1. Introduction to AI and Automation

Δi Task (Page 10)

Do it yourself.

Δi Task (Page 11)

Do it yourself.

▶ Video Session (Page 12)

Do it yourself.

Δi Reboot (Page 13)

1. Intelligence 2. Artificial 3. AI 4. Sensors

Δi Reboot (Page 17)

1. Yes, machines work on their own in automation with minimal human intervention.

2. Some of the machines that can work without humans are Autonomous vehicles, Industrial Robots, Robotic vacuum cleaners, such as Roomba.

Δi Quiz

1. a   2. b   3. b   4. d   5. b

Exercise

A. 1. Offices and banks   2. Factories   3. Industrial
4. Conveyor belts   5. Automation

B. 1. b   2. c   3. d   4. e   5. a

C. 1. The difference between automation and artificial intelligence are as follows:

Aspect	Automation	Artificial Intelligence
Definition	Technology is used to perform tasks with less human intervention.	Technology is used to perform tasks that require learning, reasoning, or decision-making.
Nature	Rule-based and repetitive.	Data-driven and adaptive.
Ability to Learn	Performs fixed operations.	Learns from data and past experiences.
Complexity	Performs relatively simple tasks.	Handles more complex and dynamic tasks.
Flexibility	Low, limited to preset tasks.	Can adapt to changing situations.
Human Interventions	Minimal human intervention once installed.	Human intervention is required for training and tuning AI models.

2. The two types of automation are as follows:
  • Fixed Automation: These machines are designed to handle a high volume of work involving repetitive tasks and are dedicated to performing a single task that is not easily altered. This is also known as hard automation. For example, Assembly line machines that manufacture the same type of bottle cap throughout the day. These machines operate at a very high speed, yet they offer low flexibility.
  • Programmable Automation: This type of automation is used in manufacturing and production systems where equipment can be reprogrammed to handle different tasks. It is especially useful in scenarios where product designs change occasionally or when small batches of different products need to be produced using the same machinery. For example, an assembly line in a car factory may be programmed today to install car engines, and tomorrow, after reprogramming, it could be used to install car dashboards.

3. The difference between human intelligence and artificial intelligence are as follows:

Parameter	Human Intelligence	Artificial Intelligence
Nature	Adapt to new environments by utilising the combination of different cognitive process.	Mimics human behaviour and performs human-like actions.
Functioning	Uses the brain's memory, thinking, and learning power.	Works using data, instructions, and training provided by humans.

Parameter	Human Intelligence	Artificial Intelligence
Learning Power	Learns from experiences, real-life events, and mistakes.	Learns from data and repeated training.
Decision-Making Power	Can take smart and emotional decisions by understanding the situation.	Makes decisions based on the data it was trained with.
Human Factor	Humans possess the unique ability to learn and apply their acquired knowledge in combination with logic, reasoning, and understanding.	AI machines cannot understand the concept of cause and effect simply because they lack common sense.

4. We need the power of AI to reduce or take over tasks that do not require specific human skills, allowing people to focus on more important, creative, and productive work.

5. The term automation refers to performing a task using machines, software, or technology with minimal human intervention.

   For example, earlier, in hotels, housekeepers had to manually switch on the lights at a certain time. Now, with smart lights, the lights turn on automatically when someone walks through the area. This not only saves time but also helps conserve energy. There are many more examples of automation that we see daily. Some of those are automatic washing machines, automatic coffee maker, sensor-activated doors, automated accelerators, etc.

6. Robotic Process Automation refers to the use of software bots that mimic human actions to perform repetitive digital tasks on a computer. These bots are designed to follow rule-based instructions to complete tasks quickly and accurately. For example, bots that read emails, copy data into spreadsheets, or process invoices. These machines are completely computer-based and do not involve any physical robots.

Ai Lab (Page 22)

Do it yourself.

Class Activity (Page 22)

Do it yourself.

Ai Ready ......1 (Page 24)

Do it yourself.

2. AI Around Us

Δi Task (Page 31)

Do it yourself.

Δi Task (Page 32)

Do it yourself.

Δi Task (Page 33)

Do it yourself.

Δi Task (Page 39)

Do it yourself.

Δi Reboot (Page 42)

   1. e   2. c   3. b   4. e   5. a

Δi Quiz

   1. d   2. c   3. b   4. c   5. b

Exercise

A. 1. YouTube   2. microphones, speakers   3. Netflix

      4. Google Maps   5. Self-driving cars

B. 1. e   2. a   3. d   4. c   5. b

C. 1. The working process to create an image using Stylize is as follows:

- Select a Content Image: Choose the image you want to transform, like a photo or a drawing.
- Select an Artistic Style: Instead of using a style image, you can choose any style you want (for example, the style of a famous artist, a painting, or a unique effect).
- Apply the Style: The AI tool analyses the content of your chosen image and applies the selected artistic style to it.
- Combine the Results: The AI combines the content and the style, producing a new image where the content remains, but the style has been completely transformed.

- Save or Edit: Once the image is created, you can save it or make further adjustments to perfect your artwork.

2. Fitbit is a fitness tracking app that syncs with Fitbit wearables to monitor health metrics, including daily steps, heart rate, sleep patterns, and calories burned.

3. The two applications of AI are as follows:

   i. In home :AI-powered devices like Amazon Alexa, Google Assistant, and Apple Siri manage home automation, handle reminders, and provide information at voice commands.

   ii. In education: There are AI-powered tutors that can help students with their homework or explain things in a way that makes sense to them.

4. Artificial Intelligence works through a cycle of collecting data, learning from it, making decisions, and continuously improving from past experiences. Let's understand each one in detail.

   - Data Collection: AI systems operate on vast datasets, making data collection crucial. They gather information from various sources such as sensors, user activity, websites, cameras, and applications. This data can be unstructured, like images, speech, or videos, or structured, consisting of numbers in a table. For example, a fitness app can collect data from your wearable devices, such as a smartwatch, regarding the number of steps, heart rate, and sleep data.

   - Learning from Data: AI learns from the data provided to it. During the model training phase, the AI model adjusts itself based on data to learn how to perform tasks and make predictions. It also finds patterns in the data. For example, AI learns to recognise cats in photos by analysing thousands of images labelled as "cat".

   - Decision Making: After learning from the data, the AI makes decisions or predictions. These decisions are based on the patterns it detected during the training phase. For example, a recommendation system decides which film to show you next based on your past viewing habits.

   - Improvement: AI systems improve over time by receiving feedback and analysing results. They retrain or update their models using new data or corrections. For example, a self-driving car improves its driving decisions as it encounters more traffic situations and receives updates.

5. Super AI surpasses human intelligence in all aspects; it can perform tasks better than humans in every field, including creativity, emotions, and decision-making. It possesses features like beyond human intelligence, self-awareness, autonomy, thinking power, and can make decisions more accurately and faster than humans. Examples of such AI are fictional characters like Skynet in Terminator, Jarvis in Iron Man, and Smith in Atlas.

Δi Lab (Page 45)

Do it yourself.

Do it yourself.

Test Sheet–1

(Based on Chapters 1 & 2)

A. 1. a   2. b   3. b   4. d   5. b   6. b

B. 1. Offices and banks   2. Industrial   3. Automation

   4. YouTube   5. Netflix   6. Self-driving cars

C. 1. e   2. a   3. d   4. c   5. b

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3. Exploring AI Domains

Δi Task (Page 52)

Do it yourself.

Δi Reboot (Page 52)

Self-Driving Cars, Healthcare

▶ Video Session (Page 53)

Do it yourself.

Δi Quiz

| 1. a | 2. c | 3. b | 4. b | 5. b |

Exercise

A.
1. Statistical data
2. Natural Language Processing (NLP)
3. Chatbots
4. Computer Vision
5. face filters

B. 1. False   2. True   3. True   4. True   5. False

C. 1. Natural Language Processing (NLP) understands and works with human languages, such as English, Hindi, and French, and can read, write, translate, and respond like a person. In short, we can say that Natural Language Processing teaches computers to talk and understand human languages just as we do. NLP assists computers in understanding the meaning and context of written or spoken language. This includes recognising words, phrases, and their relationships. It helps generate human-like text or speech, ranging from a summary of an article to creating a conversation.

2. AI-powered CCTV cameras are used in traffic monitoring to detect red-light jumping and speeding. Cameras are equipped with AI to identify vehicles breaking traffic rules and automatically send violation alerts.

3. Two real-life usages of Computer Vision are:

   i. Computer Vision is used in face recognition for devices like smartphones. Face unlock functionality, where the phone recognizes the user's face and grants access.

   ii. Computer Vision analyses X-rays or scans to detect diseases such as cancer, fractures, or other abnormalities.

4. The domains of AI refer to the primary areas or branches where AI is applied to mimic or augment human intelligence. Each domain is dedicated to a specific kind of task that the human brain performs, such as language recognition, reasoning, learning, pattern recognition, or understanding images.

5. Many companies now employ chatbots to handle customer inquiries. AI-powered chatbots on websites like IRCTC, banks, or online retailers can provide answers to common questions, book tickets, or process transactions, reducing the need for human agents.

Ai Lab (Page 58)

Do it yourself.

Ai Ready ......3 (Page 59)

Do it yourself.

4. Computer Vision and Its Applications

Ai Reboot (Page 63)

1. Humans see and understand objects through their eyes and brain, which work together to recognize and interpret visual information based on memory and experience.

2. Computer Vision trains machines to recognise and interpret images and videos, enabling them to understand and make decisions based on visual data, like identifying objects or people.

▶ **Video Session** (Page 66)

Do it yourself.

 Ai Task (Page 69)

Do it yourself.

Ai Quiz

1. c   2. b   3. b   4. c   5. c

Exercise

A. 1. False   2. True   3. True   4. False   5. False

B. 1. images, videos   2. management   3. pre-trained
    4. Training   5. virtual

C. 1. i.   Awareness: Human eyes are natural and automatic. Humans are able to identify familiar faces within seconds through perception and memory. Computer Vision systems, on the other hand, must be trained with large sets of data and algorithms in order to do the same thing.

For example, a human may easily identify a friend in a group of people, AI only identifies faces after it has been trained on facial information.

    ii.   Speed of Understanding: Humans are able to fast process what they see and frequently assign emotional significance to it. Computer Vision processes images fast but does not understand emotions.

For example, a human can see a smiling face and perceive friendliness, whereas AI can mark the face as "smiling" without any context.

2. Computer Vision (CV) is a domain of Artificial Intelligence (AI) that enables computers or machines to 'see' and interpret images and videos, much like humans do. It allows computers to extract meaningful information from visual inputs. The insights gained from CV are then used to make automated decisions or take appropriate actions. CV helps machines identify objects, people, movements, or scenes by analysing visual data—such as images or videos—through cameras, sensors, and specialised software.

3. i.   Computer vision in smart cameras monitors roads, counts vehicles, helps control traffic flow, and detects accidents or rule violations more effectively.

    ii.   Retailers utilise computer vision to identify products, monitor stock levels, and provide automated checkout without a cashier.

4. Computer Vision works in 4 basic steps:

Step 1: Image Acquisition: The computer captures an image using a camera, sensor, or scanner—just like how we take photos with a phone or scan documents.

Step 2: Image Processing: The computer breaks the image into tiny dots called pixels. Then it uses algorithms (smart instructions) to detect patterns and features in the image.

Step 3: Object Recognition: The system tries to identify what's in the image—like a face, object, shape, or even text—by comparing it with what it has learned before (pre-trained data).

Step 4: Decision-making: Based on what it sees, the computer takes action. This could mean moving a robot, raising an alarm, stopping a machine, or making an independent decision.

For example: A retail store is developing a Computer Vision system to enhance its inventory management and improve customer service. The system operates in three stages:

i. Training: The system learns from a large dataset of images of products, such as clothing, electronics, and accessories, to recognize key features like brand labels, colors, and sizes.

ii. Analysis: The system analyses new images of the store's shelves, identifying items by comparing them with the learned features. It detects whether products are out of stock, misplaced, or incorrectly labelled.

iii. Interpretation: The system makes decisions based on its analysis, such as alerting staff to restock items or automatically updating inventory records.

Through these three stages—training, analysis, and interpretation—the system helps the store maintain accurate inventory and ensures a better shopping experience for customers.

Ai Lab (Page 72)

Do it yourself.

Class Activity (Page 73)

Do it yourself.

Ai Ready ......4 (Page 74)

Do it yourself.

Test Sheet–2

(Based on Chapters 3 & 4)

A. 1. a   2. b   3. b   4. c   5. b   6. c

B. 1. False   2. True   3. False   4. False   5. True   6. False

C. 1. Statistical data   2. Chatbots   3. face filters

     4. images, videos   5. pre-trained   6. virtual

D. 1. Natural Language Processing (NLP) understands and works with human languages, such as English, Hindi, and French, and can read, write, translate, and respond like a person. In short, we can say that Natural Language Processing teaches computers to talk and understand human languages just as we do. NLP assists computers in understanding the meaning and context of written or spoken language. This includes recognising words, phrases, and their relationships. It helps generate human-like text or speech, ranging from a summary of an article to creating a conversation.

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