

Artificial Intelligence Reimagined: The Rise of Generative AI

Exploring essential concepts, applications, types of generative models, and training methodologies in the field of artificial intelligence.



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Agenda



01 Introduction to Generative AI

An overview of Generative AI and its significance in the field of artificial intelligence.

02 Superset Classification of AI

Understanding how Generative AI fits within the larger classification of artificial intelligence types.

03 Applications of Generative AI

Exploring various real-world applications where Generative AI is being utilized.

04 Key Concepts of Generative AI

Discussion of fundamental concepts that underpin Generative AI technology.

05 Types of Generative Models

An examination of the different types of generative models used in AI.

06 How to Train a Generative Model

Insights into the methodologies and techniques for training generative models.

07 Challenges in Generative AI

Identifying and addressing various challenges faced in the domain of Generative AI.

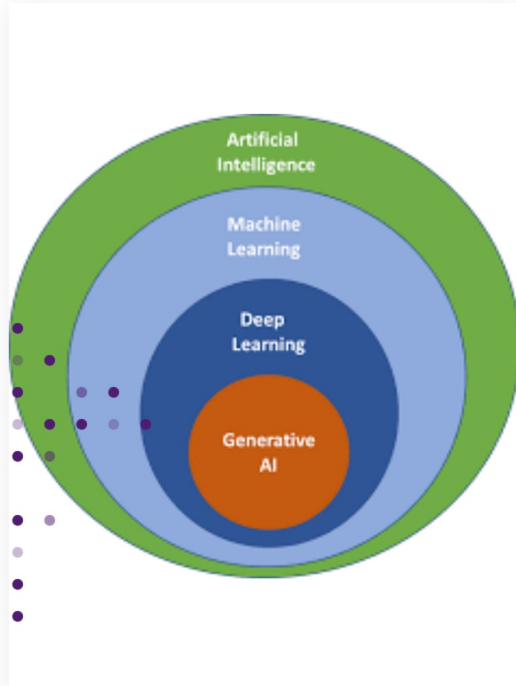
08 Case Study: Generative Adversarial Networks (GANs)

In-depth analysis of GANs, a prominent example of generative models.

09 Conclusion and Q&A

Summarizing the key points discussed and addressing any questions from the audience.

Superset Classification of Generative AI



Artificial Intelligence (AI)

Artificial Intelligence (AI) is the simulation of human intelligence in machines, enabling them to perform tasks like reasoning, learning, and decision-making. It uses algorithms and data to mimic cognitive functions such as problem-solving and pattern recognition.

01

Machine Learning (ML)

A subset of AI that includes supervised learning, where models learn from labeled data, and unsupervised learning, which discovers hidden patterns in unlabeled data. Examples include predictive analytics and clustering algorithms.

02

Deep Learning (DL)

Deep Learning is a subset of machine learning that uses neural networks with multiple layers to analyze complex patterns in large datasets. It powers advanced AI applications like image recognition, natural language processing, and autonomous systems.

03

Generative AI

This is a subset of Deep Learning specifically designed to generate new, realistic data by comprehending existing patterns, employing models such as Generative Adversarial Network (GAN), Variational Autoencoder (VAE), and autoregressive systems.

04



Artificial Intelligence

Artificial Intelligence (AI) is a branch of computer science that focuses on creating systems or machines capable of performing tasks that typically require human intelligence. These tasks include reasoning, learning, problem-solving, perception, natural language understanding, and decision-making.



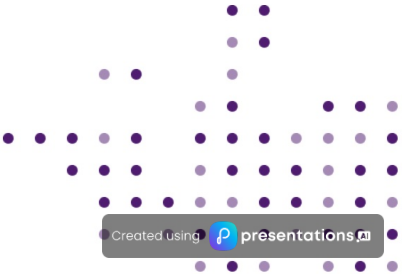
Machine Learning

Machine Learning (ML) is a subset of artificial intelligence (AI) that enables systems to learn and improve from experience without being explicitly programmed. It involves the use of algorithms and statistical models to analyze and identify patterns in data, which can then be used to make predictions or decisions.



Deep Learning

Deep learning is a subset of machine learning focused on neural networks with multiple layers that can learn complex patterns in data. There are various types of deep learning techniques, categorized based on the architecture, problem domain, or learning methodology.



Applications of Generative AI

Exploring the Impact in Various Industries



Healthcare

Generative AI can generate synthetic medical images for diagnostics, aiding in accurate disease detection and treatment planning. Additionally, it plays a crucial role in drug discovery through molecular simulation, expediting the development of new medications.



Gaming and Entertainment

In the gaming industry, Generative AI is used to create realistic characters and dynamic environments, enhancing player experience. It also contributes to the film industry by generating visual effects and facilitating scene creation, resulting in more engaging storytelling.



Content Creation

Automated text generation for blogs, articles, and marketing campaigns.



Art and Music

AI-generated paintings, music compositions, and animations.

Key Concepts of Generative AI

Neural Networks

Deep learning models, especially GANs and VAEs, are used to learn patterns and generate new data.

Probabilistic Modelling

The use of probability distributions enables realistic and diverse content generation.

Adversarial Training

GANs use a generator and discriminator working against each other to improve the quality of outputs.

Transformer Architectures

Models like GPT leverage attention mechanisms for sequential data generation, especially in text and language tasks.

How to Train a Generative Model (Part 1: Overview)



01

Choose the Model Type

Decide on GANs, VAEs, transformers, or diffusion models based on the task (e.g., text, images, or audio).

03

Define Model Architecture

Design the neural network using frameworks like PyTorch or TensorFlow.

02

Collect and Prepare Data

Collect, preprocess, and augment a high-quality dataset.

04

Select a Loss Function

Use adversarial loss (GANs), KL divergence (VAEs), or cross-entropy (transformers).

How to Train a Generative Model (Part 2: Training Steps)



05 Train

Use a training loop to optimize the model, monitor loss, and refine performance.

06 Evaluate

Assess outputs qualitatively (visual/text checks) and quantitatively (e.g., FID for images, BLEU for text).

07 Optimize and Deploy

Fine-tune, reduce model size, and deploy via APIs or cloud platforms.



Conclusion and Q&A

Summary

Generative AI combines creativity with automation, opening new possibilities across industries.

Future Potential

There are continued advancements in model architectures and ethical frameworks.

Questions

Open the floor for discussion and feedback.