Generative AI Literacy

Overview of GenAI and AI project implementation

Quick Recap

- Transformers have revolutionized AI by replacing sequential models like RNNs with a self-attention mechanism, enabling parallel processing and better handling of long-range dependencies. This has led to powerful models like BERT, GPT, and T5, which drive NLP advancements in chatbots, translation, and text generation.
- NLP applications power modern AI solutions, including sentiment analysis, spam detection, and topic categorization, enhancing business automation. Chatbots and conversational AI improve customer service, as seen in real-world case studies where AI-driven assistants enhance response times and user satisfaction.

Engage and Think

Imagine you’re a business strategist preparing for a major presentation. You need to analyze customer trends, generate compelling reports, create visuals, and summarize large datasets—all within a tight deadline.

What if AI could not only generate content but also provide data-driven insights, automate workflows, and even improve decision-making?

Learning Objectives

By the end of this lesson, you will be able to:

- Understand the foundational concepts of Generative AI, key algorithms, and architectures (such as Transformers, GANs, and VAEs) to explain how AI generates content across various domains
- Apply prompt engineering techniques to optimize AI-generated outputs, leveraging best practices and hands-on demos with tools like ChatGPT and Hugging Face Spaces
- Analyze the ethical, security, and regulatory challenges of Generative AI, including AI bias, data privacy, and governance, to assess risks and propose mitigation strategies
- Evaluate the impact of Agentic and Physical AI on automation, business workflows, and real-world applications, identifying how AI can independently perform tasks and enhance decision-making

GenAI Models

What Are GenAI Models?

They are built using combinations of algorithms that work together, including:

Learning systems

Models like transformers or GANs that process and generate the content

Mathematical rules

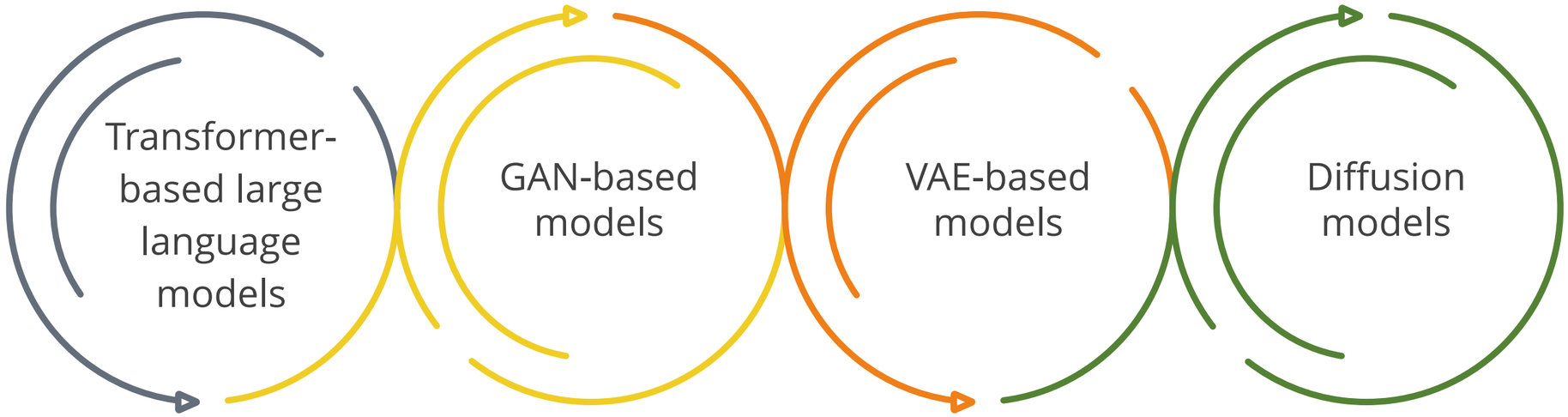
Algorithms that ensure the content looks natural and follows learned patterns

Data patterns

Large datasets that the model learns from to understand how to create realistic outputs

Popular GenAI Models

The following are some diverse Generative AI models, each uniquely crafted to excel at specialized tasks and deliver innovative, highly realistic results:

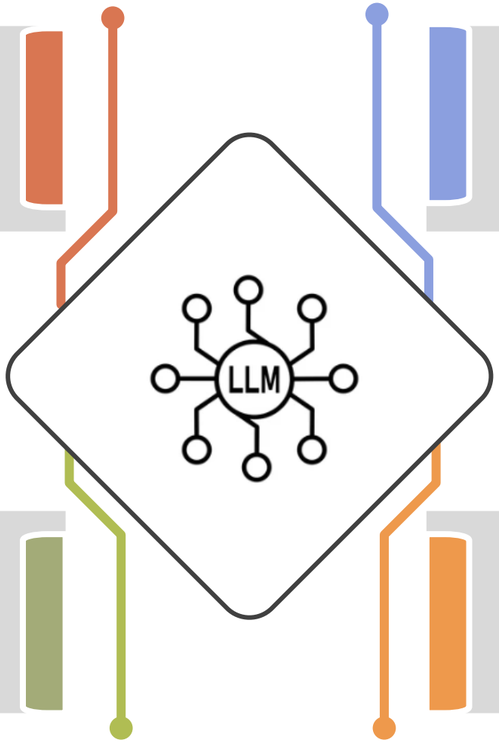


Transformer-Based Large Language Models

Large Language Models (LLMs) are cutting-edge AI systems designed to process and generate human-like language by learning from massive text datasets.

Handle language tasks with exceptional accuracy using transformer architectures

Learn linguistic patterns, grammar, and meaning through extensive data training



Support text summarization, translation, and content generation across applications

Fine-tune for domain-specific tasks to address specialized business needs

Transformer-Based Large Language Models

The following are some widely used tools built on large language models, showcasing their versatility in handling various NLP tasks:

Popular tools using LLMs

- **BERT (Bidirectional encoder representations from transformers):** Used for understanding text and extracting information
- **GPT (Generative pre-trained transformer):** Used for text generation, completing sentences, and more
- **T5 (Text-to-Text transfer transformer):** Treats every NLP task like translation and summarization

GAN-Based Models

GAN-based models create sharp, lifelike visuals, and are widely used in industries such as gaming, media, and advertising.

Popular GAN model-based tools

- **Artbreeder**: Creates and blends images, widely used in fashion, entertainment, and marketing
- **DeepArt**: Transforms photos into artwork, popular for digital art and branding
- **Pikazo:** A tool for transforming photos into artistic styles, using deep learning and GANs for creative visuals

VAE-Based Models

VAEs based GenAI models balance compression (learning core features) with creativity (diverse outputs) to both understand and generate data effectively.

Popular VAE model-based tools

- **DreamUp**: Generates custom images from text prompts, ideal for digital art and marketing
- **Avatarify**: Creates real-time facial animations for avatars, used in gaming, streaming, and virtual meetings
- **ReconstructMe**: Captures 3D models from real-world objects, useful for VR, gaming, and architecture

Diffusion Models

They use the diffusion algorithms to generate high-quality images by refining random noise step-by-step.

Popular tools using diffusion models

- **Stable diffusion**: Generates high-quality images from text descriptions for art and product visuals
- **DALL-E:** Creates unique images from text prompts for design, marketing, and AI art
- **Runway ML:** Offers AI tools for real-time video editing, image generation, and creative content

Quick Check

What key factors contribute to the exceptional power of GenAI models as transformative tools for driving business innovation, enhancing creativity, and revolutionizing operations?

A. They follow strict rule-based logic to automate simple tasks.

B. They combine advanced algorithms like transformers, GANs, and diffusion models to create realistic and diverse content.

C. They are limited to analyzing data but cannot generate new content.

D. They only work for text-based applications and cannot handle images or videos.

Introduction to GenAI Applications and Tools

GenAI Applications

GenAI tools streamline content generation, automate workflows, and enhance creativity across industries.

Some of the applications are:

- Text generation
- Code generation
- Image generation
- Audio generation
- Music generation
- Video generation
- Action generation
- 3D modeling

GenAI Tools

GenAI tools streamline content generation, automate workflows, and enhance creativity across industries. Here are some GenAI tools and their business use cases:

Tools	Business use cases
 ChatGPT by openai	**Text:** Automates customer support by generating FAQs and chatbot responses
 Github copilot	**Code:** Speeds up software development by generating boilerplate code and suggesting solutions in real time
 Craiyon	**Images:** Creates unique marketing visuals or social media graphics instantly

GenAI Tools

Here are some GenAI tools and their business use cases:

Tools	Business use cases
ElevenLabs	**Audio:** Generates personalized voiceovers for marketing videos or virtual assistants
 OpenAI’s MusicGen	**Music:** Creates royalty-free background music for ads, videos, or apps
HeyGen	**Video:** Creates AI-generated promotional videos and dynamic social media content

GenAI Tools

Here are some GenAI tools and their business use cases:

Tools	Business use cases
 Unity ML-Agents	**Action:** Designs NPC (non-player character) behaviors for interactive gaming experiences
 NVIDIA Omniverse	**3D model:** Generates 3D product prototypes for virtual reality and e-commerce applications

Quick Check

You are starting your own nutrition bar company, Nutri Delight, and want to create a professional static website. To get started, you decide to generate the website's content and layout efficiently using GenAI tools. You need a structured HTML and CSS code for the website and visually appealing images for banners and product showcases.

Which combination of GenAI tasks would be most suitable to complete the static website for Nutri Delight?

A. Text generation and audio generation

B. Code generation and image generation

C. Music generation and video generation

D. Action generation and 3D modeling

Introduction to Prompt Engineering

What Is Prompt Engineering?

It is the skill of crafting precise and effective inputs for GenAI tools to achieve accurate and useful outputs.

For example, a well-engineered prompt, such as **Summarize the benefits of generative AI for marketing in under 50 words**, guides the model to deliver more targeted and useful results, unlike the vague prompt, **Tell me about AI**.

Importance of Prompt Engineering

Prompt engineering has the potential to transform business operations by leveraging GenAI.

The various applications of prompt engineering to enhance business operations include:

Automating and optimizing business processes

Revolutionizing customer engagement

Enhancing decision-making with insights

Improving marketing and content creation

Simple Prompting Techniques for Effective GenAI Use

Understanding prompting techniques like zero-shot and few-shot can help you achieve better outcomes from generative AI tools.

Zero-shot prompting

- AI responds to a task without prior examples, relying entirely on the instructions provided in the prompt.
- Example: "Summarize this report in under 50 words."

Few-shot prompting

- AI is given examples along with the task instructions, improving its ability to generate accurate responses.
- Example: "Here’s how previous summaries were written:

  Report A: ... [example summary]

  Report B: ... [example summary]

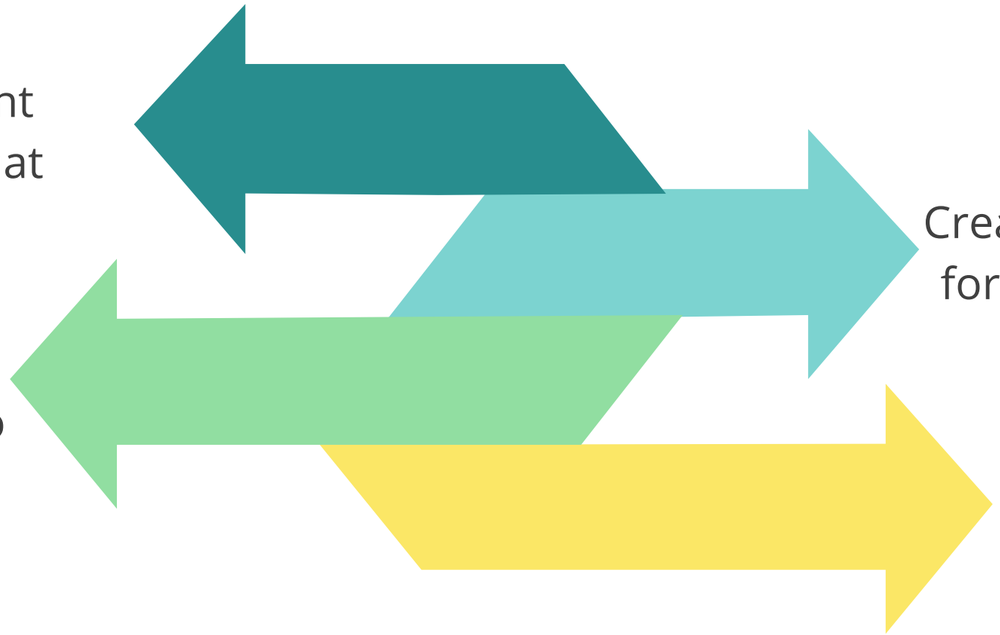
  Instruction: "Now summarize Report C in a similar style."

Prompt Engineering: Best Practices

Businesses can unlock GenAI's full potential by crafting precise prompts to tackle challenges, seize opportunities, and stay ahead in the competitive landscape.

Be specific:
Clearly state what you want such as tone, length, format

Iterate and refine:
Test different prompts to achieve the best results



Leverage templates:
Create reusable prompt templates for tasks like email generation or report summaries

Encourage team adoption:
Train employees to use prompts effectively for their specific roles

Quick Check

As the CTO of CodeSmart Solutions, you are overseeing the creation of a static website for a new client. Your developers are using GenAI tools like ChatGPT-3 to meet a tight 48-hour deadline.
How does prompt engineering help streamline the process?

A. Generate a complete HTML structure and CSS styling with a single detailed prompt

B. Experiment with multiple generic prompts to refine the output

C. Write the entire code manually for better control

D. Use a completely different AI tool unrelated to coding tasks

Demo: Generating a Product Launch Campaign Using ChatGPT

Duration: 10 minutes

This demo walks you through creating a product launch campaign using ChatGPT for Nutri Delight, a new range of healthy nutrition bars company. By crafting a detailed prompt that includes a tagline, key selling points, a social media post, and a call-to-action, you will experience the power of prompt engineering firsthand. ChatGPT will generate a comprehensive campaign, demonstrating how AI can enhance creativity, save time, and deliver professional marketing solutions.

Note:

Please download the demo document from the Reference Material section for the step-by-step execution.

DEMONSTRATION

Introduction to the GenAI Open-Source Landscape

What Is GenAI Open-Source Landscape?

It includes freely accessible tools, models, and platforms, driving innovation and collaboration in AI.

Hugging Face is a popular platform that lets researchers and developers access and share advanced GenAI models.

Demo: Exploring AI Capabilities with Hugging Face Spaces

Duration: 20 minutes

This demo highlights the power of open-source AI tools on Hugging Face Spaces, showcasing their capabilities through quick test implementations. You will explore practical applications across education, marketing, e-commerce, and more, gaining valuable insights into how these open-source solutions address real-world business challenges. This hands-on session emphasizes the simplicity, versatility, and accessibility of AI, demonstrating how the open-source AI landscape empowers users of all technical levels.

Note:

Please download the demo document from the Reference Material section for the step-by-step execution.

DEMONSTRATION

Quick Check

What does the GenAI open-source landscape include, and how does Hugging Face contribute to it?

A. Proprietary tools and restricted platforms

B. Free tools and models for AI collaboration, with Hugging Face enabling access to advanced GenAI models

C. Paid tools for enterprises, focusing only on image generation

D. Limited AI resources, with Hugging Face as a research database

Security, Bias, and Responsible Use of GenAI

Why is Responsible AI Important?

Generative AI (GenAI) has immense potential but comes with risks related to bias, security, ethics, and accountability.

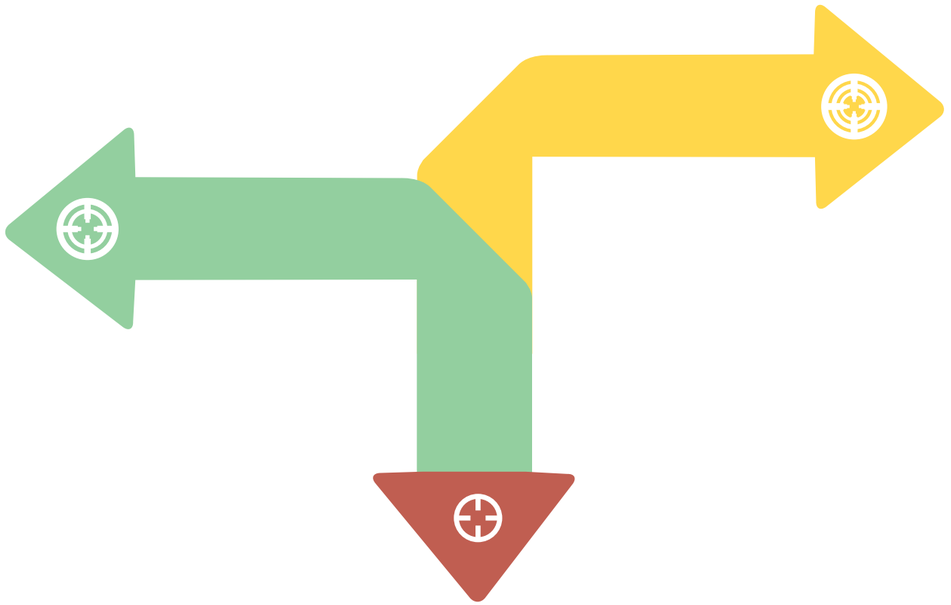
Organizations must address these challenges to ensure fair, safe, and ethical AI deployment.

AI Bias

AI bias occurs when a model produces unfair outcomes due to biased training data or algorithmic design, potentially leading to discrimination based on gender, race, or socioeconomic factors.

Examples of Bias in GenAI:

AI recruitment tools favoring certain demographics.

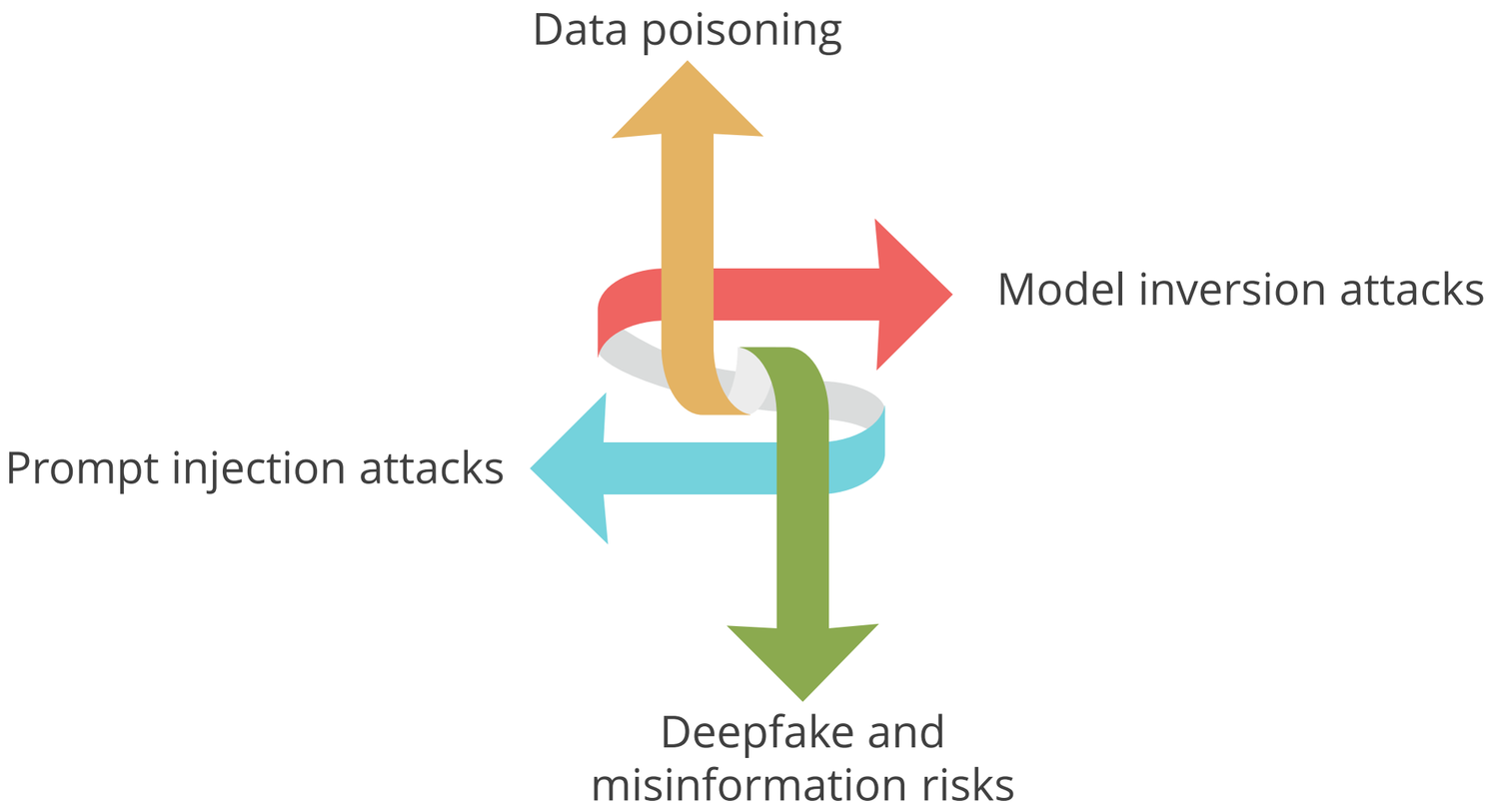


Facial recognition systems misidentifying individuals.

Chatbots generating biased responses based on training data.

Security Risks in GenAI

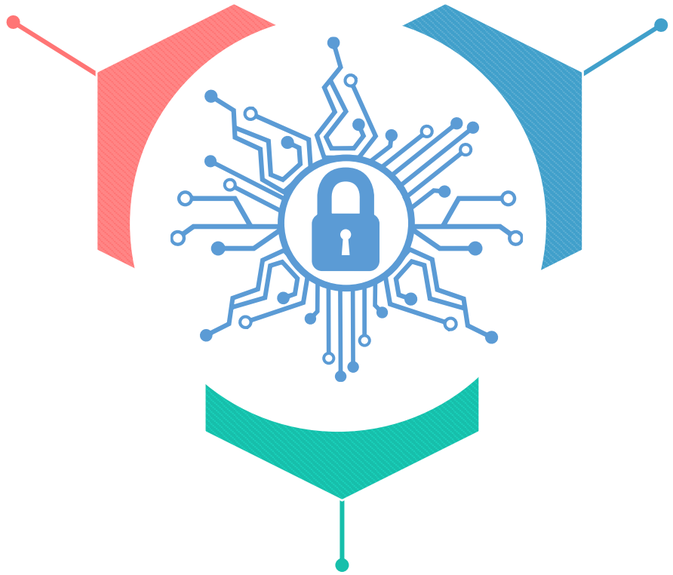
The major security concerns are:



Ethical challenges in GenAI

The key ethical issues are:

Misinformation and deepfakes



Lack of consent

Job displacement

Regulatory and Compliance Considerations

Existing and emerging AI regulations:

EU AI Act – Framework for AI risk classification and governance.

GDPR (General Data Protection Regulation) – Rules on AI handling personal data.

U.S. AI Executive Orders – Government guidelines on responsible AI use.

Mitigation Strategies for Bias and Security

How to reduce bias in AI?

Diverse and representative training data:
Avoid one-sided datasets.

Fairness audits:
Regularly assess AI models for biased outputs.

Algorithmic transparency:
Ensure AI decisions can be explained.

Mitigation Strategies for Bias and Security

How to improve AI security?

Secure AI development:
Protect training data from manipulation.

Robust authentication:
Prevent unauthorized AI model access.

Adversarial testing:
Simulate attacks to identify vulnerabilities.

Transparency and Explainability

Users must understand how AI makes decisions to ensure trust and accountability.

The key principles of explainable AI (XAI) are:

Interpretability: Models should provide understandable reasoning.

Traceability: AI-generated outputs should be verifiable.

Accountability: AI decisions should be justifiable.

Privacy and Data Protection in AI

Major privacy concerns in AI are:

AI models can store and recall sensitive personal data.

Risk of **data leaks, unauthorized access, and re-identification**.

AI scraping public data without user consent.

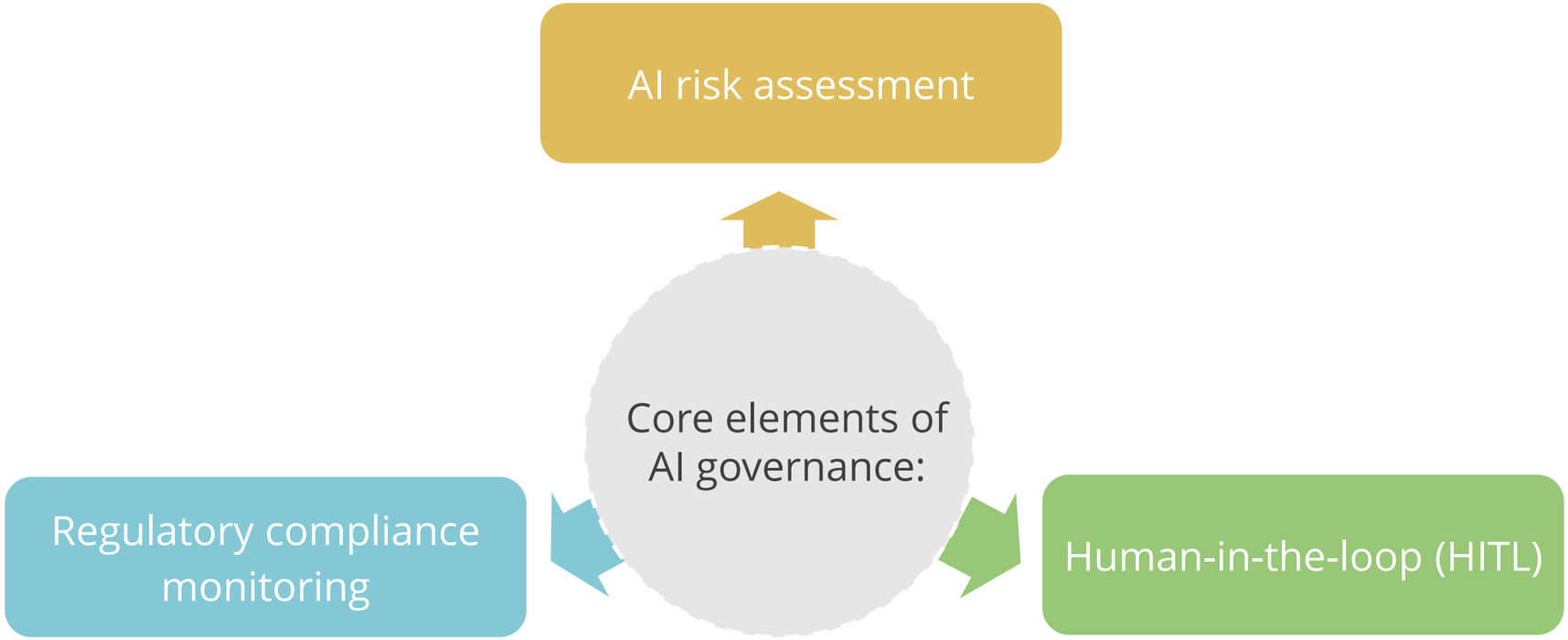
Privacy and Data Protection in AI

Best practices for privacy-preserving AI:

- Federated learning
- Data anonymization
- User consent mechanisms

Accountability and Governance in AI

AI must be governed to ensure ethical and safe operation, with accountability shared by organizations, developers, and policymakers.



Quick Check

Which regulation primarily focuses on handling personal data and privacy in AI applications?

A. EU AI Act

B. GDPR (General Data Protection Regulation)

C. U.S. AI Executive Orders

D. ISO 27001

Future of AI and Emerging Trends

Future of AI

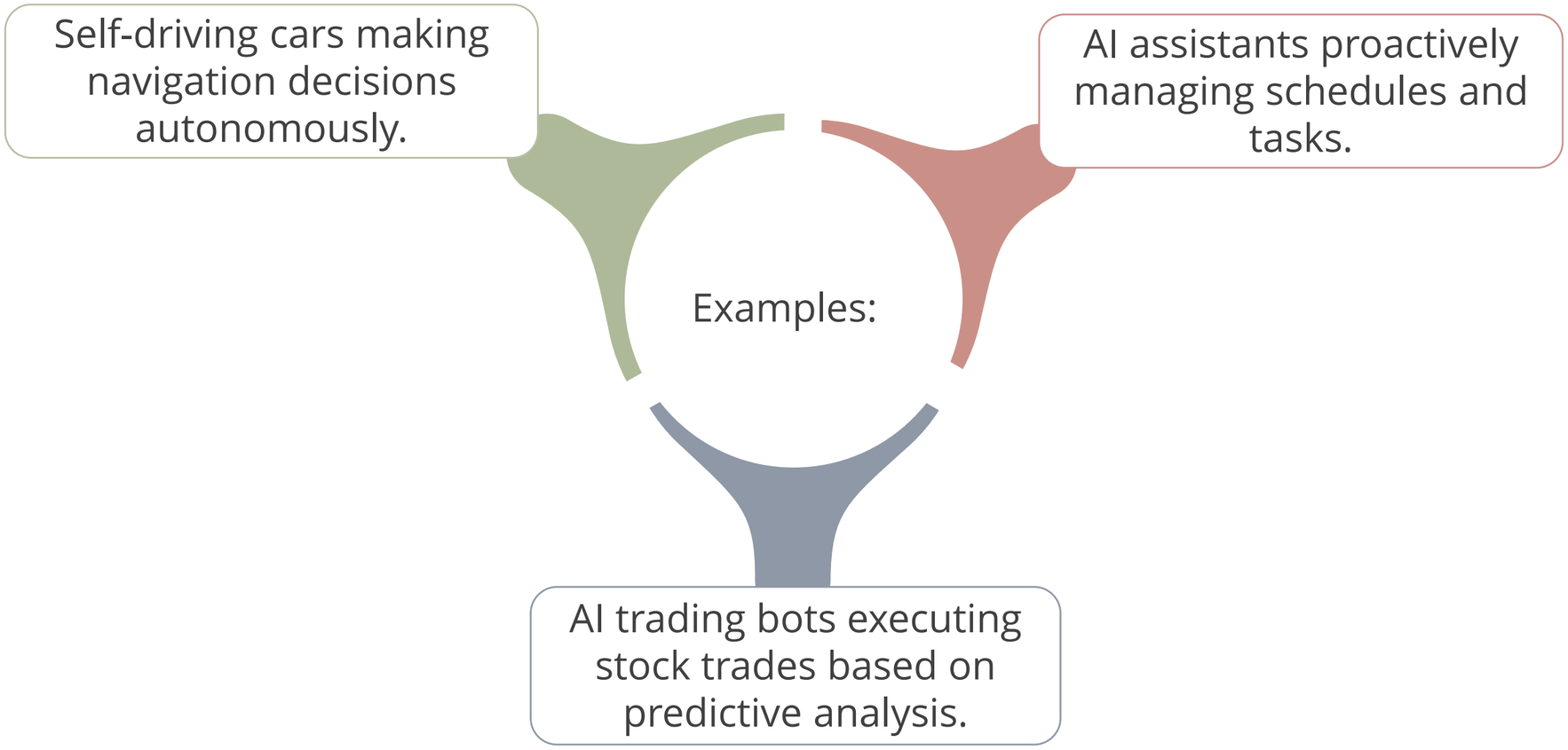
AI is shifting from purely software-driven models to autonomous, decision-making, and physical AI agents. Agentic AI and Physical AI are leading this transformation.

Agentic AI: AI that acts independently and makes autonomous decisions.

Physical AI: AI integrated with robotics for real-world applications.

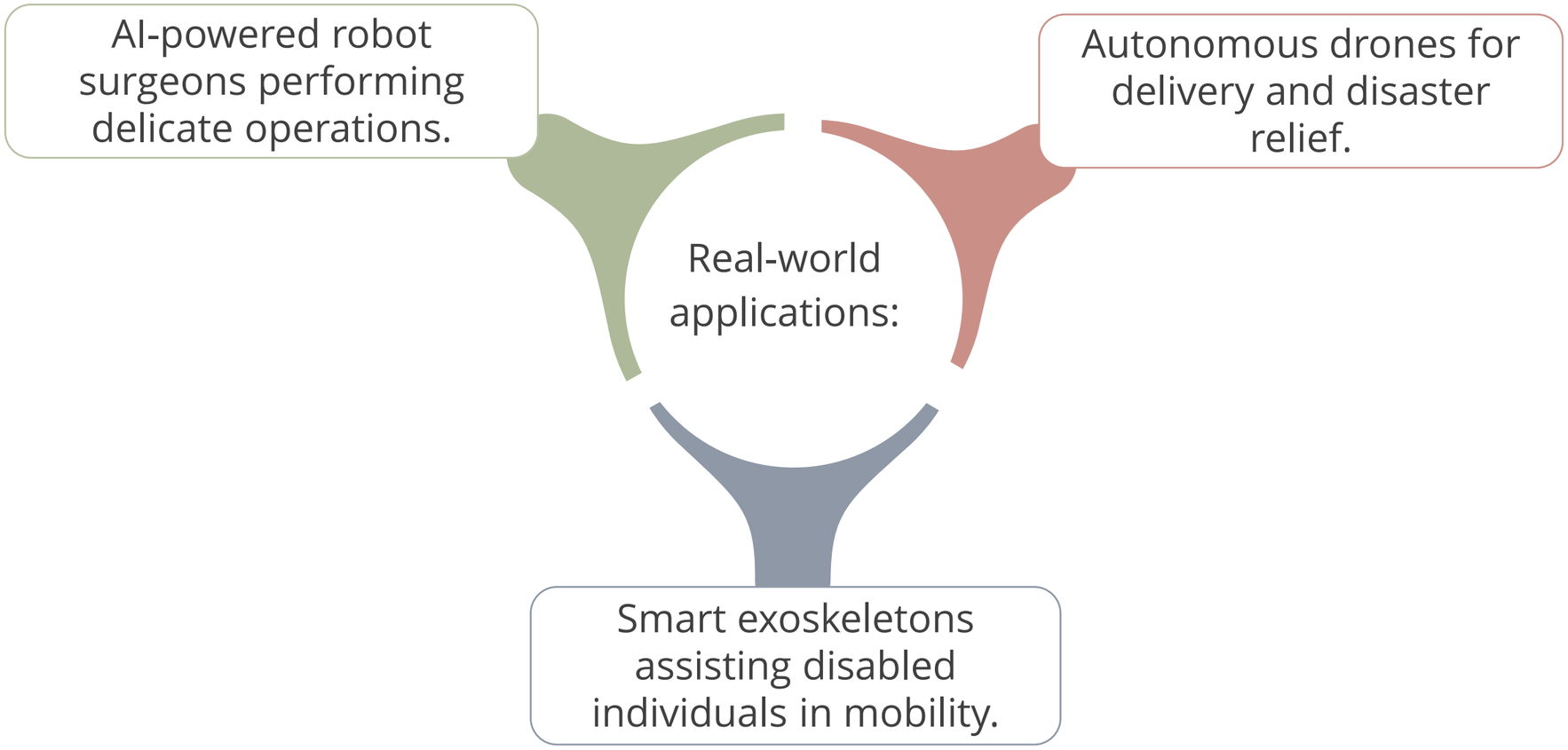
Agentic AI

It is an AI systems that operate independently, making decisions without continuous human intervention, go beyond standard AI models by planning, reasoning, and executing actions.



Physical AI

It is AI that interacts with the physical world through robots, drones, and smart devices combines machine learning, robotics, and automation to extend its capabilities beyond virtual AI systems.



Quick Check

Which of the following is an example of **Agentic AI**, where the system operates independently and makes autonomous decisions?

A. A search engine retrieving web pages based on user queries.

B. AI-powered spell check correcting typos in a document.

C. A self-driving car navigating through traffic without human intervention.

D. A rule-based chatbot that responds with pre-defined answers.

Guided Practice

Overview

Duration: 20 minutes

In this exercise, you will learn to prioritize AI project features by leveraging prompt engineering and ChatGPT-3 to create a 2x2 prioritization grid. For a scenario, you will evaluate GenAI features based on their business impact and feasibility and organize them within a 2x2 prioritization grid framework. This session emphasizes crafting precise prompts to guide GenAI in making strategic decisions for you effectively.

Note: Please download the solution document from the Reference Material section for step-by-step guidance.

GUIDED PRACTICE

Key Takeaways

- Generative AI is transforming content creation and automation, leveraging powerful models like Transformers, GANs, and VAEs to generate text, images, and more across various industries.
- Prompt engineering plays a crucial role in optimizing AI responses, with techniques like few-shot, zero-shot, and structured prompts improving accuracy and relevance in AI-generated content.
- AI security, bias, and ethical concerns must be addressed, as challenges like data privacy, misinformation, and regulatory compliance impact responsible AI deployment.
- Agentic and Physical AI enable autonomous decision-making, where AI-powered systems operate independently in business automation, robotics, and real-world applications.

Q&A