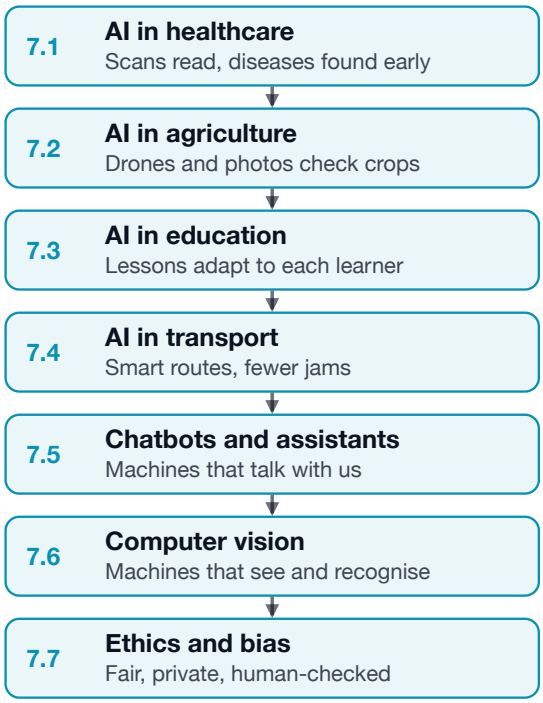
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Chapter 7: Applications of AI

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Chapter 7 shows where **artificial intelligence** is used in daily life and how it helps people work faster and make better decisions. You will see AI reading X-ray images in hospitals, spotting crop disease from drone and phone photos, suggesting lessons to students and guiding traffic and ride apps. You will also learn how **chatbots** and voice assistants understand questions, and how **computer vision** lets a machine recognise faces, number plates and objects. The chapter ends with the risks: biased data, privacy, fake images and jobs, and why humans must stay responsible for decisions an AI system suggests.



Topics at a glance

- **7.1 AI in healthcare** Scans read, diseases found early
  Medical image analysis, early diagnosis and health apps.
- **7.2 AI in agriculture** Drones and photos check crops
  Crop monitoring, pest and disease detection, smart irrigation.
- **7.3 AI in education** Lessons adapt to each learner
  Personalised learning, auto-marking and study helpers.
- **7.4 AI in transport** Smart routes, fewer jams
  Navigation, traffic control and self-driving vehicles.
- **7.5 Chatbots and assistants** Machines that talk with us
  Natural language processing, chatbots and voice assistants.

- **7.6 Computer vision** Machines that see and recognise
  Image recognition, face and object detection.
- **7.7 Ethics and bias** Fair, private, human-checked
  Bias, privacy, deepfakes, jobs and responsible use.

Key terms

- **Artificial intelligence (AI)** is the ability of a computer system to do tasks that normally need human thinking, such as recognising images, understanding language and making decisions.
- **Chatbot** is a program that talks with people in text or voice, answering questions or helping with simple tasks.
- **Natural language processing (NLP)** is the branch of AI that lets computers understand, process and produce human language.
- **Computer vision** is the branch of AI that lets computers understand images and videos, for example to identify objects or faces.
- **Precision agriculture** is farming that uses sensors, drones and AI to give each part of a field exactly the water, fertiliser or spray it needs.
- **Algorithmic bias** is unfair results from an AI system, usually because the data it learned from was incomplete or one-sided.
- **Deepfake** is a fake image, video or voice recording made with AI to look or sound like a real person.

Code examples

A simple rule-based chatbot in Python

```
replies = {
    "hello": "Hi! Ask me about your timetable.",
    "exam": "Revise one chapter a day and practise old papers.",
    "bye": "Goodbye, good luck with your studies!",
}

question = input("You: ").lower()
answer = "Sorry, I do not understand that yet."
for word in replies:
    if word in question:
        answer = replies[word]
        break
print("Bot:", answer)
```

Questions students ask

Q. Is a rule-based chatbot the same as an AI chatbot?

No. A rule-based chatbot only matches fixed keywords written by a programmer. An AI chatbot learns patterns from large amounts of text, so it can handle questions it was never given word for word.

Q. How does AI help farmers in Pakistan?

AI tools can study photos of leaves taken by drones or phones to spot pests and disease early, forecast weather, and suggest when and how much to water, which saves water, fertiliser and money.

Q. Why can an AI system be biased?

An AI system learns from data. If that data leaves out some groups or contains unfair past decisions, the system repeats those patterns, so its results can be unfair unless people test and correct it.

Q. Can AI replace doctors and teachers?

Not fully. AI can read scans quickly or mark simple work, but people are still needed to check its results, explain decisions, show care and take responsibility.

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