



GENERATIVE AI

GEN-AI

FROM SCRATCH TO PRO

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WHAT IS GENERATIVE AI?

Generative AI (sometimes called gen AI) is artificial intelligence that can generate new content – such as text, code, images, audio or video in response to a user's prompt or request.

It learns patterns from large datasets and produces results similar to human-created content.

Why it is powerful?

Because it allows us to produce material that would normally take time, creativity, and effort – instantly.

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WHERE IT COMES?

AI (Artificial Intelligence)

The broad field of machines simulating human intelligence.

Machine Learning

AI that learns from data.

Deep Learning

ML using neural networks and large datasets.

Generative AI

A branch of deep learning that creates new content.

**Artificial
Intelligence**

**Machine
Learning**

**Deep
Learning**

**Generative
AI**

TYPES OF GEN-AI MODELS

WHAT IS A MODEL?

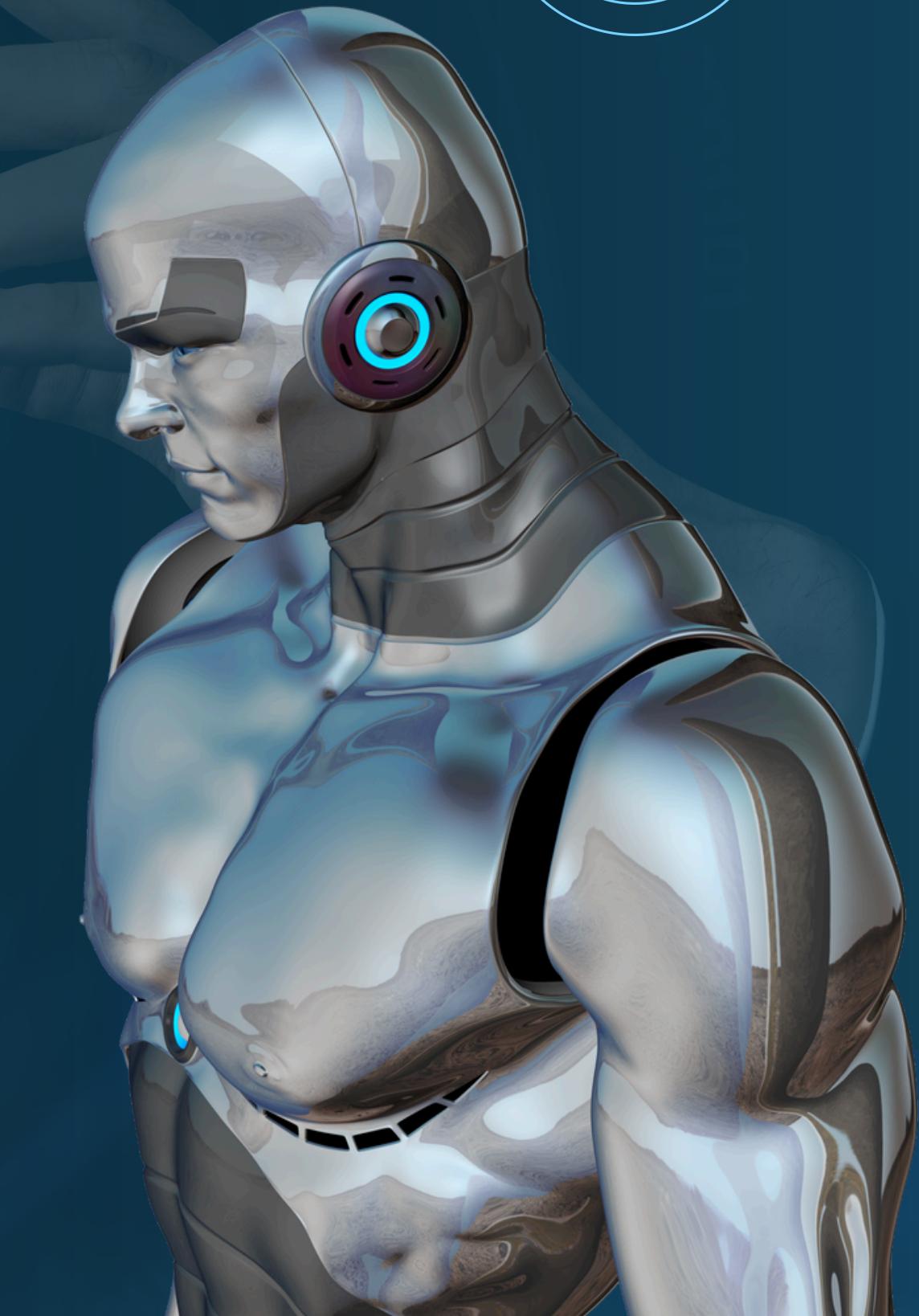
A model in AI is a trained system that learns from data and then generates or predicts new content based on that learning.

What is a Large Language Model (LLM)?

A Large Language Model (LLM) is an AI model trained on massive amounts of text data to understand, generate, and interact using natural language.

What is a Diffusion Model?

A diffusion model is a type of generative AI model that learns to create new data, like images, by reversing a process of adding noise to existing data.



GEN-AI MODELS

LARGE LANGUAGE MODELS (LLMs)

Used for:

Text, chat, articles, lesson plans, coding help

Examples:

ChatGPT, Gemini, Grok, DeepSeek

DIFFUSION MODELS

Used for:

Image generation, characters, designs

Examples:

NonoBanan, Ideogram, DALL·E, Leonardo.AI

AUDIO & VOICE MODELS

Used for:

Sound effects, music, voice cloning

Examples:

HeyGen, ElevenLabs, Resemble AI

VIDEO GENERATION MODELS

Used for:

Videos, animations, realistic clips

Examples:

Veo3, Sora, Pika Labs, Runway ML

CODE GENERATION MODELS

Used for:

Writing code, debugging, explanations

Examples:

GitHub Copilot, Codeium, BlackBox

HOW GEN-AI WORKS

TRAINING DATA



- Generative AI learns from massive datasets
- Sources: books, websites, code, research papers, images, audio, etc.
- More data = better accuracy and creativity

TOKENS & EMBEDDINGS



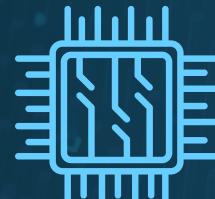
- AI doesn't read full words – it breaks text into tokens
- Each token is converted into a numeric form called embeddings
- This helps the AI understand context and meaning

NEURAL NETWORKS



- Brain-inspired architecture
- Uses layers of artificial neurons to process data
- Deep Learning = multiple layers processing complex patterns

PROMPTING & OUTPUT GENERATION



- You give input (prompt)
- The model predicts the next best word, pixel, or sound
- Finally, it generates the complete response

REAL-WORLD APPLICATIONS OF GEN-AI

EDUCATION & TRAINING

- Create lesson plans, quizzes, assignments
- Generate explanations, summaries, notes
- Personalized learning support for students
- Language translation and simplification

CONTENT CREATION

- Articles, blogs, social media posts
- Email drafts and professional comm..
- Presentation content and scripts
- Report writing & documentation

SOFTWARE DEVELOPMENT

- Code generation and debugging
- API documentation and comments
- SQL queries and code explanation
- Refactoring old code

DESIGN & MEDIA

- Image generation from prompts
- Logo, poster, banner creation
- Video drafts and animations
- UI/UX concept designs

BUSINESS & PRODUCTIVITY

- Customer support (chatbots)
- Automation of repetitive tasks
- Data analysis and report summaries
- Proposal and PPT creation

BENEFITS OF GEN-AI

SAVES TIME & EFFORT

- Tasks that take hours (like writing notes, coding, designing) can be done in minutes
- Automates repetitive work

BOOSTS CREATIVITY

- Helps generate new ideas, variations, and concepts
- Useful for brainstorming lesson plans, designs, content, and prototypes

IMPROVES PRODUCTIVITY

- Speeds up workflows in teaching, IT, research, design, and office work
- Acts like a virtual assistant or co-pilot

ENHANCES LEARNING & TEACHING

- Generates examples, quizzes, and explanations on demand
- Helps weak students with personalized support

ACCESSIBLE TO EVERYONE

- No programming required to use tools like ChatGPT, Gemini, Copilot
- Available across web, apps, and integrations

CHALLENGES & LIMITATIONS OF GEN-AI

ACCURACY & MISINFORMATION

- AI can generate confident but incorrect answers
- Always verify AI-generated information before use

LACK OF REAL UNDERSTANDING

- AI does not “think” – it predicts based on patterns
- It doesn’t have human reasoning or emotions

BIAS IN DATA

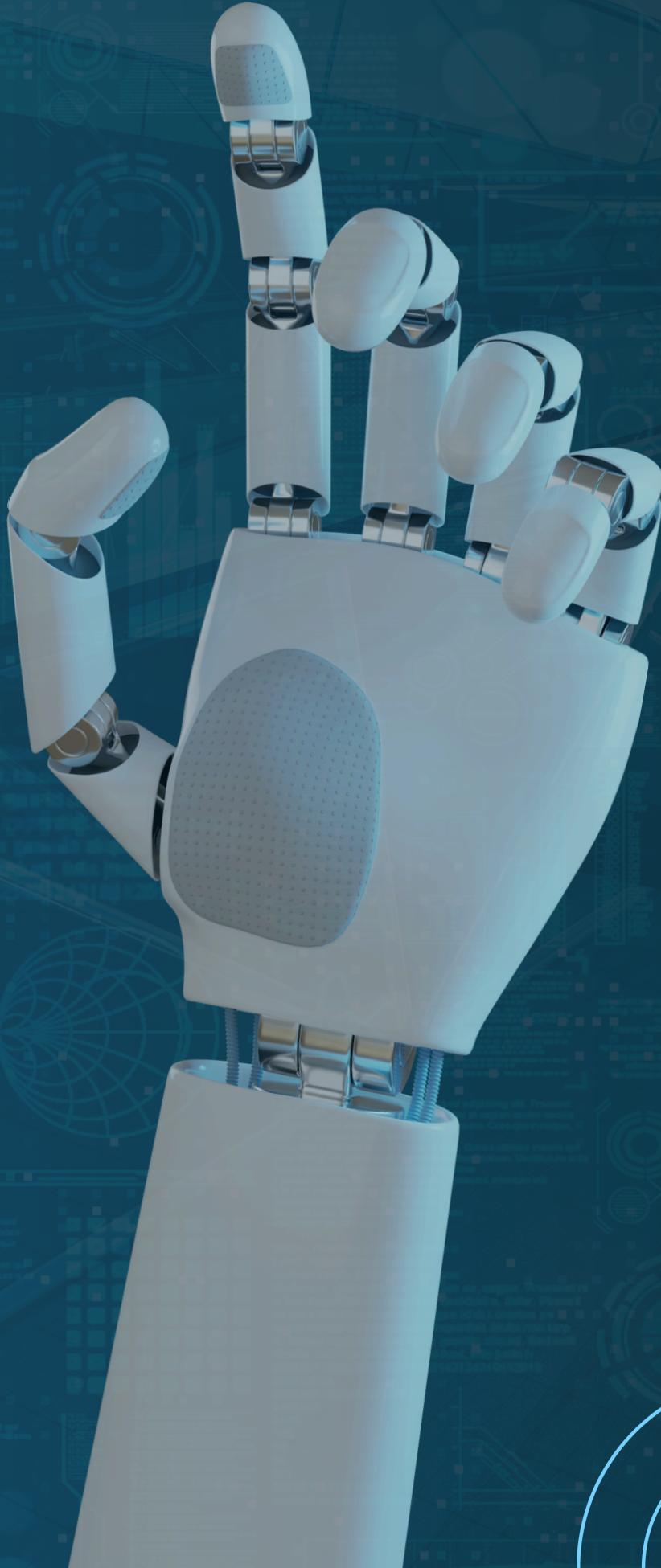
- If training data is biased, output may also be biased
- Can lead to unfair or insensitive responses

PRIVACY & SECURITY CONCERN

- Sensitive data should not be shared
- AI tools may store or use user inputs for training

OVERDEPENDENCE RISK

- People may stop thinking critically
- AI should assist, not replace human intelligence



ROLE OF PYTHON IN GEN-AI

- Backbone language for AI and machine learning
- Supports major AI libraries (TensorFlow, PyTorch etc ..)
- Used for training, fine-tuning, and deploying models
- Enables API integration with tools ChatGPT & Gemini
- Ideal for automation, data handling, and prototyping



THANK YOU!

Questions and Discussion