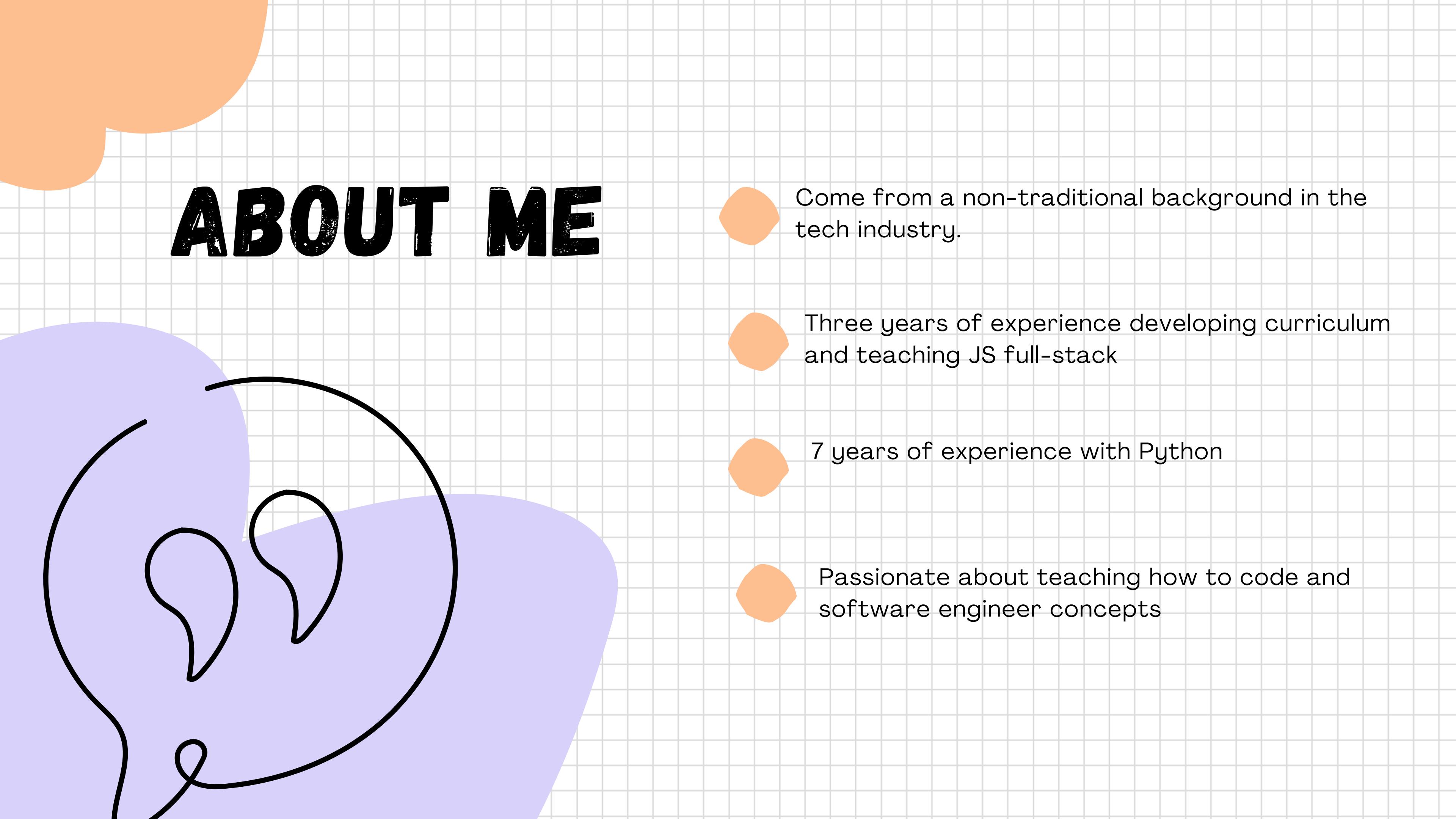


INTRODUCTION to GENERATIVE AI

Cristina Rodriguez
WWC Seattle 2024



ABOUT ME

Come from a non-traditional background in the tech industry.

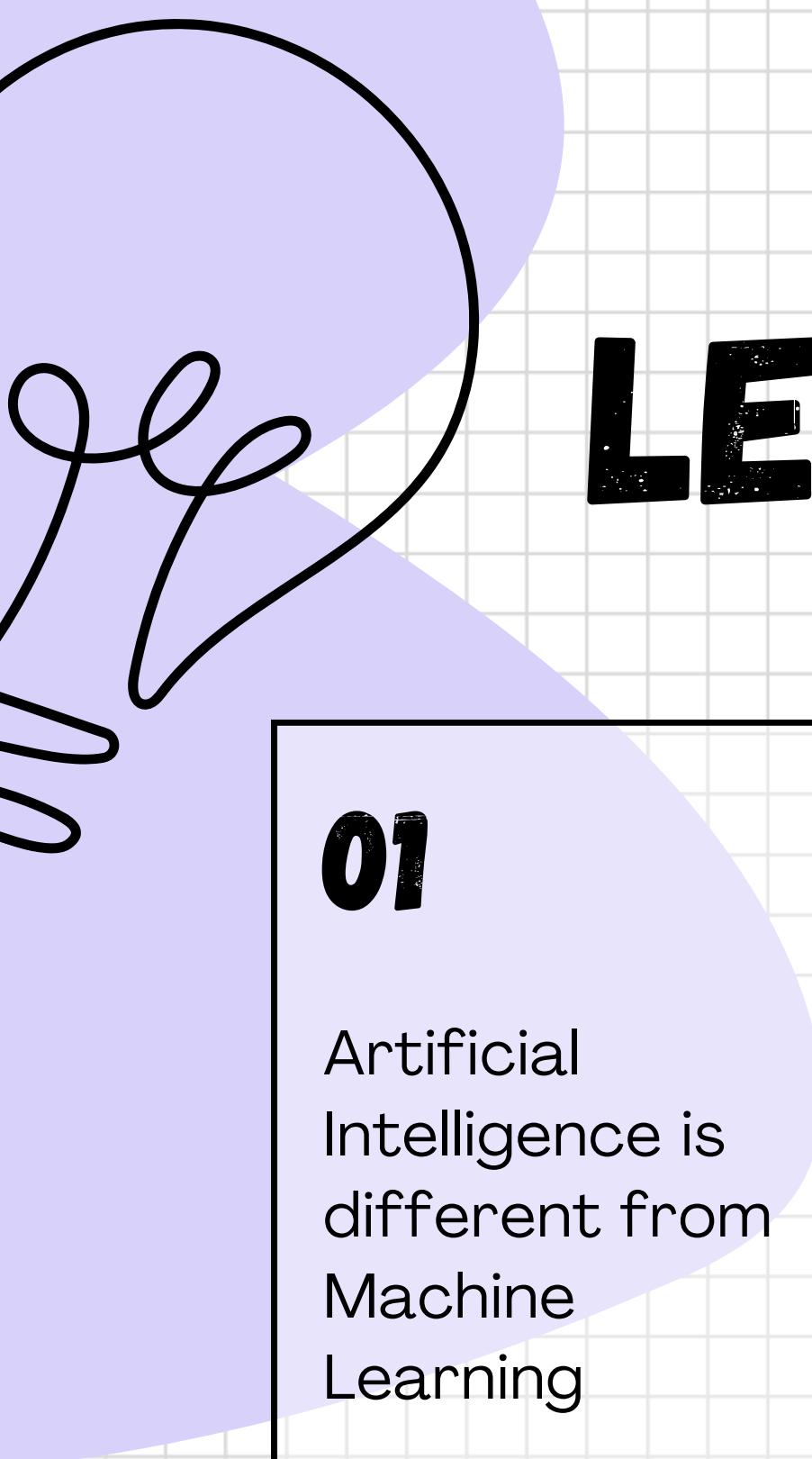
Three years of experience developing curriculum and teaching JS full-stack

7 years of experience with Python

Passionate about teaching how to code and software engineer concepts

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

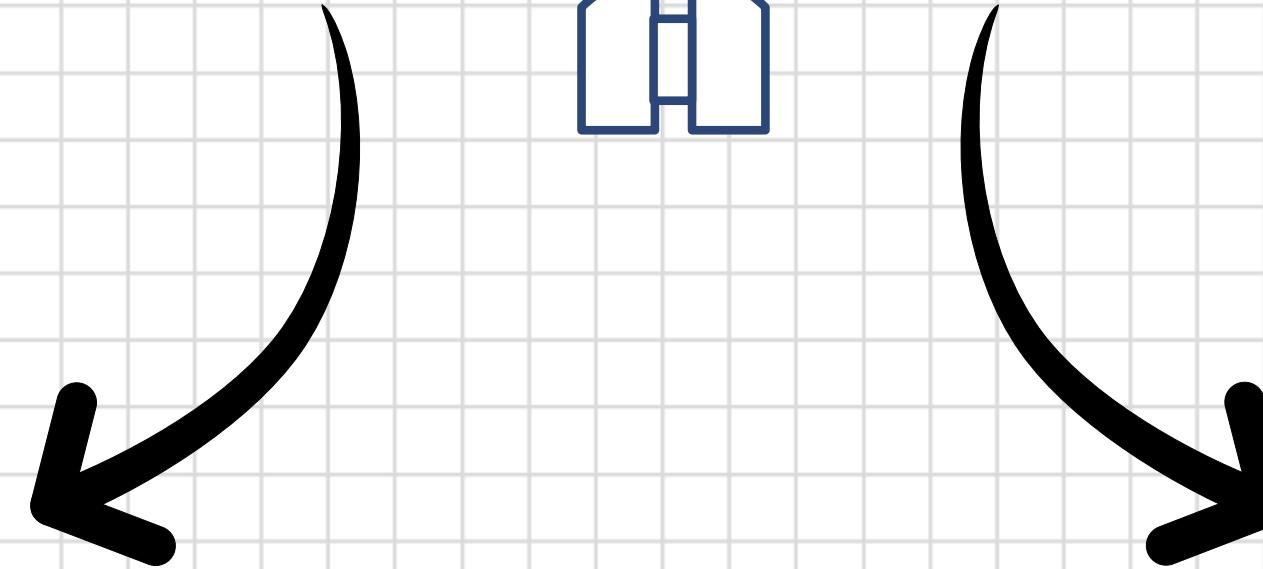
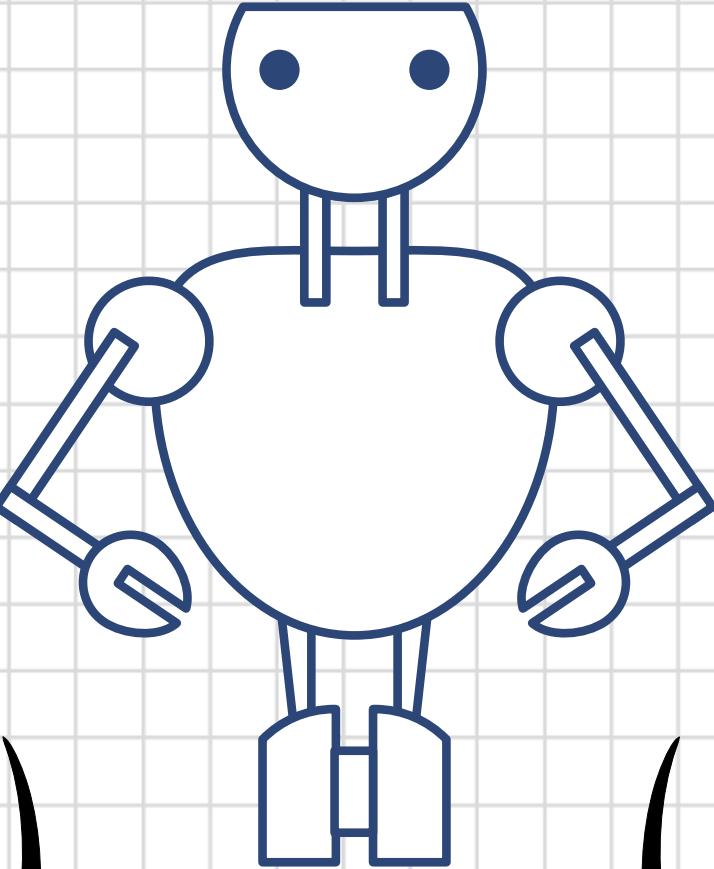
WHAT IS AI ?

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

ML

WHAT IS ML ?

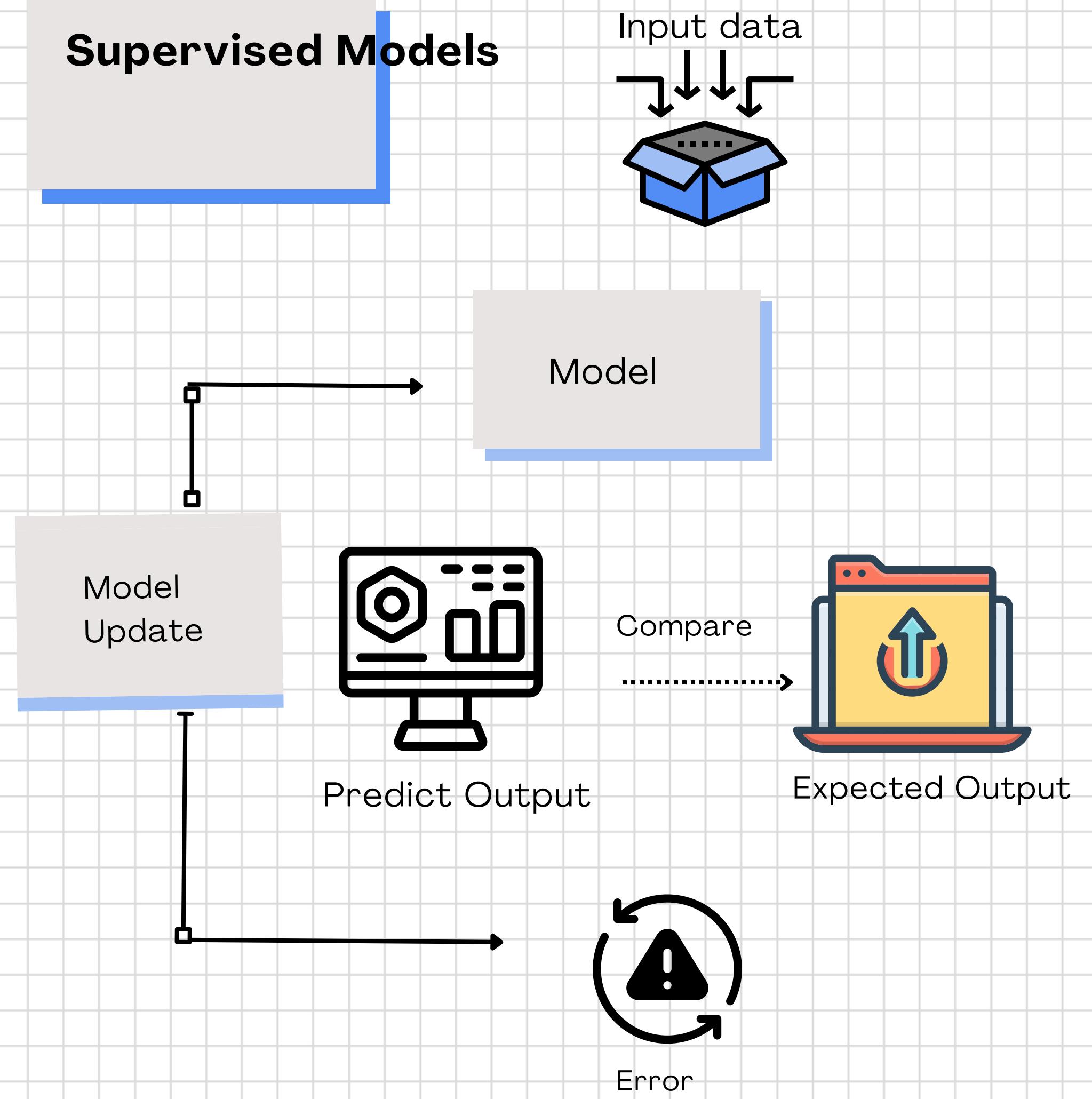
Machine learning (ML) is the field of study that focuses on programs or systems designed to train models for making predictions based on input data



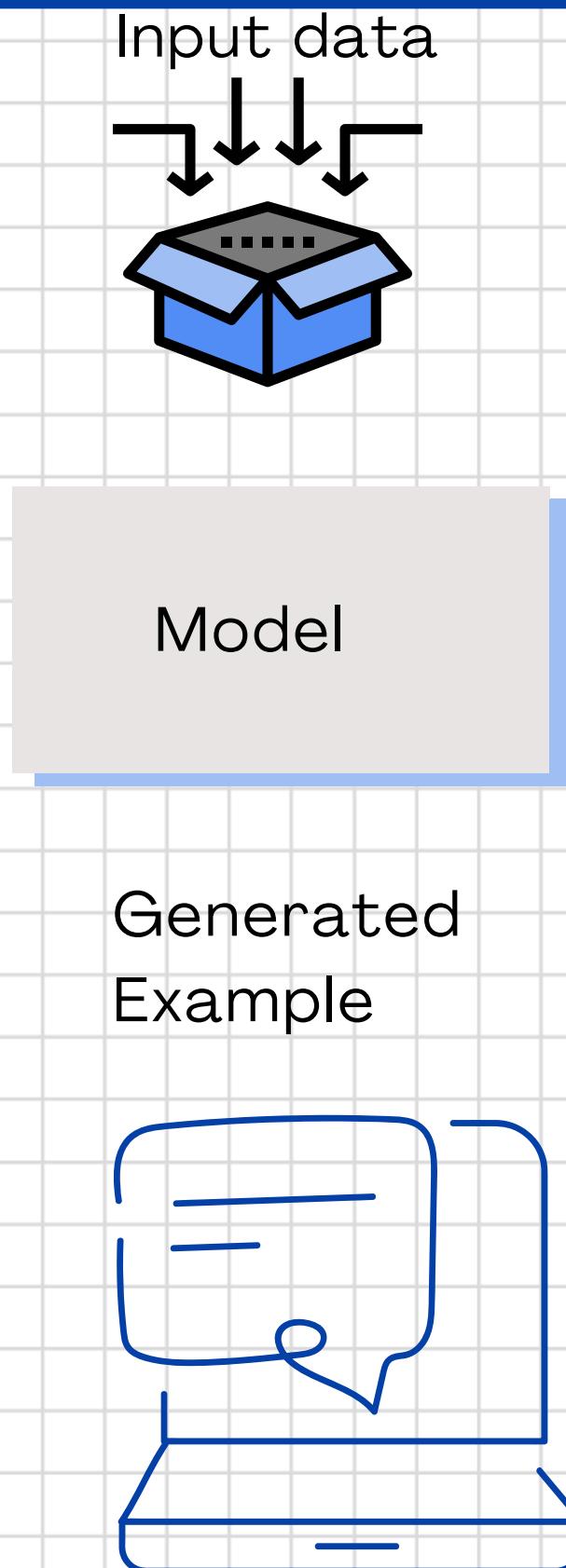
Supervised Models

Unsupervised Models

Supervised Models



Unsupervised Models



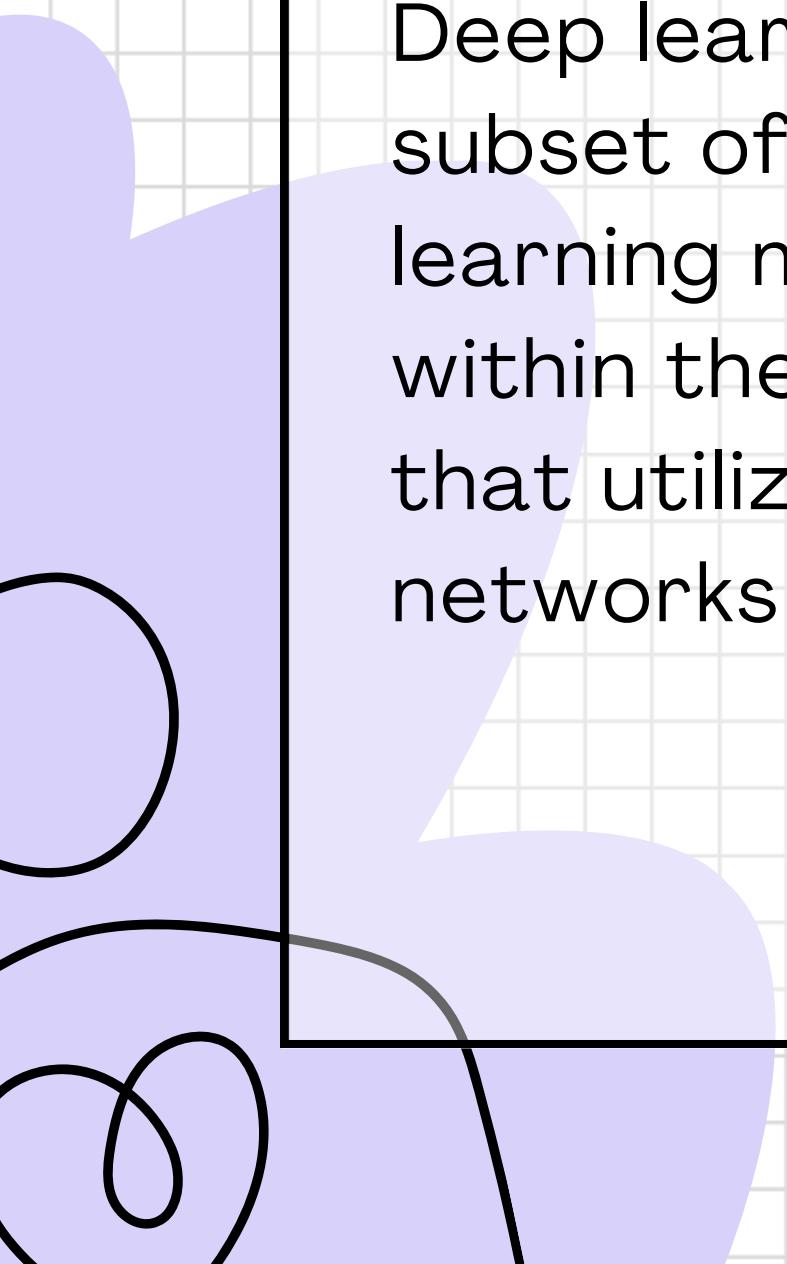
WHAT IS DL ?

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

AI field

ML

DL



Neural Networks

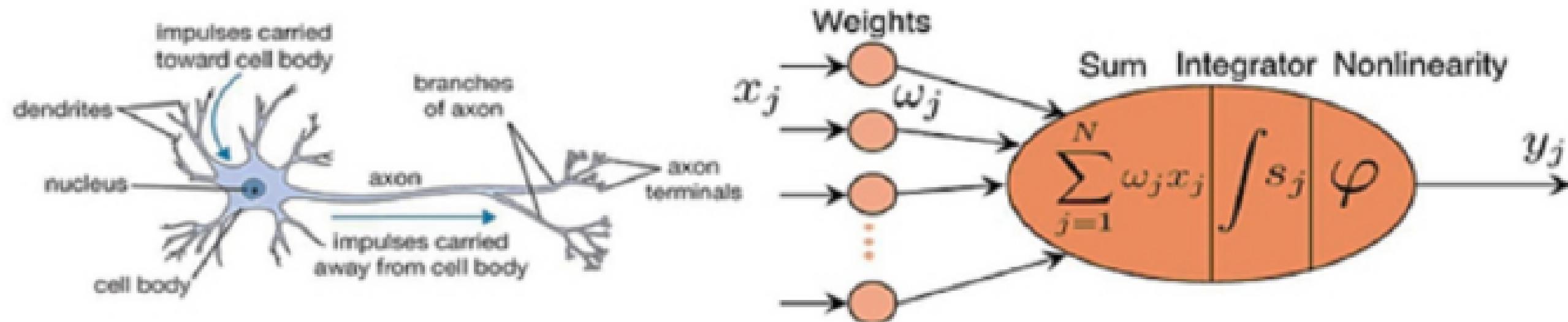


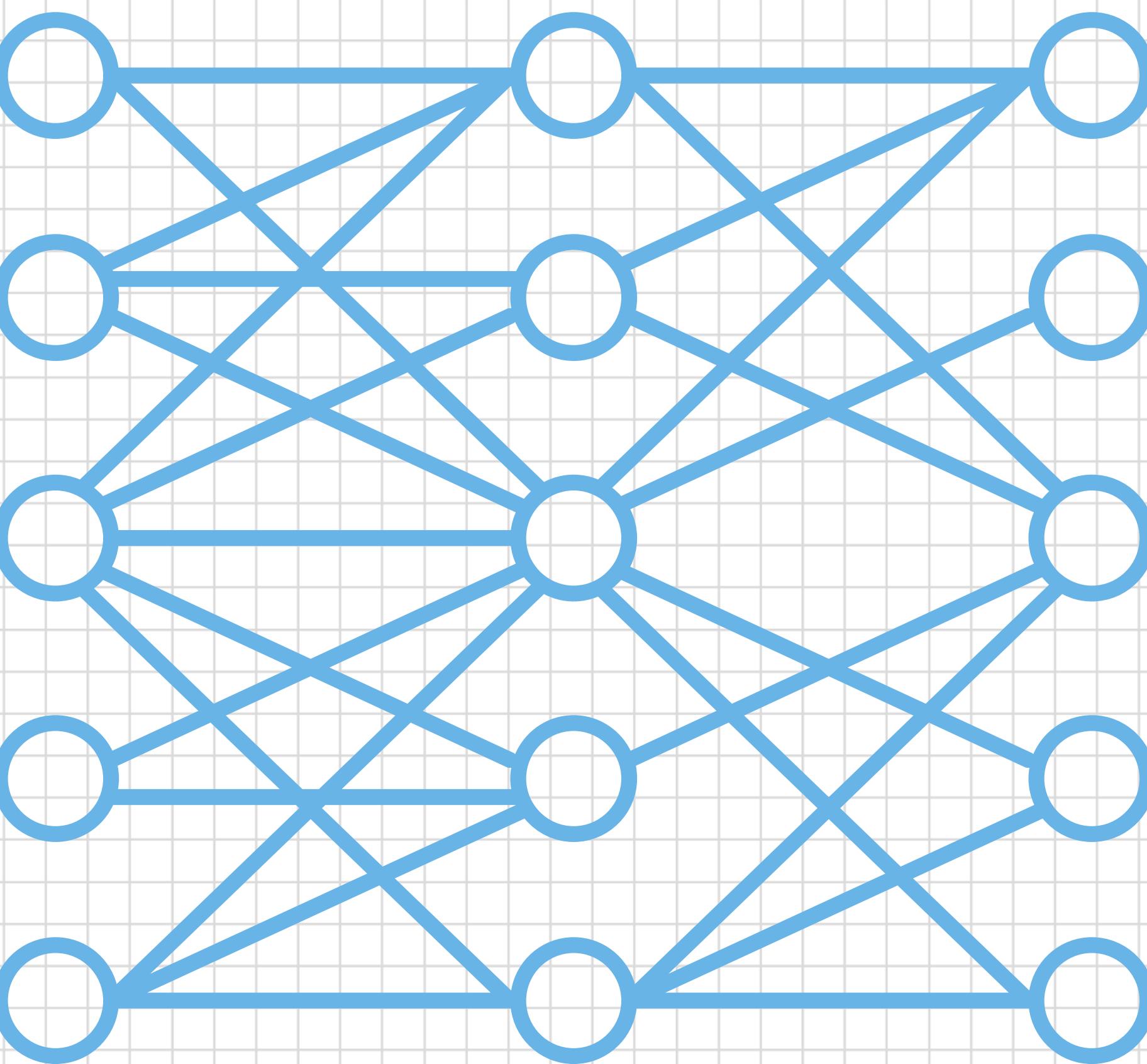
Figure 1 Biological Neuron and the Mathematical Computations it Inspired

Neural Networks

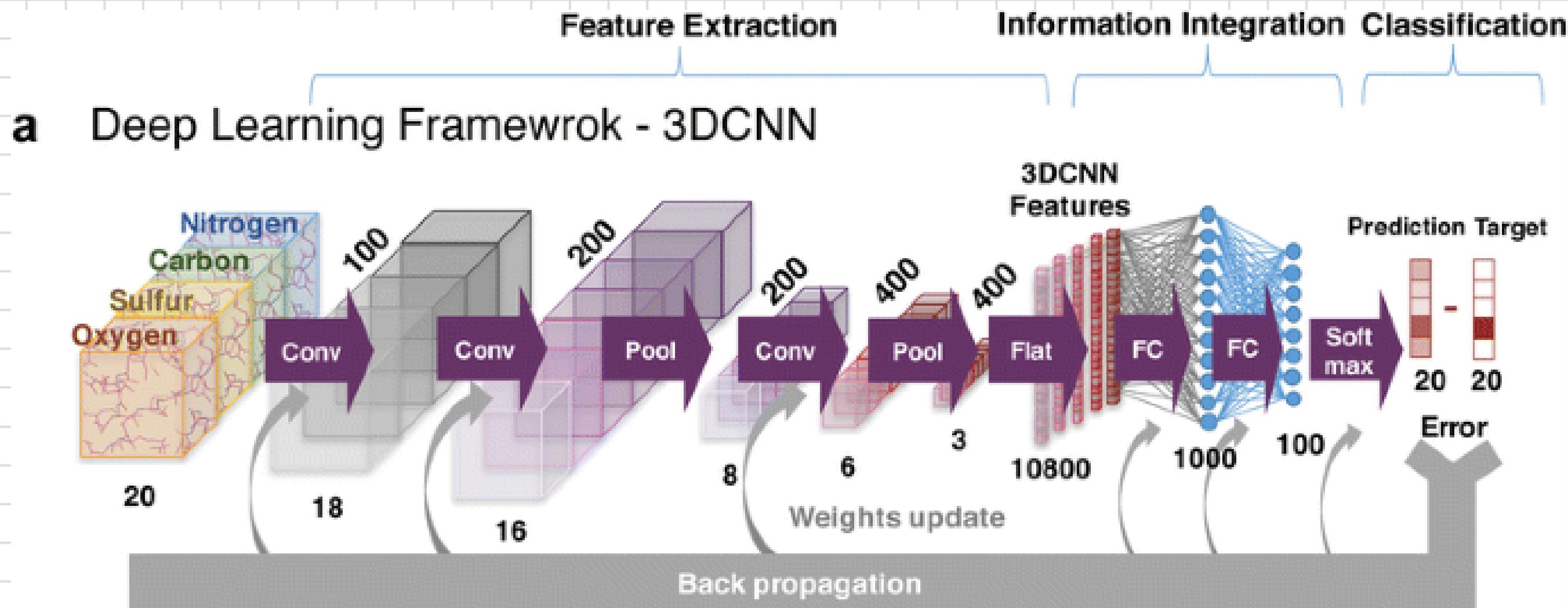
Input layer

Model Layer

Output Layer



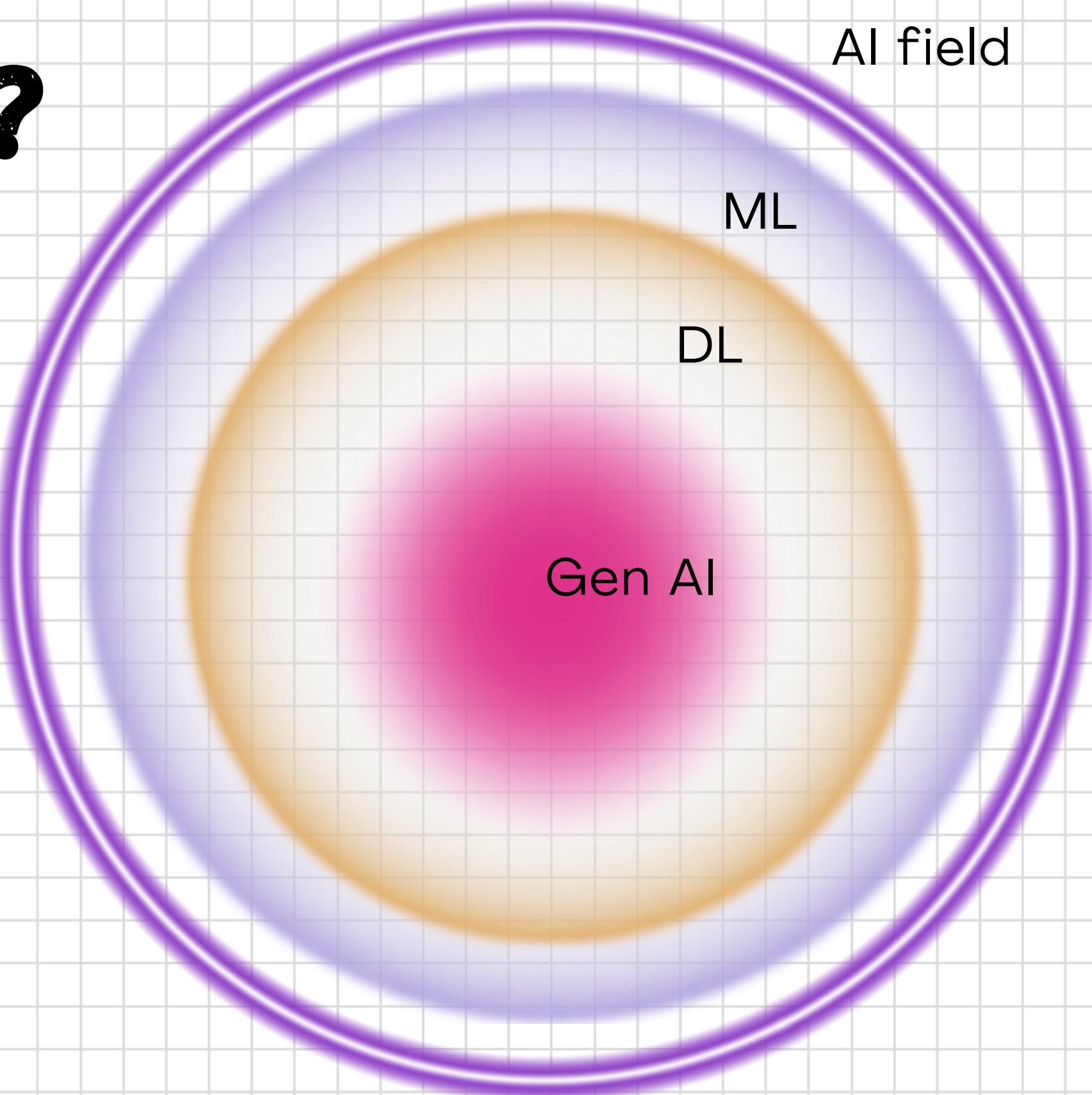
Neural Networks



Source: 3D deep convolutional neural networks for amino acid environment similarity analysis

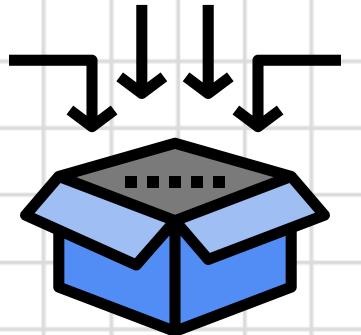
WHAT IS GEN AI ?

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



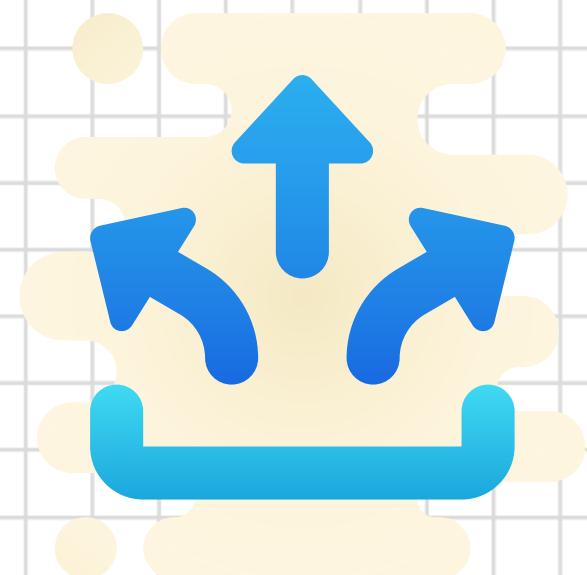
Input

Model



Output

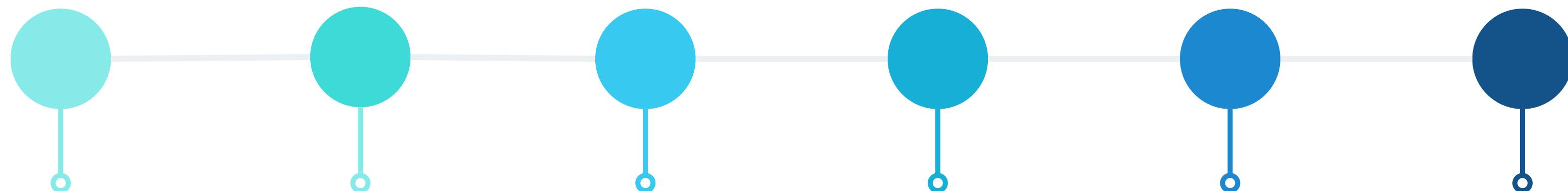
Stable Diffusion



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

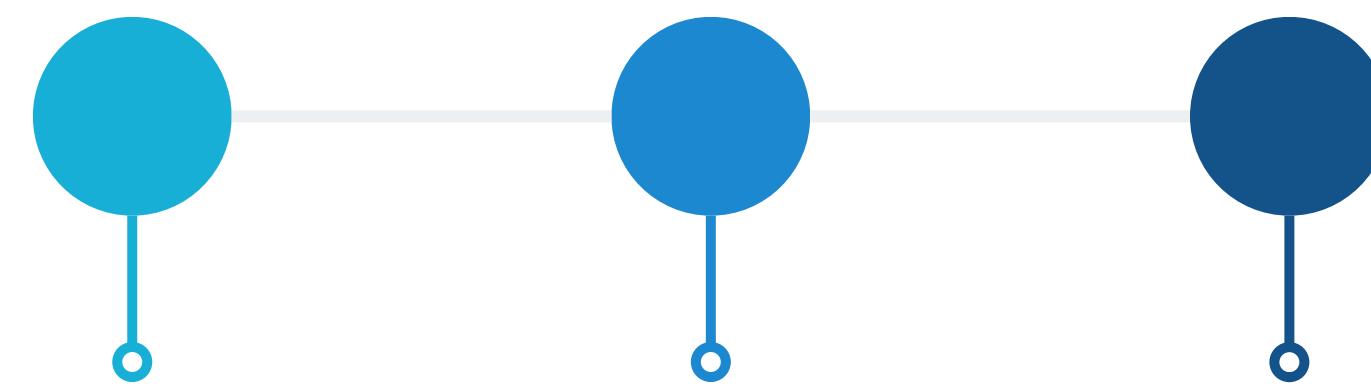
Rediscovery of backpropagation causes a resurgence in machine learning research.

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

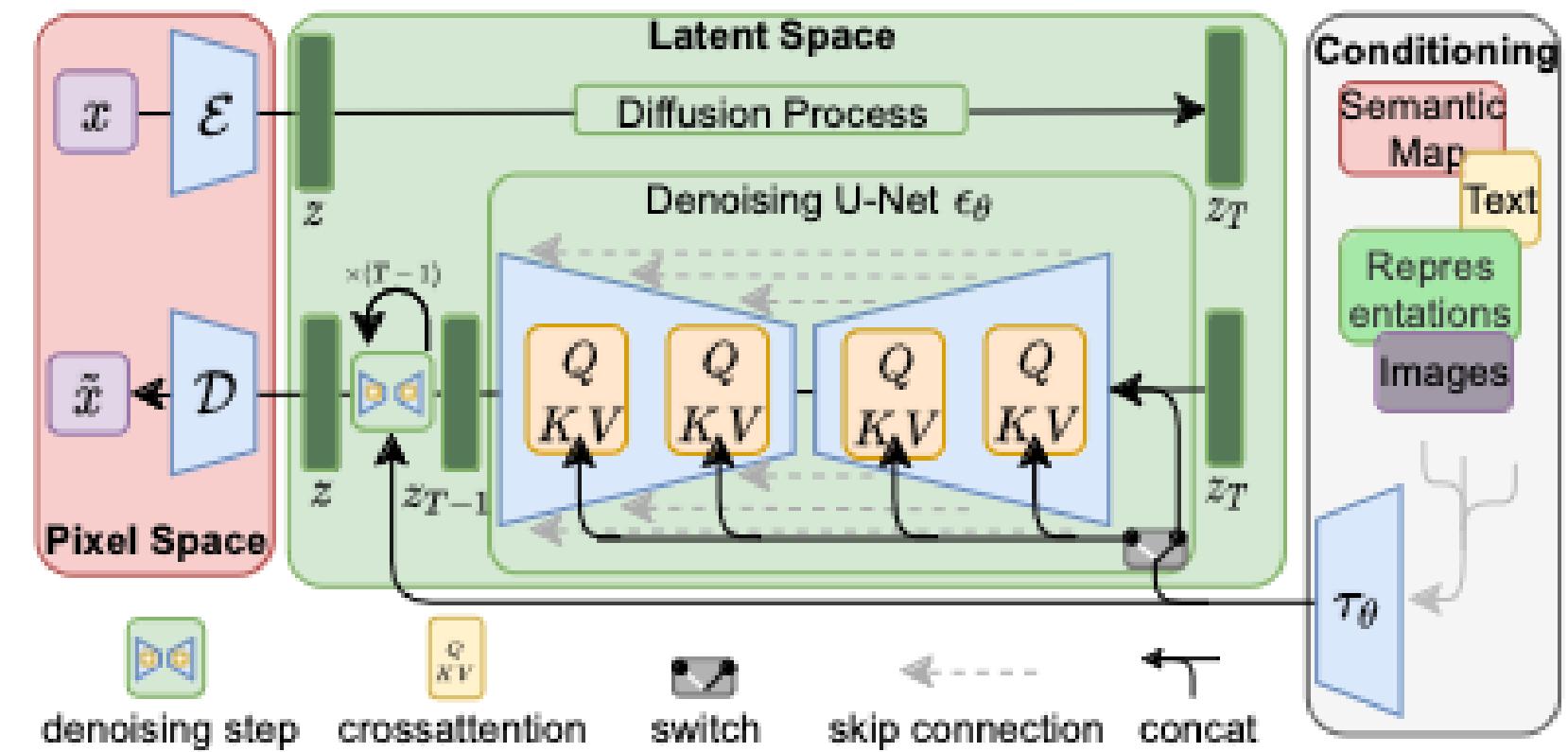
2010

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

2020

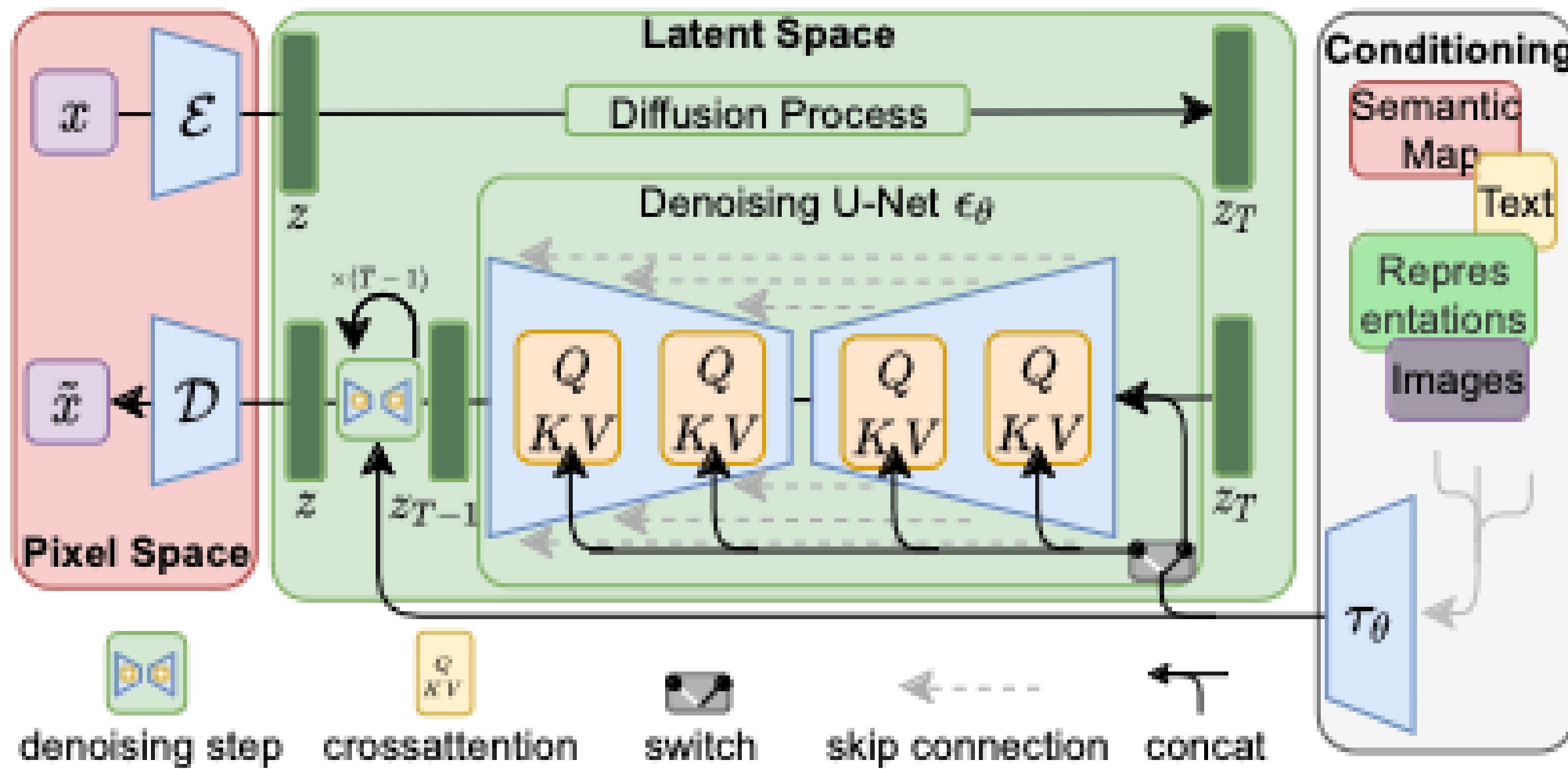
Generative AI leads to revolutionary
models, creating a proliferation of
foundation models both proprietary
and open source, notably enabling
products such as ChatGPT (text-
based) and Stable Diffusion (image
based)

HOW DOES STABLE DIFFUSION WORK?

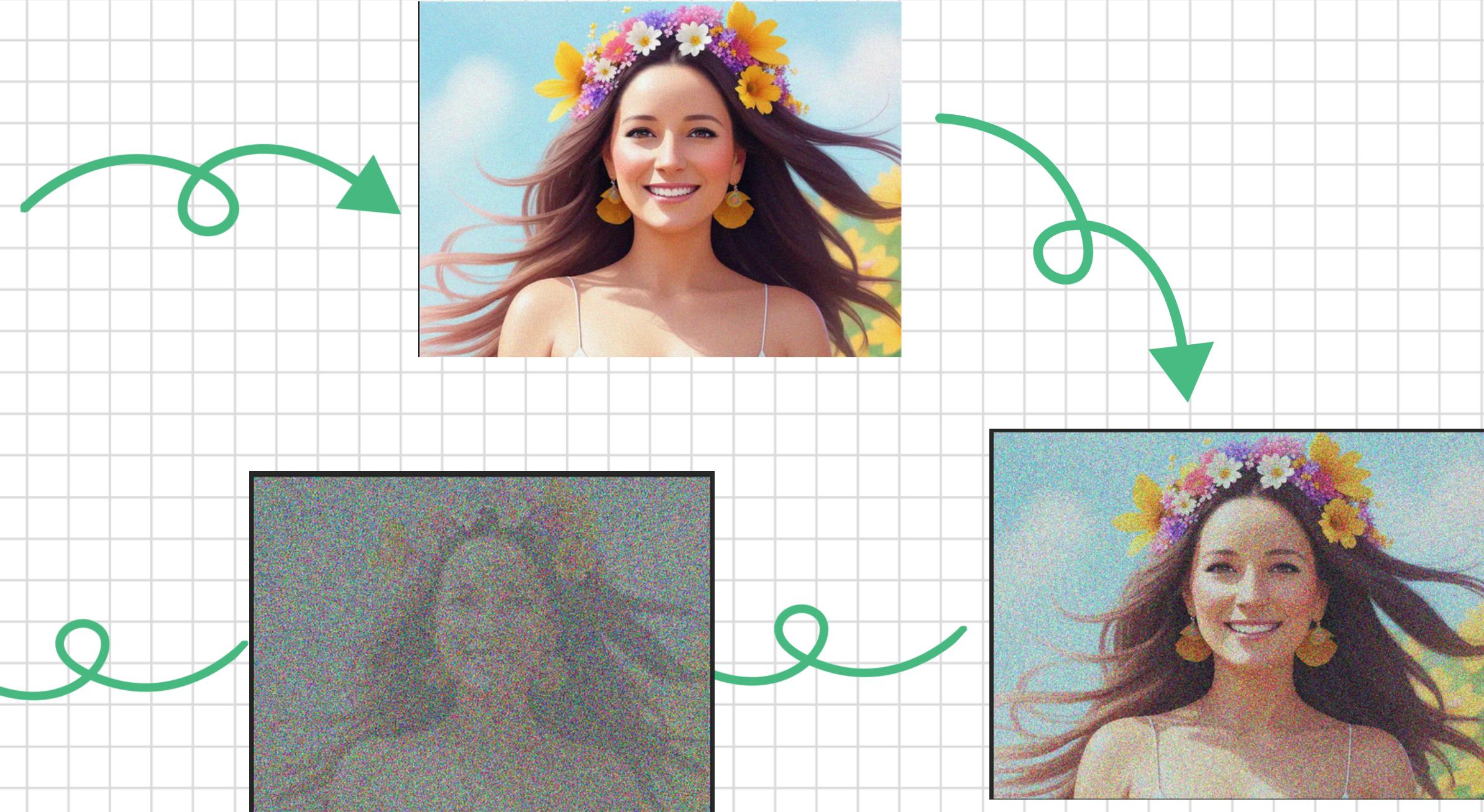


Diffusion models rely on the fact that we have powerful computer vision models. Given a large enough dataset, these models can learn complex operations.

HOW DOES STABLE DIFFUSION WORK?

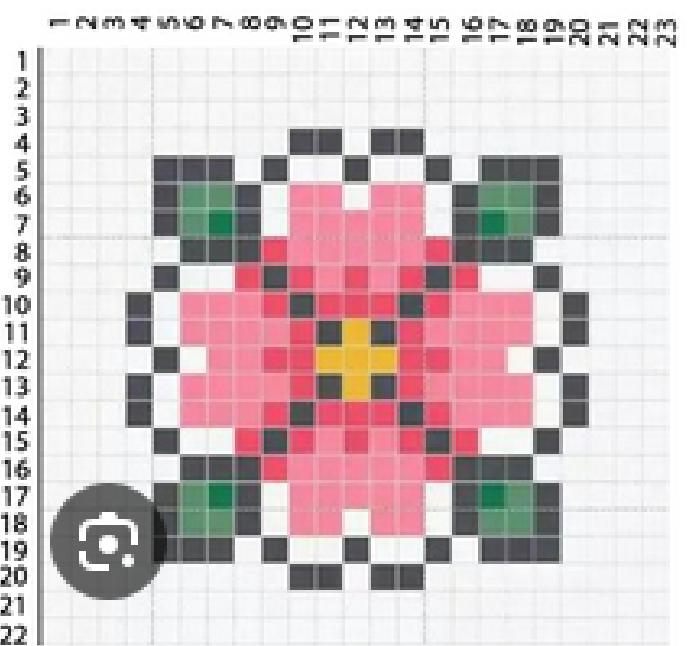


HOW DOES STABLE DIFFUSION WORK?

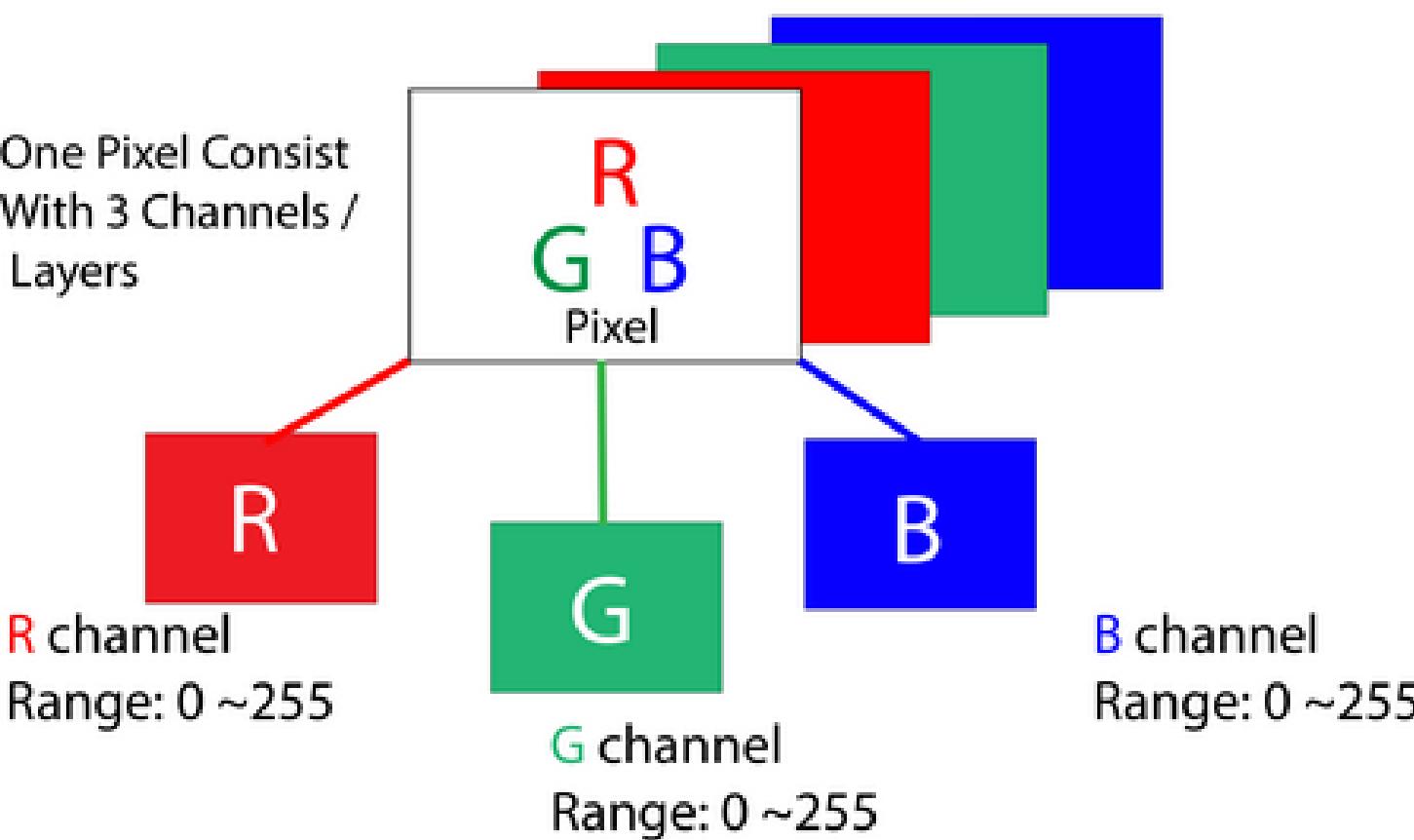


HOW DOES STABLE DIFFUSION WORK?

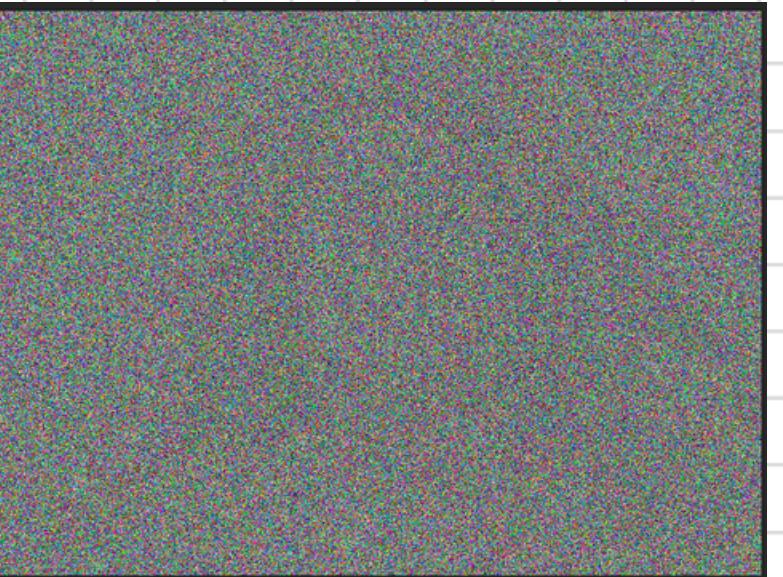
Mixing different intensities of each color gives us the full color spectrum.



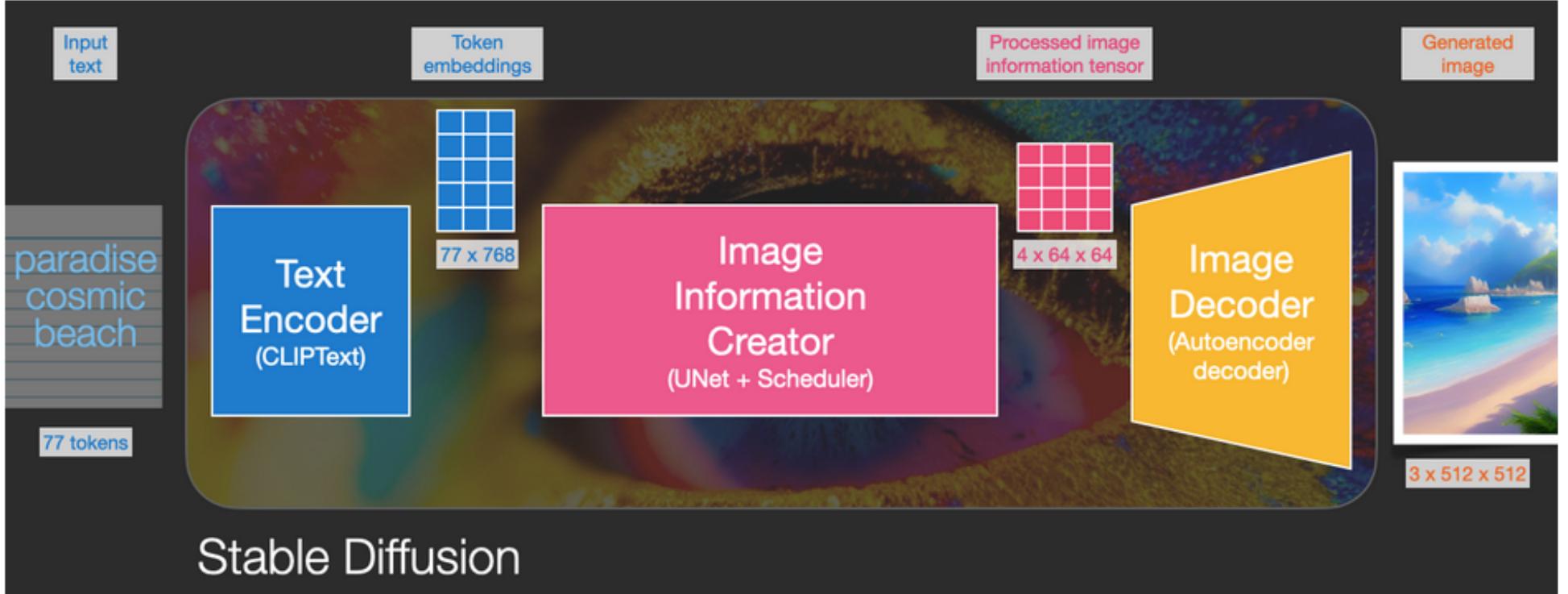
One Pixel Consist
With 3 Channels /
Layers



HOW DOES STABLE DIFFUSION WORK?



WHY STABLE DIFFUSION?



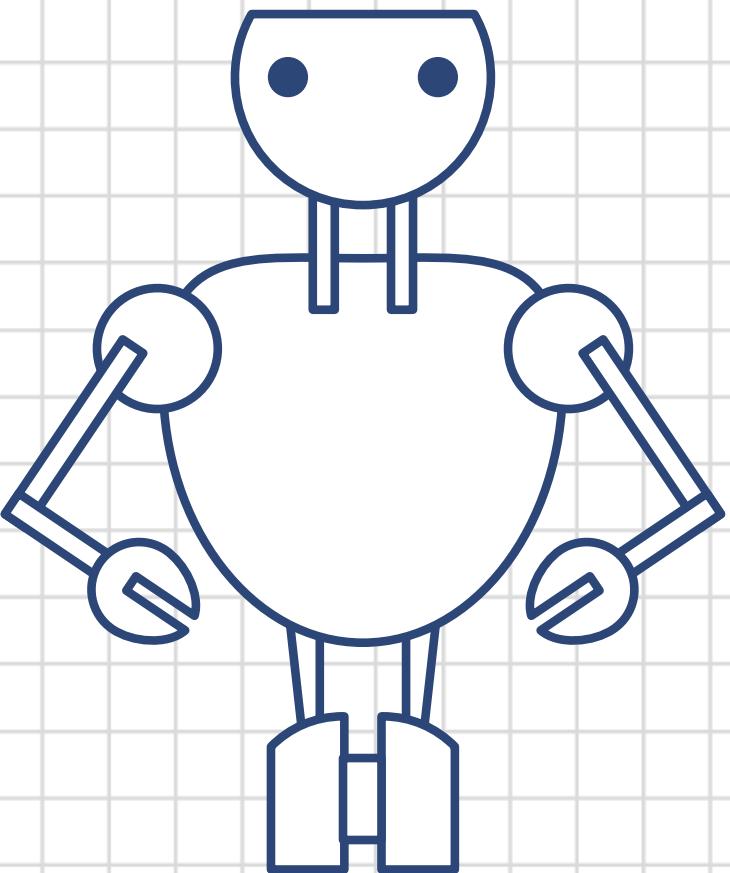
1 Is Free (*)

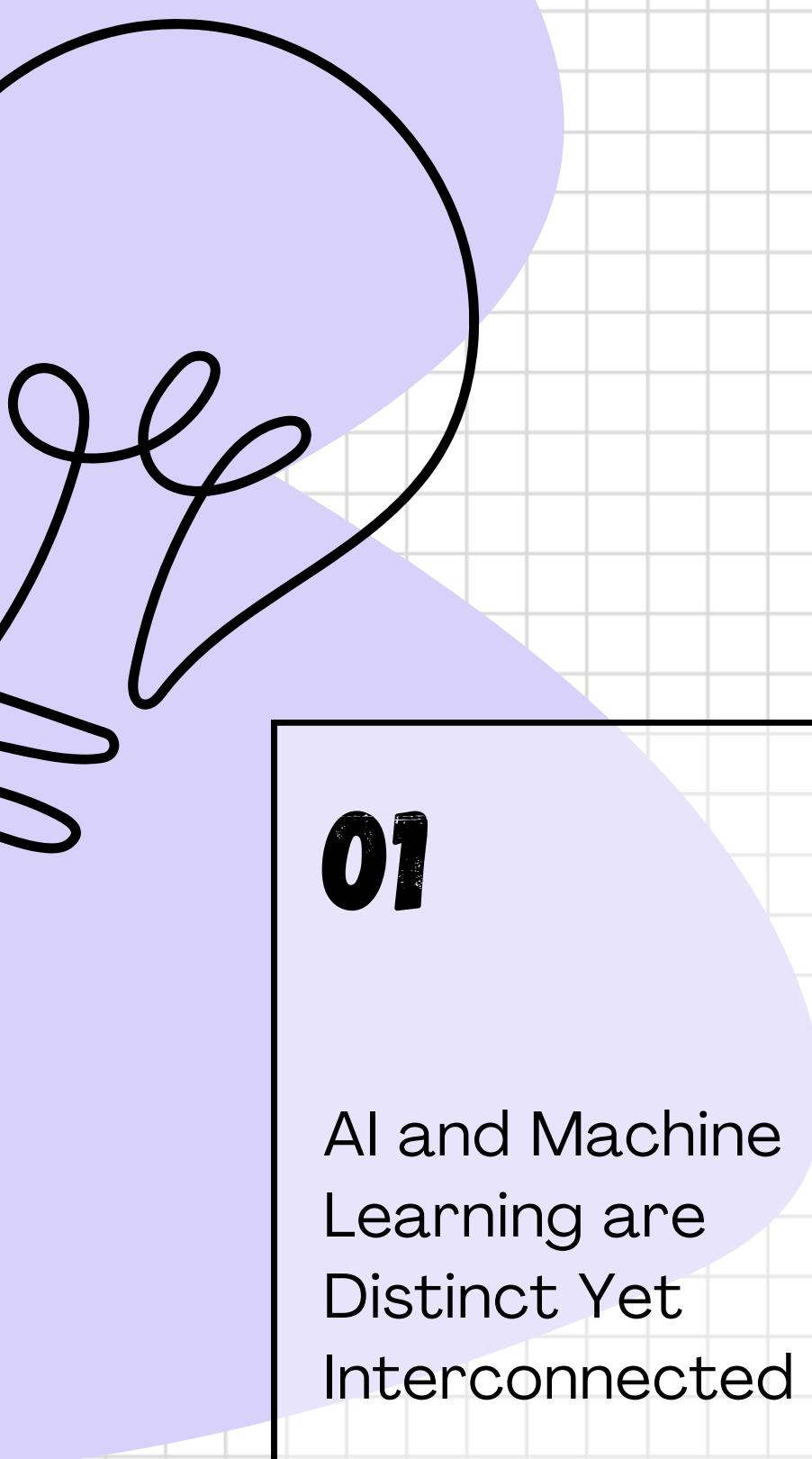
Except for GPU costs

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