# Introduction to Artificial Intelligence (AI)

What is AI?
AI refers to machines that mimic human intelligence, reasoning, and decision-making to solve specific problems.

## AI vs. Artificial General Intelligence (AGI):

**AI**: Focused on specific tasks; learns from data, reasons, and makes decisions.
**AGI**: Matches or surpasses human intelligence across various tasks.

### Examples of AI:
- Voice assistants
- Facial recognition
- Personalized recommendations
- Autonomous robots

### Applications Moving Towards AGI:
- Self-driving cars
- AlphaGo
- Generative AI (e.g., GPT models)

## What AI Can and Cannot Do

**Predictions and Inferences**: Example Weather forecasts or book recommendations.

**Pattern Recognition**: Tasks include clustering, anomaly detection, and generative AI.

**Optimization**: Applications: Logistics, energy, tourism, marketing.

**Automation**: Example Document classification, job screening, or parcel management.

**Limitations**:
Lack of social/emotional intelligence.
Inability to adapt to unseen scenarios or biases in data.

## Subdomains of AI
**Machine Learning**: Learning from data to make predictions or inferences. | **Deep Learning**: Neural networks for solving complex problems. | **Knowledge Representation Reasoning** and communication between AI systems. | **Robotics**: Acting and manipulating the physical environment. | **Computer Vision**: Visual recognition of objects in the environment. | **Natural Language Processing (NLP)**: Understanding and processing human language.
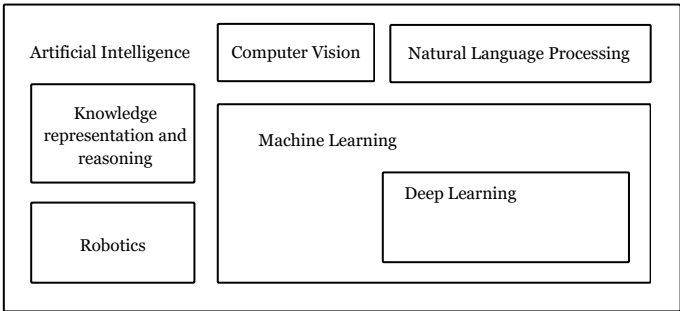


## Examples of AI Applications
**Personalized Recommendations**: Machine Learning | **Warehouse Management**: Robotics, Computer Vision | **Medical Diagnosis**: Deep Learning, Computer Vision | **Smart Assistants:** NLP, Deep Learning

**Facial Recognition** is a biometric technology that identifies or verifies a person's identity using their facial features. It analyzes a person's face by mapping its geometry—such as the distance between the eyes, the shape of the cheekbones, and the contour of the jawline—and compares this data to a database of stored facial profiles.

## Key Components of Facial Recognition

*Image Capture*:
A camera captures an image or video of a person's face.
*Face Detection*:
The system locates the face within the image or video frame.
*Feature Extraction*:
Key facial landmarks and features (e.g., eyes, nose, and mouth) are identified and measured.
*Face Matching*:
The extracted features are compared to stored profiles in a database to find a match.
*Verification or Identification*:
Verification: Confirms if the person matches a specific identity.
Identification: Determines who the person is from a group of profiles.

## Applications of Facial Recognition:

*Authentication*:
Unlocking smartphones and laptops (e.g., Apple's Face ID).
Verifying identity for financial transactions or access to secure areas.

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