



# Artificial Intelligence

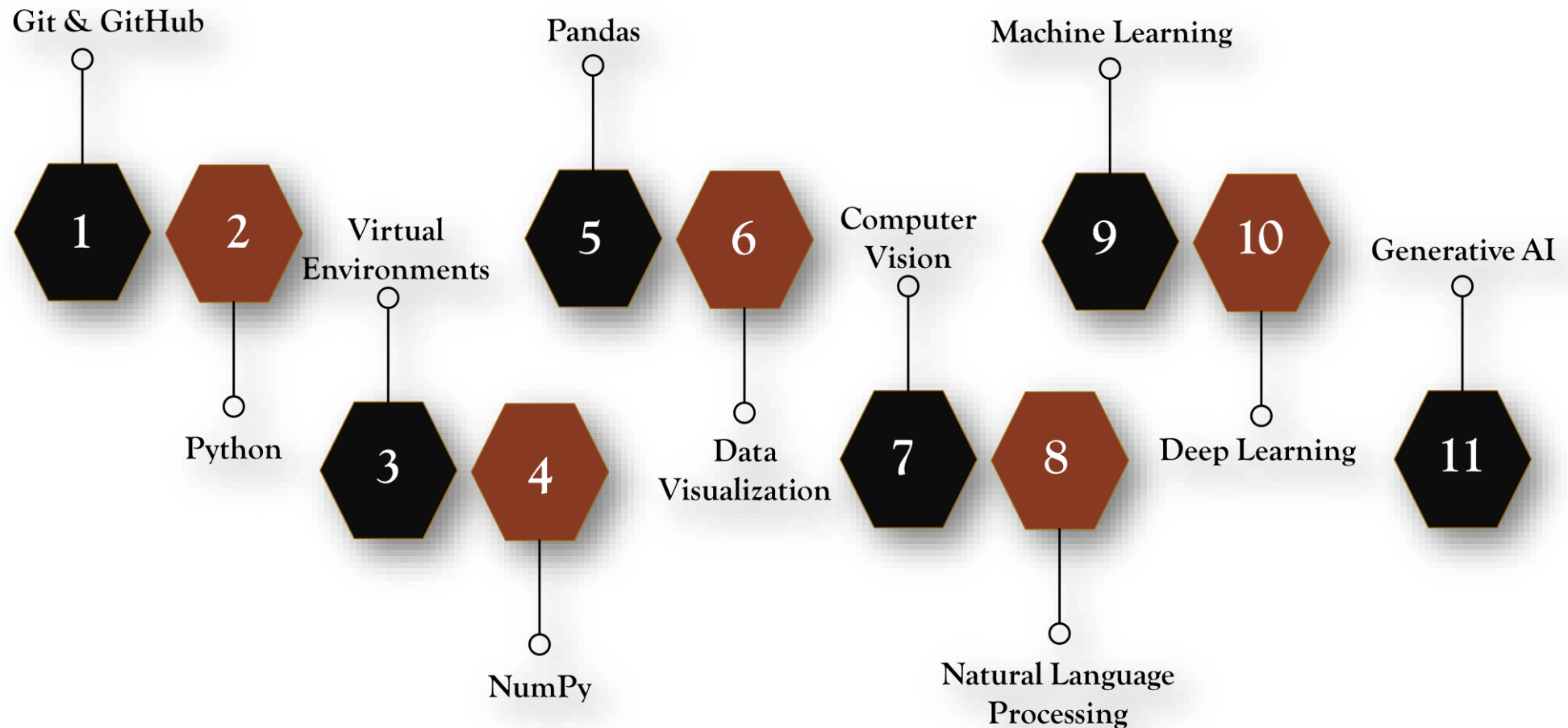
## Machine Learning & Deep Learning

Dated: 14 June 2025

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# Course Roadmap

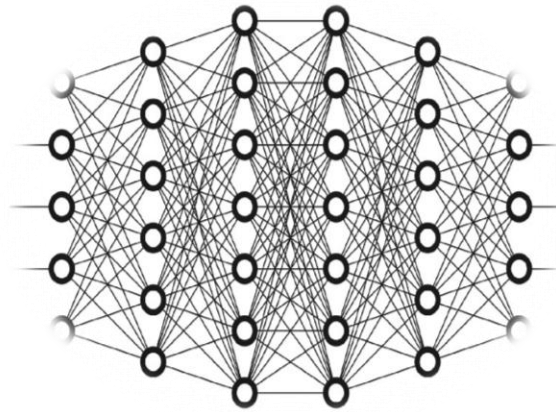


# Training Objective

AI/ML Fundamentals



Deep learning frameworks



Real-world AI application development



# Artificial Intelligence

## Definition

Artificial Intelligence (AI) is the simulation of human intelligence in machines that are programmed to think, learn, and make decisions.



Autonomous Vehicle

## Core Abilities

**Perception** – Understanding input (e.g., images, speech)

**Reasoning** – Making decisions or solving problems

**Learning** – Improving from data over time

**Interaction** – Communicating via speech, text, etc.

**Autonomy** – Acting independently

Traditional Programming	Artificial Intelligence
Rule-based	Data-driven
Fixed logic	Learns and adapts
No learning	Improves over time



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## Image Recognition

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# Weak VS Strong AI

## Weak

AI designed for a specific task and operates within a limited context.

### Characteristics

- Excels at one particular function
- Does not possess consciousness or self-awareness.
- Cannot generalize beyond its trained domain.



ChatGPT



## Strong

AI with human-like cognitive abilities, capable of reasoning, learning, and applying knowledge across various domains.

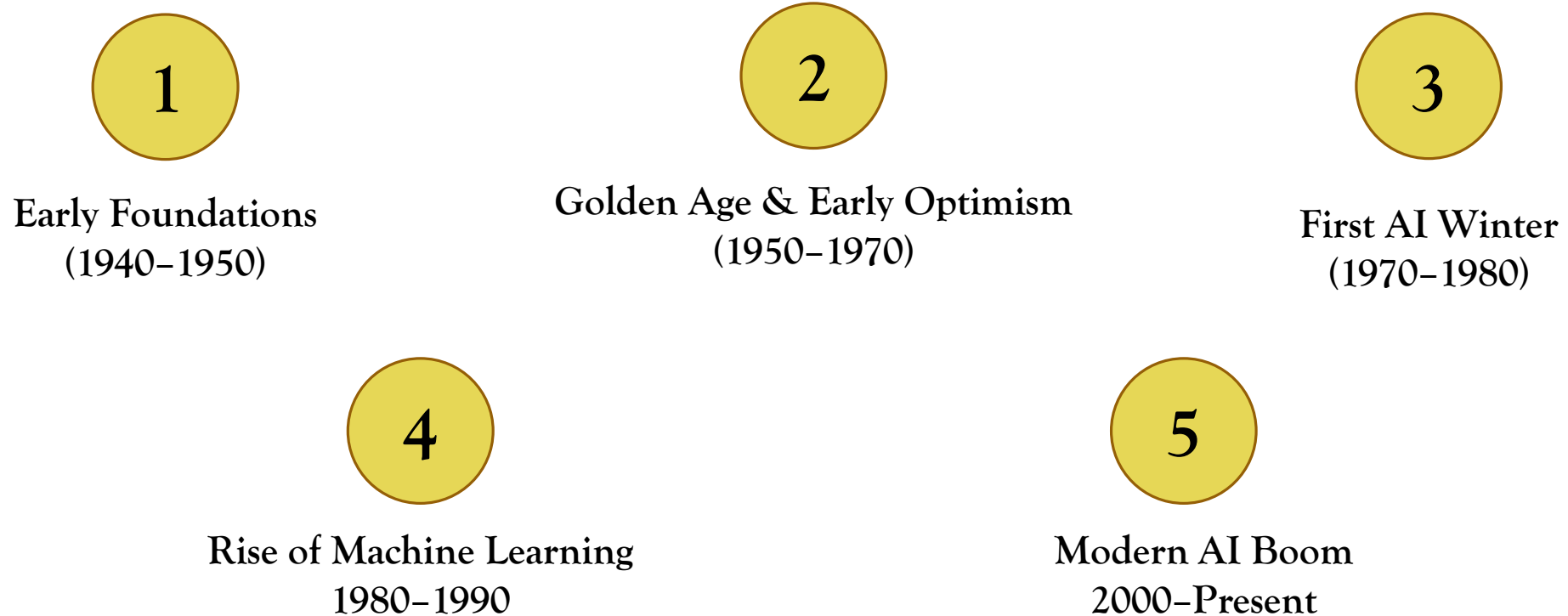
### Characteristics

- Can perform any intellectual task a human can.
- Possesses self-awareness, consciousness, and understanding.
- Adapts to new situations without explicit programming.

**Current Status:** Does not yet exist; remains theoretical.



# Historical evolution of artificial intelligence



# Symbolic vs Machine Learning AI

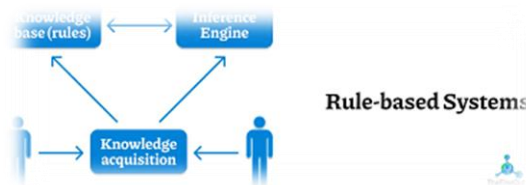
## Symbolic AI

1. Uses predefined rules and knowledge representation
2. Relies on human expertise and logic
3. Suitable for well-defined problems

### Examples



Logic Based



Rule-based systems

## Machine Learning AI

1. Learns from data and identifies patterns
2. Improves performance over time
3. Suitable for complex, data-driven problems

### Examples



Image Recognition



Natural Language Processing



# Key Domains in AI

## Natural Language Processing



NLP deals with the interaction b/w **computers** and **human** (natural) language.

- Natural Language Understanding
- Natural Language Generation
- Speech Recognition
- Machine Translation etc.

## Computer Vision



Computer Vision enables computers to **see**, **interpret** and **understand** the visual world.

- Image classification
- Object Detection
- Object Tracking
- Facial Recognition etc.

## Robotics



Robotics is a **multidisciplinary** field that integrates AI with **Physical** machines (robots) to enable them to perform tasks, often autonomously in the real world.

- Perception
- Motion Planning
- Manipulation
- Human-robot interaction

# Artificial Intelligence in Different Fields

## Healthcare

- Disease prediction
- Medical imaging
- AI in diagnostics

**Example:** Cancer detection using DL models



## Agriculture

- Crop yield prediction
- Pest and disease detection using drones
- Soil and weather analysis

**Example:** AI image analysis for plant diseases



## Finance

- Fraud detection
- Credit scoring
- Algorithmic trading

**Example:** Real-time transaction monitoring



## Manufacturing

- Predictive maintenance
- Robotics in assembly lines
- Defect detection
- Example: AI visual inspection systems



# Conti...

## Education

- Adaptive learning systems
- Automated grading
- Virtual tutors

**Example:** AI-based learning apps



## Cybersecurity

- Threat detection
- Anomaly detection
- Automated response systems.

**Example:** AI identifying malware patterns



## Transportation

- Self-driving technology
- Traffic prediction
- Route optimization

**Example:** Tesla Autopilot, Google Maps traffic forecasting



## Manufacturing

- Content recommendations
- AI-generated content (music, art)
- Deepfake technology

**Example:** Netflix & YouTube recommendations



# Global AI Industry Landscape



# Artificial Intelligence Trends

## Generative AI



**Creates new content**

Text, images, music, code

Based on models like GPT, DALL-E, Sora

## Large Language Models



**Trained on massive text data**

Understand and generate human-like language

**Example:** GPT-4, Claude, Gemini

## Edge AI



**AI than runs on device (not cloud)**

Low latency, privacy-friendly, work offline

**Example:** AI in phones, smart cameras, wearables

## Agentic AI



**AI systems that take initiative, act autonomously**

Goal-directed, can plan, adapt and execute

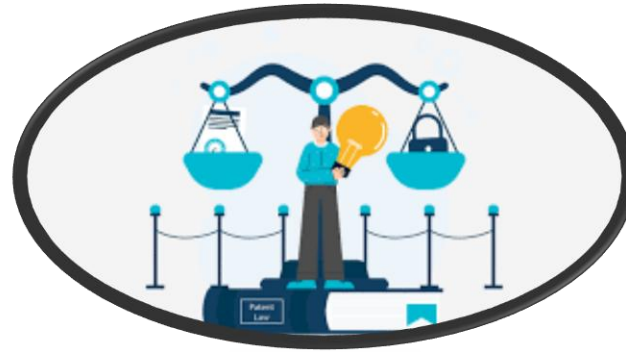
**Example:** AI agents managing tasks, self-improving bots



# Challenges in AI Adoption

## Data

- Garbage in, Garbage out
- Siloed Data
- Data Scarcity
- Privacy Concerns



## Cost and ROI Justification

- Significant Upfront Investment
- Uncertain ROI
- Operational Costs
- Talent Acquisition

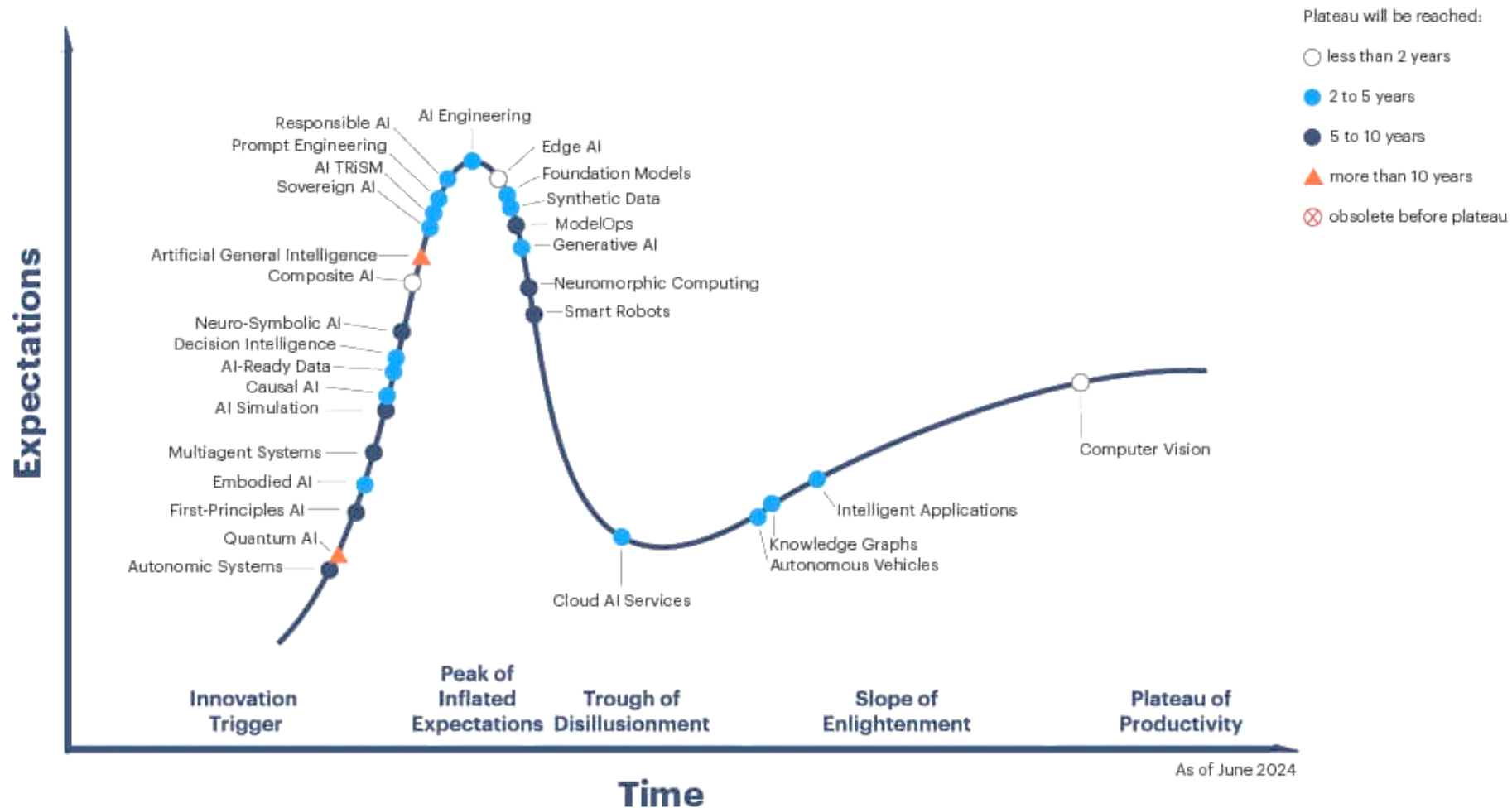


## Regulation and Compliance

- Evolving Landscape
- Ethical Concerns
- "Black Box" Problem



# Gartner Hype Cycle for Artificial Intelligence





**THANK  
YOU**