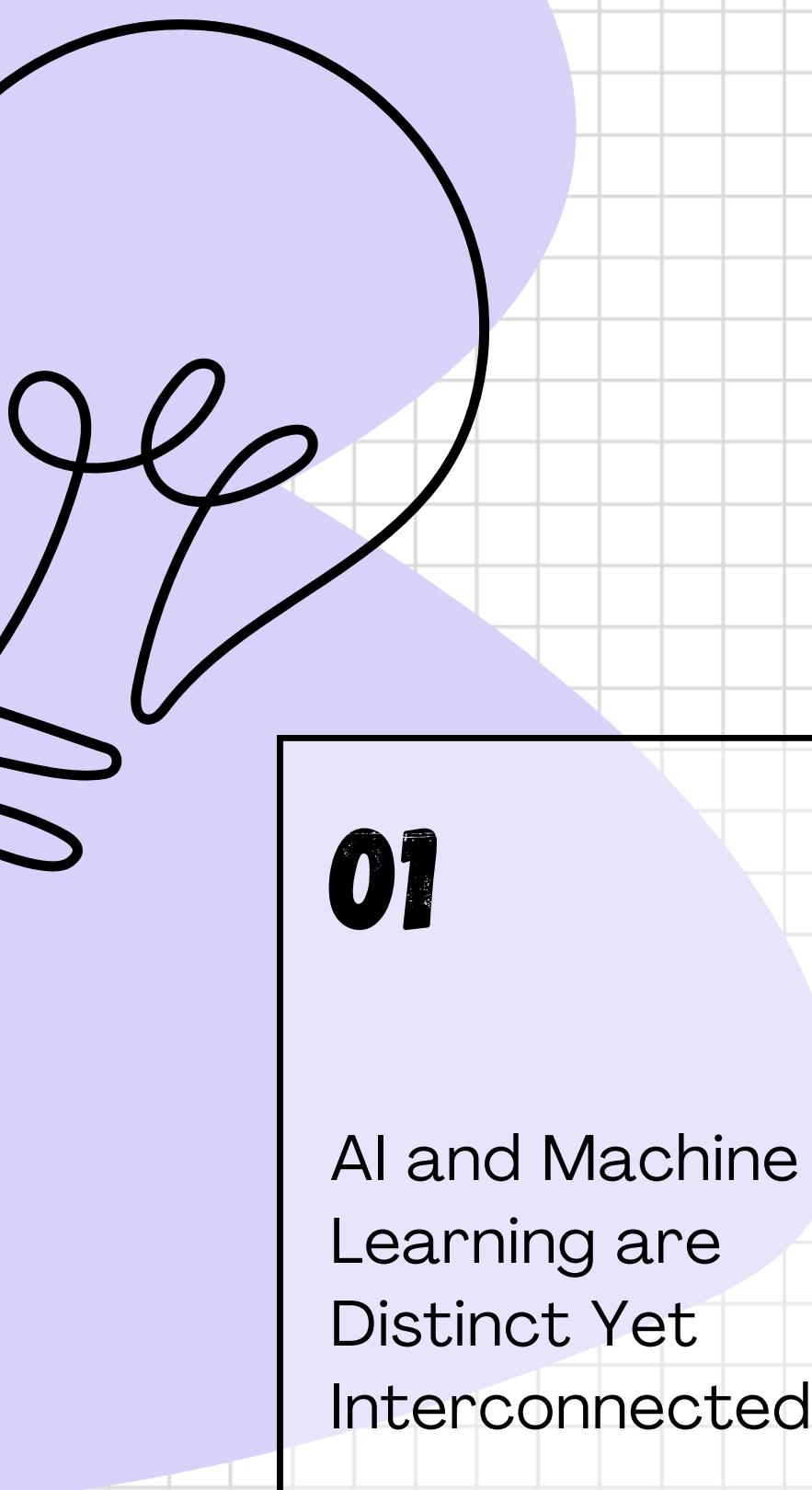
Except for GPU costs

## 2 Open Source

## 3 Low computational requirements

Time to see some  
Notebooks and  
code





# CONCLUSIONS

**01**

AI and Machine Learning are Distinct Yet Interconnected

**02**

Stable Diffusion as a Foundation Model in Generative AI

**03**

The Evolution of AI Technologies is Rapid and Significant

**04**

Accessibility and Practical and Bias Application of Generative AI Tools

