The Business of AI
March 20 - 21, 2024 | New York

AI JARGON

by ChatGPT-4

Powered by OpenAI

www.inta.org/events/the-business-of-ai/

CONTENTS

This is a rapidly developing field. Definitions are not standardized and often overlap.

Editor: Pete Pollard

AI (ARTIFICIAL INTELLIGENCE)

Computers that can think & learn like a human

Computers performing tasks requiring human-like intelligence, such as **learning**, **reasoning**, **problem-solving**, **understanding language**, & **creativity**.

AI creates algorithms to **analyze data**, **make decisions**, **recognize patterns**, and **automate tasks**.

Aim is to **enhance and expand** abilities of machines and humans in various tasks, from simple automation to complex decision-making.

AI TYPES

1. **Narrow or Weak AI:** performing specific tasks, like chatbots & voice assistants (e.g., Siri, Alexa). Work under limited conditions and lack broad intelligence.
2. **General or Strong AI:** human-like intelligence, including self-awareness, learning new tasks, & broad problem-solving. Not yet realized.
3. **Artificial Superintelligence (ASI):** future form surpassing human intelligence across a wide range of fields, with ethical & social challenges.
4. **Reactive Machines:** react to specific situations or inputs, but without memory (e.g. IBM's Deep Blue chess).
5. **Limited Memory AI:** learns from past data to make decisions (e.g., self-driving cars, chatbots).
6. **Theory of Mind AI:** understands and remembers emotions, beliefs and needs that affect human behavior. Still in research.
7. **Self-aware AI:** theoretical AI with their own consciousness, self-awareness, and sentience.
8. **Generative AI:** AI that creates new content like text, images, music, or speech.

NARROW OR WEAK AI

Very good at one specific task, like chess or translating

Most common type of AI in use today.

Computers designed to **perform specific tasks** or **to solve particular problems**.
E.g., chatbots, recommendation systems, web search, and voice assistants like Siri or Alexa.

They operate under a limited set of constraints and contexts and do not possess general intelligence or consciousness.

GENERATIVE AI

Computer artist creating new things, like pictures or stories

Creates **new**, **original**, **content** like text, images, music, or speech, enhancing creativity.

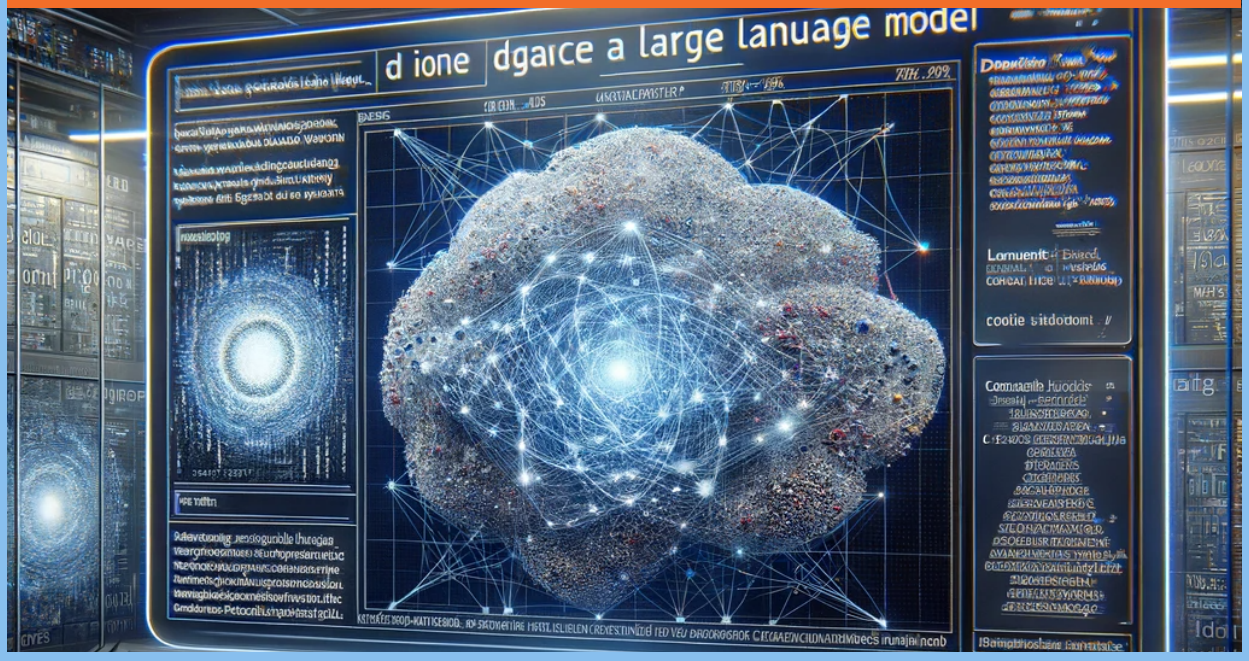
Analyzes large datasets to learn patterns and styles to create similar content. E.g., based on a:

- **Large Language Models (LLM)**
- **Diffusion Model**
- **Generative Adversarial Network (GAN)**
- **Variational Autoencoder (VAE)**
- **Transformer model**

Used in art creation, design, virtual environments, and drug discovery.

Raises ethical issues like potential for deepfakes and misinformation.

LARGE LANGUAGE MODEL (LLM)



Computer that understands and generates human-like text

E.g., GPT-3 (OpenAI), BERT (Google), PaLM 2 (Google), ChatGPT (OpenAI), RoBERTa (Facebook AI)

For understanding, generating, and interacting in **natural language**. Built on complex neural networks, often **Transformer Models,** for effective text processing.

Continuous training on vast datasets including books, articles, and websites to learn language patterns and nuances.

Can **understand text, generate coherent, context-relevant text, and carry conversations**.

Used in chatbots, writing aids, translation, and content creation.

DIFFUSION MODEL

Computer artist creating pictures by gradually refining chaos

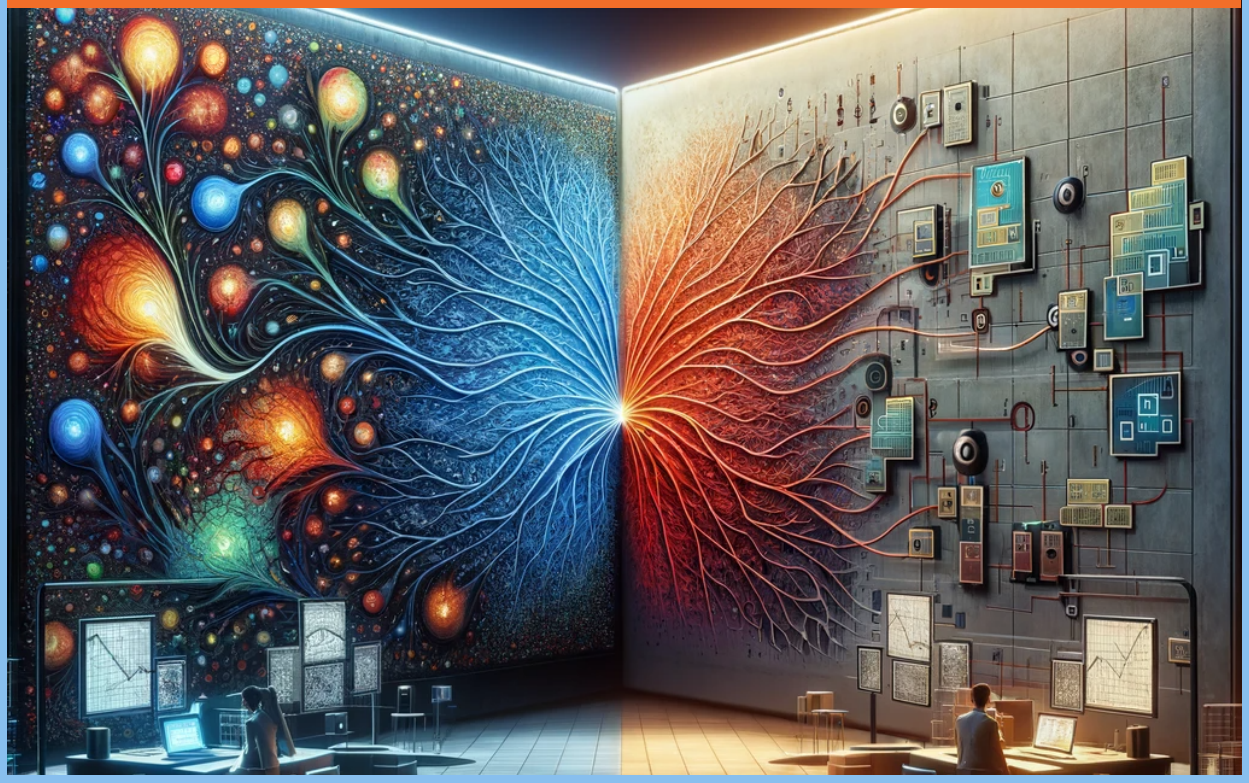
E.g., Stable Diffusion, Midjourney, Openjourney, DALL·E 3

Used to create detailed synthetic data, such as images. Model transforms an image into pure noise and then **learns to reverse process**, recreating original image from noise.

Learns patterns and structures of data, understands how to generate high-quality images.

Used mainly for **generating realistic images**, but also applicable in audio and text generation.

GENERATIVE ADVERSARIAL NETWORK (GAN)



Dual computers competing to create and spot realistic fake data

E.g., GauGAN (NVIDIA), Deepmind (Google)

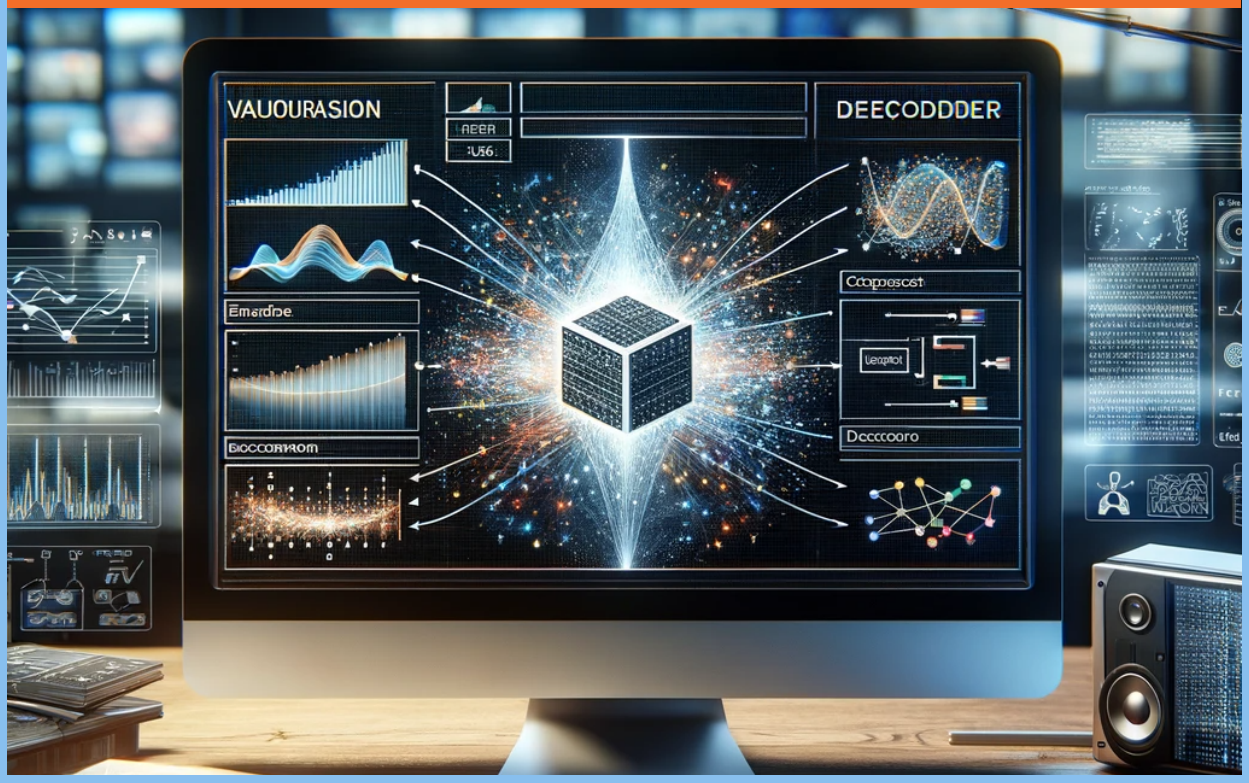
Creates synthetic data, based on **two competing neural networks**: a generator creating new data, and a discriminator evaluating authenticity.

Both networks improve through competition: generator gets better at creating realistic data, and discriminator improves in identifying fakes.

Used for **creating realistic images**, virtual environments, sounds, and **upscaling images**.

Training GANs is complex, requiring a careful balance between the two networks.

VARIATIONAL AUTOENCODER (VAE)



Simplifies & redraws pictures to find their essence

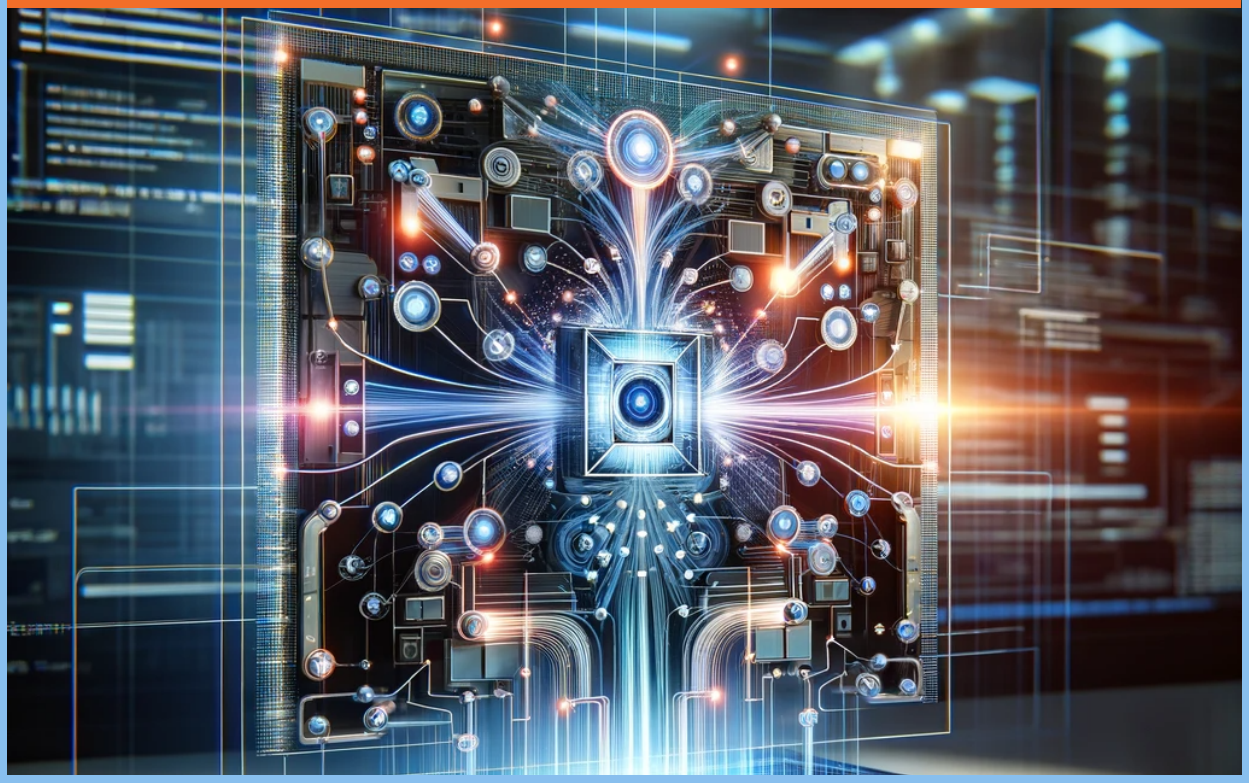
Used for generating complex data, like images, and denoising.

VAEs merge data compression and reconstruction (like autoencoders) **with probabilistic methods to model data distribution.**

An encoder compresses data into a hidden space, creates a probability distribution for data attributes, and a decoder reconstructs data from this space.

VAEs are **good at generating new data similar to their training data**.

TRANSFORMER MODEL



Reads & understands entire sentences at once

E.g., GPT-3 (OpenAI), BERT (Google), ChatGPT (OpenAI), RoBERTa (Facebook AI), Bard (Google)

Efficiently transforms entire data sequences **in parallel** to different, but related data, such as **language translation, summarization, text generation, and question answering**.

Uses 'attention mechanism' to focus on different parts of data sequence to help understand relationships and context.

Scales well with large datasets, making them suitable for building extensive LLMs.

AI HALLUCINATION

Gets confused and creates weird, incorrect patterns or answers

Incorrect, nonsensical, illogical or wrong result caused by:

- **misinterpretation or incorrect processing of of data**
- **insufficiently diverse or biased training data** to handle new or different data types
- **opaque decision-making processes** ("black boxes")
- **misidentifying objects or seeing nonexistent patterns**

Difficult to manage, so comprehensive training data becomes important, and careful deployment advised in real-world applications.

DEEPFAKE

Realistic video or audio made by swapping faces or voices

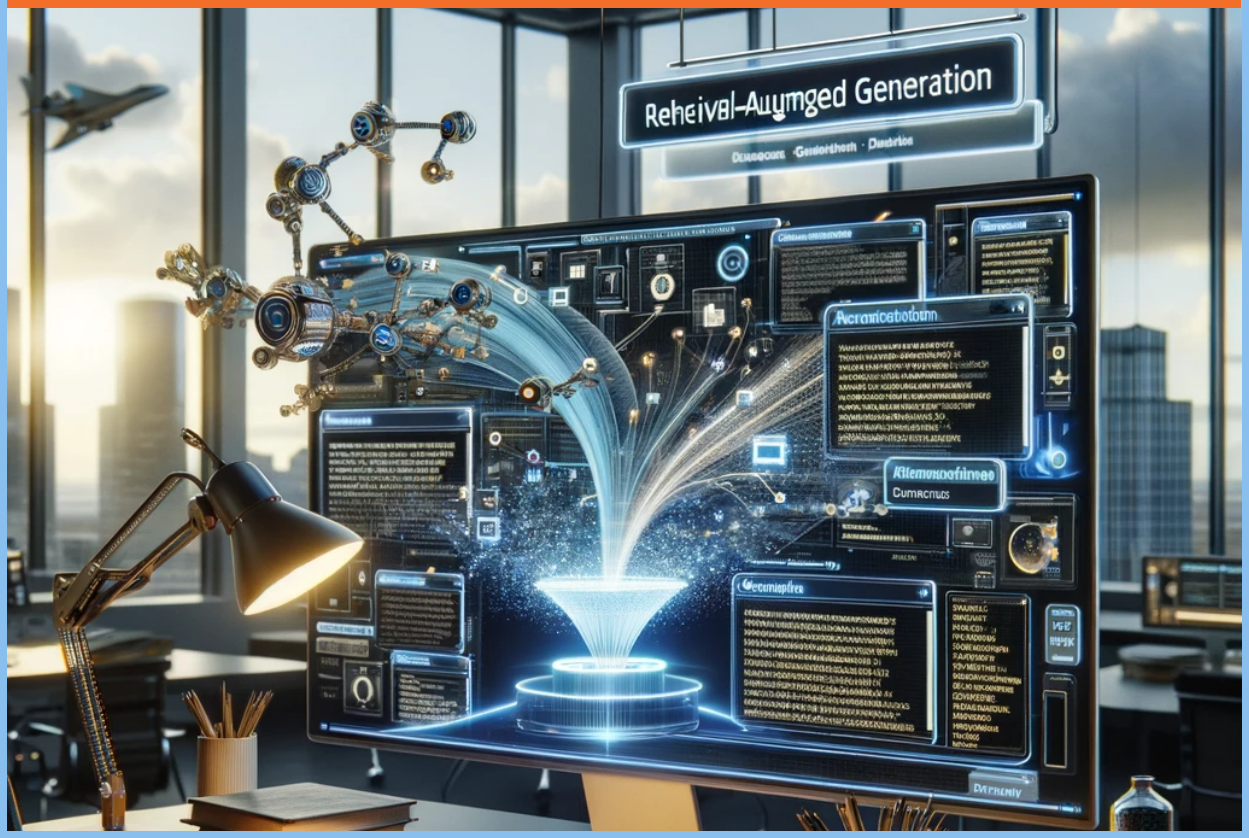
Artificially created media where **a person's image or voice is replaced** with someone else's.

They blend and superimpose media to create realistic but fake content, changing faces or voices seamlessly.

Used in filmmaking and content creation, but also for misinformation, fake news, and **impersonation**.

Pose ethical and legal challenges, including concerns about privacy, consent, and spreading false information.

RETRIEVAL-AUGMENTED GENERATION (RAG)



Improving relevance by researching before creating

Combines relevant **info retrieval from a large text database** (similar to a search engine), and a language model to create responses based on this model.

By using real-world information, RAG models generate **more precise and contextually relevant outputs** than those relying only on pre-trained data.

Used for chatbots, question-answering systems, and content creation, **where accurate and understandable information needed**.

MACHINE LEARNING

Computers learning from data like a student learning from books

Enables **learning and improving from experience without explicit programming**.

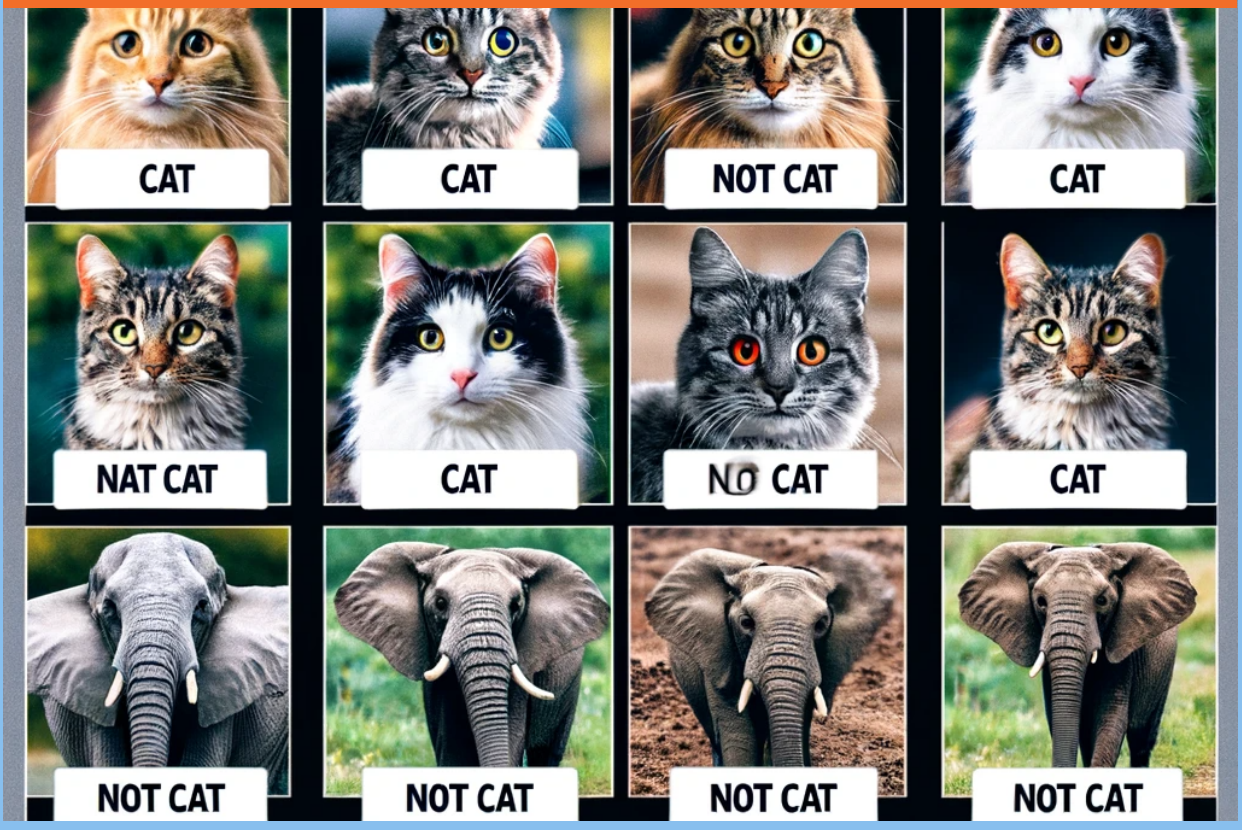
Uses training algorithms and **large data sets** to **recognize patterns, make decisions**, and **predict outcomes**.

E.g., email filtering, speech recognition, autonomous driving

Performance enhances as **more data** is fed into and "trains" model:

- **Supervised Learning** (labeled data)
- **Unsupervised Learning** (unlabeled data)
- **Reinforcement Learning** (trial and error)

SUPERVISED LEARNING



Teaching using examples with correct answers

Machine Learning to associate **specific inputs with corresponding outputs.**

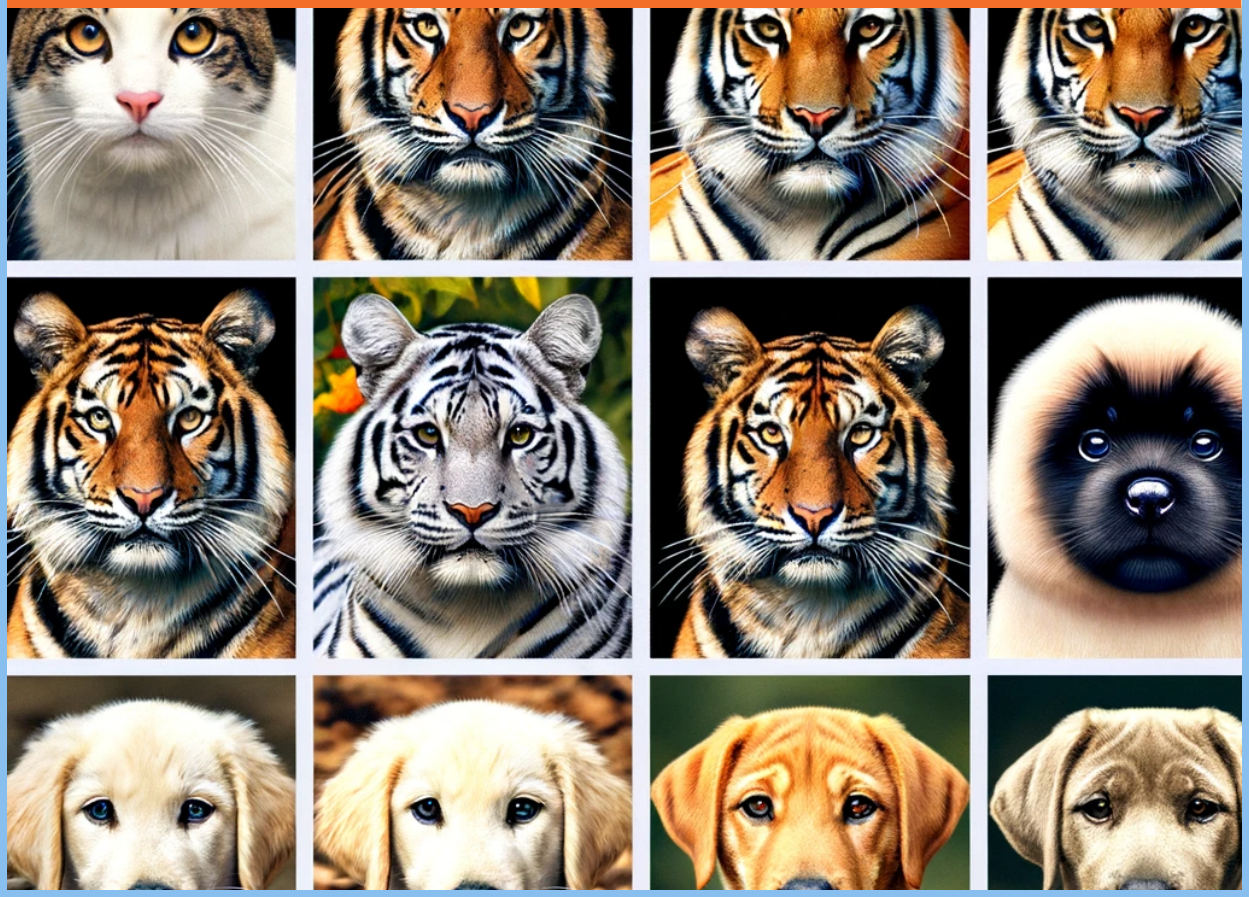
Uses **Labeled Data** = data tagged with correct outputs (e.g., images labeled as cat, dog)

E.g., for spam detection, credit scoring, medical diagnosis

Handles classification (categorizing data) and regression (predicting continuous values).

Trains by **comparing its output with actual labels**, and mapping inputs to outputs. It can then predict outputs on new, unseen data.

UNSUPERVISED LEARNING



Finding patterns & groups in data without specific guidance

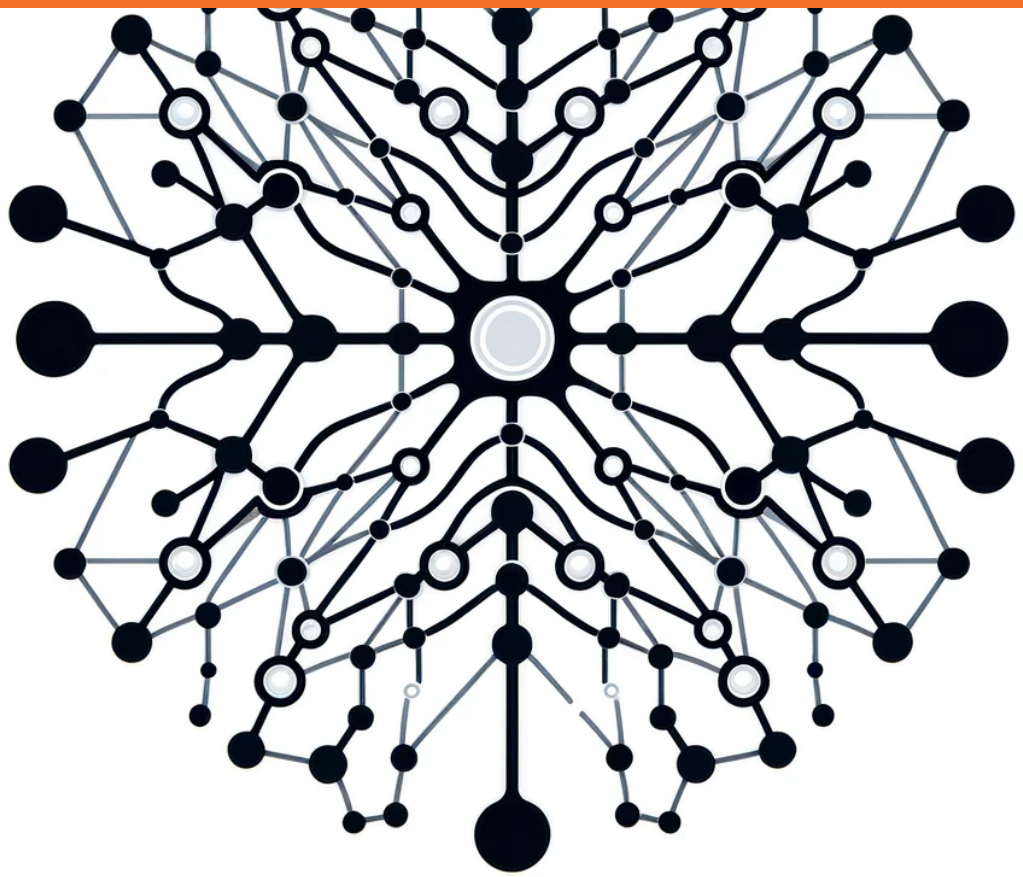
Machine Learning **without human guidance** to find hidden patterns or structures, such as grouping similar items or identifying subgroups..

Trains **using complex, unstructured and Unlabeled Data.**

Includes clustering, association analysis, and dimensionality reduction.

E.g., for exploratory data analysis, customer segmentation, market analysis, and anomaly detection.

DEEP LEARNING



Using brain-like networks to recognize patterns & insights

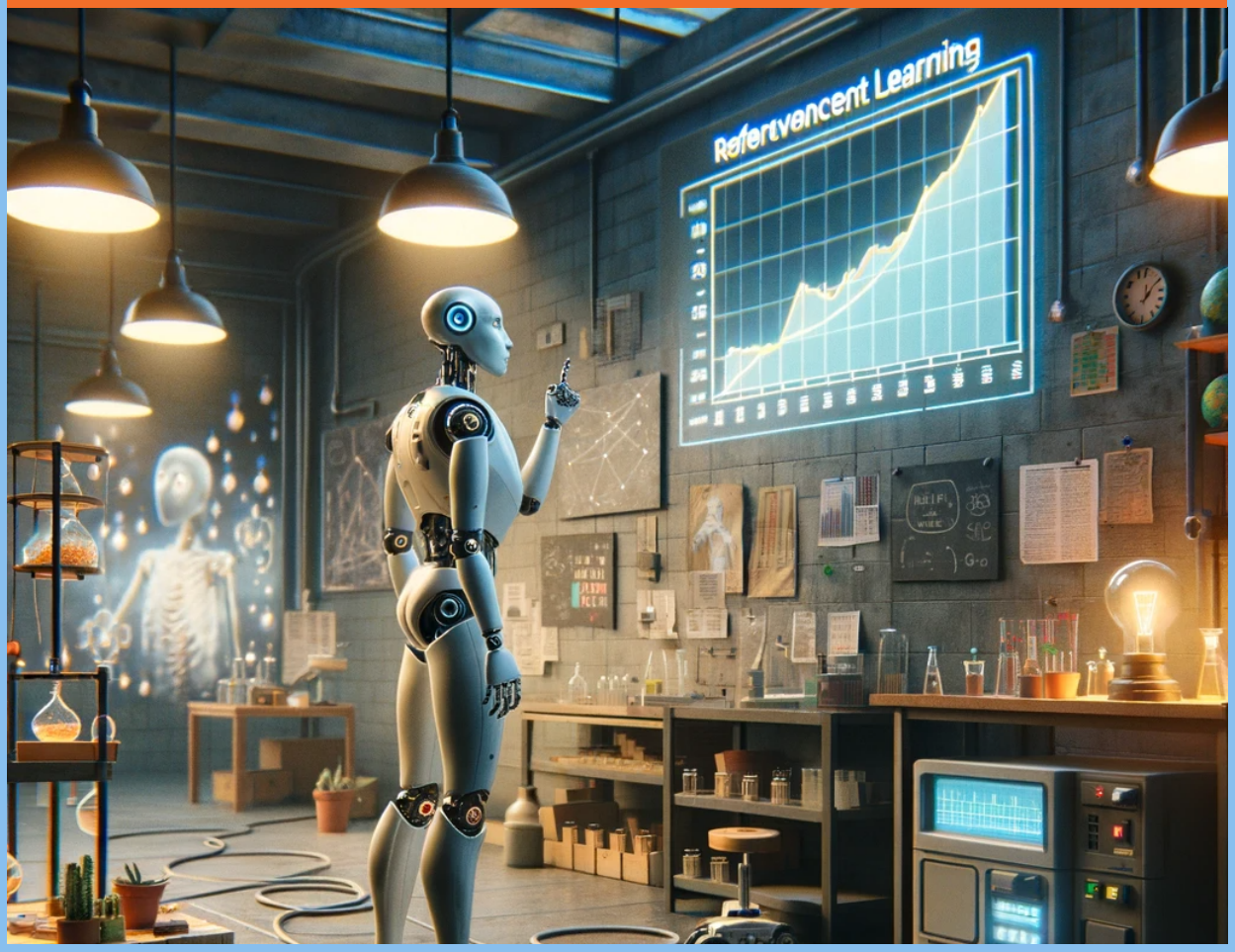
Machine Learning using **artificial neural networks**.

Nodes of each layer transmit signals to each other (like neurons in human brain).

During training, weights of connections are adapted to **recognize basic shapes early layers** and **more complex objects in later layers.**

Large amounts of data and significant computing power (GPU's) needed. Used in image/speech recognition, natural language processing, medical diagnosis, and autonomous vehicles.

REINFORCEMENT LEARNING



Learning to do tasks well by rewarding good actions

Machine Learning trained **through trial and error** to make decisions to achieve a goal. Actions are taken within a specific environment and **rewards or penalties** are given for outcomes.

Training **maximizes rewards over time**.

Used in robotics, gaming, autonomous vehicles, and optimization tasks.

Useful in scenarios **where correct actions are not predefined**.

The Business of AI

March 20 - 21, 2024 | New York

www.inta.org/events/the-business-of-ai/

PRACTICAL APPLICATIONS IN THE IP ECOSYSTEM