

# Artificial Intelligence

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## Textbook

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# Artificial Intelligence



Artificial Intelligence (AI) and Robotics are changing our world. This chapter will cover AI's history and how we test it. We'll then explore major uses of AI and Machine Learning in fields like medicine, space, and cars. Finally, we'll see how robots help with human challenges.

## Exploring the History of Artificial Intelligence (AI)

The idea of thinking machines started long ago, but AI formally began in 1956. Early AI used rules to solve problems like chess. The **Turing Test**, from 1950, was a key AI test; a judge chatted with a human and a machine, and if they couldn't tell them apart, the machine passed.

AI tests changed as AI grew. After a slow period, powerful computers and new methods like machine learning brought AI back. Modern tests now go beyond conversation, checking AI's common sense (like the **Winograd Schema Challenge**), visual recognition (ImageNet), and understanding of language (GLUE). These new tests show how much AI has advanced.

## Major Applications of AI and Machine Learning

AI and Machine Learning (ML), which lets systems learn from data, are now everywhere.

In **medicine**, AI helps doctors diagnose diseases earlier and more accurately by analyzing images. It speeds up drug discovery and predicts outbreaks.

In **space exploration**, AI guides Mars rovers, helps them find interesting spots, and picks samples. AI also analyzes telescope data to find new planets and optimizes spacecraft travel.

The **automotive field** uses AI for self-driving cars, helping them "see," understand traffic, and navigate. ML constantly improves these systems. AI also predicts car problems and enhances in-car experiences.

## Predictive Artificial Intelligence

Predictive AI uses old data to guess future events or trends, helping us plan.

In **sports**, it forecasts game outcomes and player performance, aiding coaches and fantasy sports. For the **stock market**, AI analyzes financial data and news to predict stock prices and trading chances. In **weather forecasting**, AI uses past patterns and sensor data to make predictions more accurate, helping us prepare for storms and manage resources better. Predictive AI reduces uncertainty for better decisions.

## How Do Robots Address Human Challenges

Robots are used to handle dangerous, boring, dirty, or complex tasks for humans.

In **healthcare**, surgical robots help doctors with precise movements, leading to faster recovery. Robots also deliver supplies and disinfect rooms. In **hazardous environments**, robots defuse bombs, explore radiation zones, or search collapsed buildings, protecting human lives. Deep-sea and space robots perform tasks humans can't.

In **manufacturing and logistics**, robots do repetitive lifting, speeding up production and reducing injuries. In warehouses, robots move goods and manage inventory, making deliveries faster. Robots are also being made to help **elderly or disabled people** with daily tasks, improving their quality of life.

## Critical Thinking Questions

1. The Turing Test was an early way to check AI's intelligence. With today's advanced AI, like chat programs, is this test still good enough? What new tests would be better for AI now?
2. Pick one main use of AI (medicine, space, or cars). Describe a specific problem AI solves there. Then, think about any ethical issues or potential societal risks as AI becomes more involved in that area.

## Questions (5)

**1. In 1950, Alan Turing proposed a test where a human judge converses with a human and a machine. If the judge cannot tell them apart, the machine passes. What is this test called?**

MULTIPLE CHOICE

**Choose the correct answer:**

- A. The Winograd Schema Challenge
- B. The ImageNet Test
- C. The Turing Test
- D. The GLUE Benchmark

**2. Modern AI tests go beyond simple conversation. Which of the following tests specifically evaluates an AI's common sense understanding?**

MULTIPLE CHOICE

**Choose the correct answer:**

- A. Turing Test
- B. Winograd Schema Challenge
- C. ImageNet
- D. GLUE

**3. In the field of medicine, how does AI and Machine Learning primarily assist doctors in diagnosing diseases?**

MULTIPLE CHOICE

**Choose the correct answer:**

- A. By conducting surgeries autonomously without human supervision.
- B. By replacing human doctors entirely in patient consultations.
- C. By analyzing medical images to help detect diseases earlier and more accurately.
- D. By predicting which patients will not recover from an illness.

**4. A company uses AI to analyze historical sales data and current market trends to forecast future product demand, allowing them to optimize production schedules. What type of AI is being utilized here?**

MULTIPLE CHOICE

**Choose the correct answer:**

- A. Conversational AI
- B. Generative AI
- C. Predictive AI
- D. Robotic Process Automation (RPA)

**5. Robots are deployed to explore a radiation-contaminated zone after a nuclear incident, collecting data that would be too dangerous for humans to gather. This is an example of robots addressing which type of human challenge?**

MULTIPLE CHOICE

**Choose the correct answer:**

- A. Repetitive tasks
- B. Dirty tasks
- C. Dangerous tasks
- D. Complex tasks (requiring high precision)

## Answer Keys & Solutions

### Questions

1. In 1950, Alan Turing proposed a test where a human judge converses with a human and a machine. If the judge cannot tell them apart, the machine passes. What is this test called?

MULTIPLE CHOICE

**Correct Answer:**

- |                                  |             |
|----------------------------------|-------------|
| A. The Winograd Schema Challenge | ✗ Incorrect |
| B. The ImageNet Test             | ✗ Incorrect |
| C. The Turing Test               | ✓ Correct   |
| D. The GLUE Benchmark            | ✗ Incorrect |

**Explanation:**

Recall the foundational test for machine intelligence named after its creator.

2. Modern AI tests go beyond simple conversation. Which of the following tests specifically evaluates an AI's common sense understanding?

MULTIPLE CHOICE

**Correct Answer:**

- |                              |             |
|------------------------------|-------------|
| A. Turing Test               | ✗ Incorrect |
| B. Winograd Schema Challenge | ✓ Correct   |
| C. ImageNet                  | ✗ Incorrect |
| D. GLUE                      | ✗ Incorrect |

**Explanation:**

Look for the test that focuses on nuanced language understanding requiring common sense.

### 3. In the field of medicine, how does AI and Machine Learning primarily assist doctors in diagnosing diseases?

MULTIPLE CHOICE

**Correct Answer:**

- A. By conducting surgeries autonomously without human supervision. ✗ Incorrect
- B. By replacing human doctors entirely in patient consultations. ✗ Incorrect
- C. By analyzing medical images to help detect diseases earlier and more accurately. ✓ Correct
- D. By predicting which patients will not recover from an illness. ✗ Incorrect

**Explanation:**

Think about how AI processes visual data in healthcare.

### 4. A company uses AI to analyze historical sales data and current market trends to forecast future product demand, allowing them to optimize production schedules. What type of AI is being utilized here?

MULTIPLE CHOICE

**Correct Answer:**

- A. Conversational AI ✗ Incorrect
- B. Generative AI ✗ Incorrect
- C. Predictive AI ✓ Correct
- D. Robotic Process Automation (RPA) ✗ Incorrect

**Explanation:**

Think about AI that uses past data to make educated guesses about the future.

### 5. Robots are deployed to explore a radiation-contaminated zone after a nuclear incident, collecting data that would be too dangerous for humans to gather. This is an example of robots addressing which type of human challenge?

MULTIPLE CHOICE

**Correct Answer:**

- A. Repetitive tasks ✗ Incorrect

B. Dirty tasks

✗ Incorrect

C. Dangerous tasks

✓ Correct

D. Complex tasks (requiring high precision)

✗ Incorrect