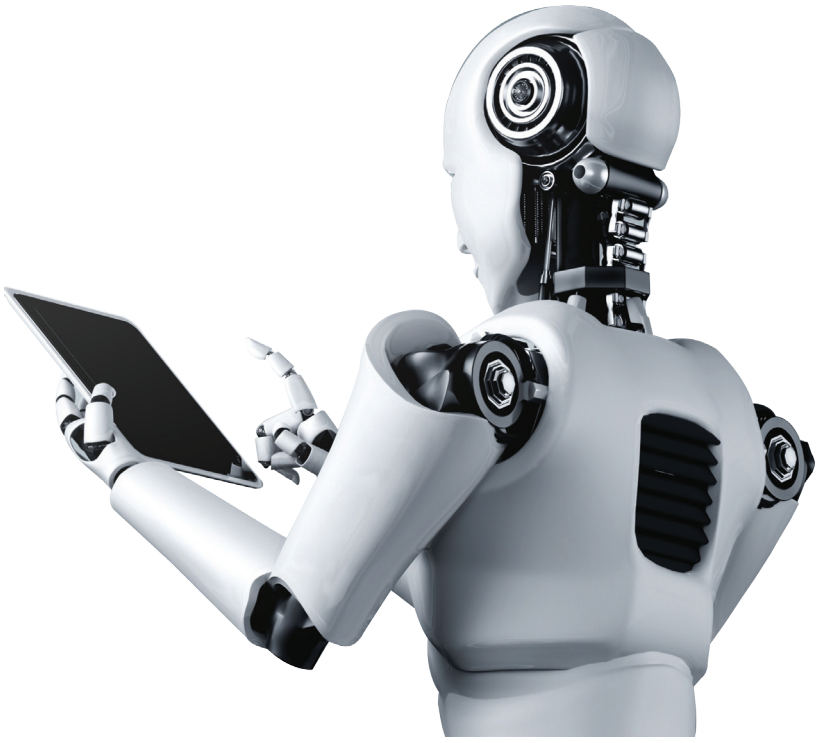
9
CBSE

# ARTIFICIAL INTELLIGENCE



Beta

ORANGE

Class IX

# Answer Key

Part-B: Subject Specific Skills

Artificial Intelligence

## 1. AI Reflection, Project Cycle and Ethics

**Ai Task** (Page 172)

1. "The Mitchells vs. the Machines" (2021), "Finch" (2021), "M3GAN" (2023)
2. Predicting the exact trajectory of artificial intelligence by 2030 is challenging, but we can make some educated guesses based on current trends and expert opinions. Here are some potential developments:
   - **Advanced General AI (AGI):** While true AGI—an AI with human-like general intelligence—remains a longer-term goal, we may see significant strides toward more versatile and adaptable AI systems. These systems might be capable of performing a wide range of tasks across different domains with less need for human intervention.
   - **Natural Language Processing:** AI's ability to understand and generate human language will likely continue to improve. We can expect more sophisticated and context-aware conversational agents, capable of holding more natural and nuanced interactions with humans.
   - **Autonomous Systems:** Self-driving cars, drones, and other autonomous systems will become more reliable and widespread. Advances in AI and sensor technology will enable these systems to navigate complex environments more safely and efficiently.
   - **Healthcare:** AI will play an increasingly critical role in healthcare, from diagnostics and personalized treatment plans to drug discovery and robotic surgery. AI-driven tools will help doctors and researchers achieve better outcomes for patients.
   - **AI in Creativity:** AI will enhance creative processes in fields like art, music, and writing. Tools powered by AI will assist artists and creators in generating new content, exploring novel ideas, and pushing the boundaries of human creativity.
3. Computers currently surpass humans in a wide range of activities, especially those involving specific types of tasks and data processing. Here are some key areas where computers excel, Data Processing and Analysis Mathematical Calculations, Pattern Recognition, Repetitive Tasks, Memory and Recall, Speed, Multitasking, Complex Simulations, Chess and Other Games, Natural Language Processing.

## Ai Reboot (Page 174)

a. Yes b. No c. No d. Yes e. Yes

## Ai Task (Page 176)

Its a drawing, No need to provide this

## Ai GAME 01 (Page 178)

1. Not always.
2. I was trying to study the most probable moves of the system.
3. Not really
4. It analyzed the move of the player and predicted the next move based on its previous experience.

## Ai GAME 02 (Page 180)

1. Not always.
2. Try to make an outline of the object asked to draw so it may identify it.
3. Most of them

## Ai Reboot (Page 182)

| Application | Domain |
|---|---|
| Google Image Search | Computer Vision |
| Akinator | Data Science |
| Face-Recognition System in Mobile | Computer Vision |
| Cortana | NLP |

## Ai Task (Page 186)

Telemarketing Roles, Administrative legal positions, Routine customer support roles

## Ai Task (Page 187)

**One advantage of AI:** AI is branching out into every aspect of our lives and helping us live a better life. We use AI systems to interact with our phones and speakers through voice assistants like Siri, Alexa, and Google. Cars made by Tesla using AI for self-driving cars. Even Google gives us recommendations based on our activities.

**One disadvantage of AI:** AI machine lacks human emotions and creativity. AIs can become skilled machines but they can never acquire the abilities of humans. The creativity of AI is only limited to the ability of humans that created them.

## Ai Reboot (Page 189)

1. Problem Scoping, Data Acquisition, Data Exploration, Modeling, Evaluation, Deployment.

2. Before deployment, the AI model must be tested to see if it is meeting the goals established in the first phase. The testing is also done to ensure that the AI model works not just with the data on which it is trained but new data that is added to it.

**Ai Reboot** (Page 200)

1. Surveys, Web Scraping, Sensors, Cameras, Observations, APIs

**Video Session** (Page 159)

Accept all relevant answers.

**Ai Task** (Page 201)

- 1. **Satellite imagery:** to detect plastic waste patches.
  2. **Drone footage:** for high-resolution localized detection.
  3. **Oceanographic data:** currents, temperature, salinity for understanding plastic movement.
  4. **Environmental parameters:** marine habitats, biodiversity hotspots.
- These features not only enable AI models to pinpoint the location and concentration of plastic waste but also facilitate real-time adjustments to cleanup strategies based on dynamic ocean conditions. By integrating diverse data sources, AI can offer comprehensive insights into the spread of plastic pollution, enhancing the efficiency and effectiveness of cleanup operations worldwide.
- Environmental organizations, government agencies, research institutions, satellite imagery providers, and local communities contribute crucial data on plastic waste distribution and environmental conditions, fostering collaborative efforts towards sustainable ocean conservation.
- Regularly, considering the dynamic nature of ocean currents and seasonal changes.
- Model accuracy decreases, leading to ineffective detection and cleanup operations, ultimately hindering progress in mitigating the environmental impact of ocean plastic pollution and jeopardizing marine biodiversity conservation efforts.
- 1. Spatial analysis: distribution and concentration of plastic waste.
  2. Temporal analysis: changes over time and seasonality.
  3. Feature extraction: identifying plastic debris among other marine features.
- 1. Cross-validation techniques using ground truth data ensure that AI models generalize well beyond training datasets, providing robust performance across various environmental conditions.
  2. Real-world testing in different oceanic regions validates the scalability and adaptability of AI-driven solutions, confirming their practical effectiveness in diverse marine ecosystems.
- Analysis guides the deployment of AI models and cleanup strategies in targeted oceanic areas, optimizing resource allocation and prioritizing areas most in need of intervention to maximize the impact on ocean plastic pollution reduction.

Also,

- 1. **AI-driven Detection:** Develop CNN models for automated plastic detection in satellite and drone imagery.
  2. **Autonomous Cleanup:** Integrate AI with drones and underwater robots for efficient cleanup operations.
  3. **Scalable Deployment:** Implement cloud-based solutions for global coverage and scalability.
  4. **Real-time Monitoring:** Utilize AI for continuous monitoring and adaptive cleanup strategies.
- Plastic concentrations, Ocean currents and dynamics, Marine habitat and biodiversity data, Satellite and drone imagery quality, Environmental parameters (temperature, salinity)
- **Data Acquisition:** Gather satellite imagery, drone footage, and oceanographic data from various sources.

  **Data Exploration:** Clean, preprocess, and visualize data to understand plastic waste distribution and dynamics.

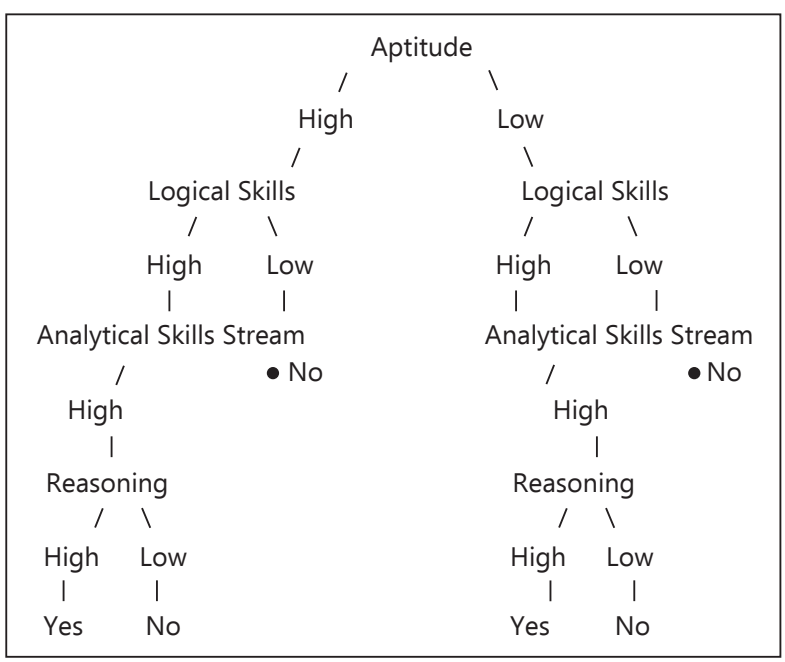
  **Modelling:** Develop and train AI models (CNNs, reinforcement learning) for plastic waste detection and cleanup optimization.

  **Evaluation:** Validate models using metrics and real-world testing.

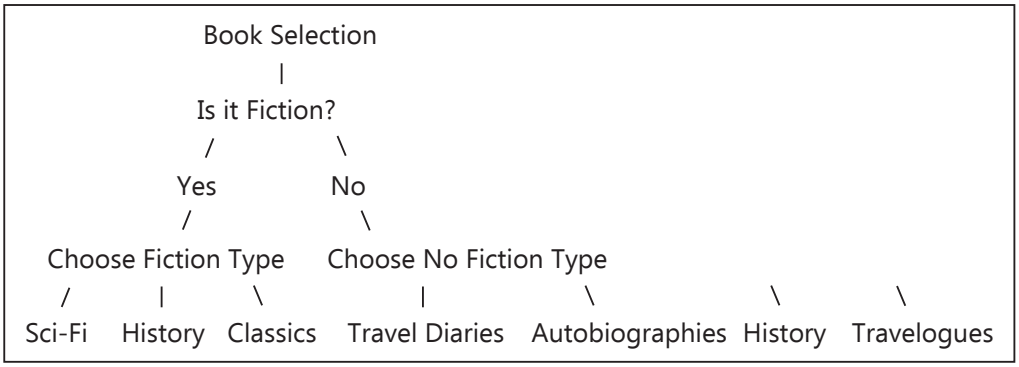
  **Deployment:** Integrate AI models into autonomous systems for operational deployment.

## Ai Task (Page 209)

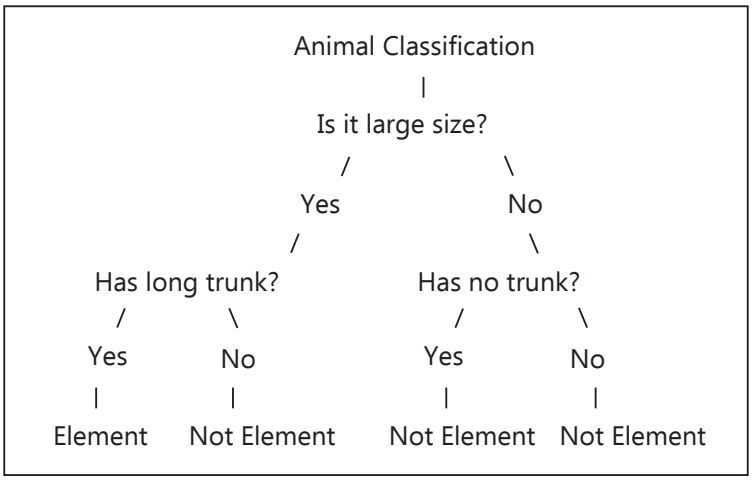
1.



2.




3.




## Ai Task (Page 212)

Calculate the total number of pixels:

Total pixels=width×height

For an image with a resolution of 3264x2448 pixels:

Total pixels=3264×2448=7,990,272 pixels

Convert pixels to megapixels:

Megapixels=Total pixels/ 1,000,000

Megapixels=990,272/1,000,0007≈7.99 MP

So, an image with a resolution of 3264x2448 pixels is approximately 7.99 megapixels.

## Ai Reboot (Page 212)

1. Problem scoping is the first and one of the most critical stages in the AI project cycle. It involves defining the problem that the AI system is intended to solve. Proper problem scoping ensures that the project goals are clear, achievable, and aligned with the desired outcomes.
2. Data acquisition is the process of gathering and filtering the data from various sources, while data exploration is analysing and visualizing the patterns and hidden insights from the data.

## Ai Reboot (Page 215)

1. The prediction is the output which is given by the machine and the reality is the real scenario in which the prediction has been made.
2. The confusion matrix, also known as the error matrix, is mainly use for statistical classification. It is a specific table layout that allows visualization of the performance of an algorithm. Each row of the matrix represents an instance in a predicted value while the column represents the actual value, or vice versa.

## Ai Task (Page 221)

AI Project Cycle Mapping Template

| Problem Solving | Data Acquisition | Data Exploration | Modelling | Evaluation | Deployment |
|---|---|---|---|---|---|
| Identify the specific problem in personalized education to address. | Collect relevant data for training the AI model and personalizing content. | Analyze and preprocess the data to understand its structure and relevance. | Develop and train AI models to personalize educational content based on the data. | Assess the effectiveness of the AI models and the solution. | Implement the AI solution in a real setting and ensure its effectiveness. |
| Example: Students receive generic content without consideration of individual learning styles and needs. | Student Profiles: Learning styles, academic performance | Data Cleaning: Handle missing or inconsistent data | Recommendation Systems: Personalized learning material suggestions | Accuracy: Alignment with student needs | Integration: Incorporate into existing platforms |
| | Educational Content: Textbooks, videos | Descriptive Statistics: Summarize data | Adaptive Learning Models: Real-time content adjustments | Student Engagement: Interaction levels | Monitoring: Track performance |
| | Interaction Data: Engagement metrics, quiz results | EDA: Identify patterns and correlations | NLP: Tailored feedback | Performance Improvement: Academic progress measures | Feedback Loop: Refine based on user feedback |

## Ai Reboot (Page 222)

1. Problem Solving
2. Data Acquisition
3. Data Exploration
4. Modelling
5. Evaluation

## Ai Task (Page 225)

| Sr. No. | App Name | Ethical or Privacy Concern |
|---|---|---|
| 1. | Whats App | None |
| 2. | Facebook | Yes |
| 3. | Paytm | None |
| 4. | Linkedin | Yes |
| 5. | SBI YONO | None |

# Exercise

## Unsolved Questions

**SECTION A** (Objective Type Questions)

### Ai Quiz

**A.** 1. a 2. d 3. d 4. c 5. a 6. b
7. d 8. b 9. a 10. b 11. b 12. a
13. a

**B.** 1. machine learning algorithms
2. skilled workforce and favourable government policies
3. Hanson Robotics
4. analysis and prediction
5. image recognition and interpretation
6. computer vision system
7. Word Association
8. iterative design
9. APIs (Application Programming Interfaces)
10. data

**C.** 1. False 2. False 3. False 4. True 5. True
6. False 7. True 8. True 9. False 10. True

**SECTION B** (Subjective Type Questions)

**A.**

1. Self-driving cars use computer vision to recognize and interpret road signs, obstacles, and pedestrians.
2. Healthcare (diagnostic tools), finance (fraud detection), and transportation (autonomous vehicles).
3. AI can transform industries, improve efficiency, solve complex problems, and enhance everyday life through automation, personalized services, and advanced decision-making.
4. Data statistics involves analyzing data to uncover patterns and trends, which helps AI systems make informed decisions and predictions.
5. To assess the performance of a classification model by displaying the number of true positive, true negative, false positive, and false negative predictions.
6. A leaf node represents the final classification or decision outcome in a decision tree, indicating the end of a decision path.
7. Data acquisition is the process of collecting and gathering data from various sources for analysis, training, and model development.
8. Weak AI and narrow AI are often used interchangeably. Both refer to AI designed for specific tasks, but weak AI generally implies limited capabilities, while narrow AI emphasizes its specialization in a particular function.
9. AI research in natural language understanding focuses on enabling machines to interpret, process, and respond to human language in a meaningful way, improving communication between humans and computers.
10. AI can assist in analyzing data from space missions, controlling spacecraft autonomously, optimizing mission planning, and detecting anomalies or patterns in space environments.
11. AI can lead to unemployment by automating tasks and jobs previously performed by humans, potentially reducing job opportunities in certain industries.
12. AI can automate repetitive tasks with high accuracy and efficiency, reducing human workload and freeing up time for more complex and creative activities.

**B.**

1. **Artificial General Intelligence (AGI)** refers to AI systems that possess the ability to understand, learn, and apply intelligence across a broad range of tasks at a level comparable to human capabilities. AGI can perform any intellectual task that a human can, but it is still hypothetical and has not yet been achieved.

   **Artificial Super Intelligence (ASI)**, on the other hand, refers to AI systems that surpass human intelligence in all aspects, including creativity, problem-solving, and emotional understanding. ASI would be vastly superior to the most intelligent human minds and could potentially outperform human capabilities in every field. While AGI is a step towards achieving ASI, ASI remains a theoretical concept and presents significant ethical and safety concerns.
2. **Machine Learning Engineer:** Develops and implements machine learning models and algorithms to solve specific problems and improve data-driven applications.

**Data Scientist:** Analyzes and interprets complex data to help organizations make informed decisions, often using machine learning and statistical techniques.

**AI Research Scientist:** Conducts research to advance the field of AI, focusing on developing new algorithms, models, and theories to improve AI systems and address challenges in the field.

3. 
- **Expensive Technology:** As AI is advancing day by day, the hardware and software need to get updated with time to meet the latest requirements. Setting up AI-based systems requires high costs because of the complexity of the engineering that goes behind its making. AI Reflection, Project Cycle and Ethics 187
- **Leads to Unemployment:** With the rapid development of AI, the fear of unemployment is constant. Jobs in manufacturing, agriculture, food service, retail, transportation, logistics, and hospitality are some of the industries likely to be affected. The majority of the repetitive tasks would be taken over by AI.
- **Lacks Emotions and Creativity:** AI machine lacks human emotions and creativity. AIs can become skilled machines but they can never acquire the abilities of humans. The creativity of AI is only limited to the ability of humans that created them.

4. **Does Not Improve with Experience:** Humans learn from experiences, whereas it's not possible with machines. AIs cannot alter their responses based on the changing environment. They are programmed to behave in a specific manner, so they cannot make decisions in case they encounter an unprogrammed situation. If a change is required, they need to be re-programmed.

- **Discouraging Human Creativity:** Apps like ChatGpt and others can be used with ease to do anything and everything

4. Computer vision is crucial because it enables machines to interpret and understand visual information from the world, mimicking human vision. This technology is essential for applications such as autonomous vehicles, facial recognition, medical imaging, and surveillance systems. By allowing computers to process and analyze images and videos, computer vision facilitates a wide range of automated and intelligent tasks, enhancing efficiency and creating new possibilities in various fields.

5. **Healthcare:** AI assists in diagnosing diseases, personalizing treatment plans, and analyzing medical images for early detection of conditions like cancer.

**Finance:** AI is used for fraud detection, algorithmic trading, and personalized financial advice, improving the accuracy and efficiency of financial operations.

**Customer Service:** AI-powered chatbots and virtual assistants provide 24/7 support, handle customer inquiries, and automate routine tasks, enhancing customer experience and reducing operational costs.

6. AI improves email communication through features such as smart email categorization, spam filtering, and predictive text. AI algorithms can automatically sort emails into different folders,

prioritize important messages, and filter out unwanted spam. Additionally, AI-driven tools can suggest responses, correct grammatical errors, and provide writing assistance, making email management more efficient and user-friendly.

7. **Manufacturing Workers:** Automation and robotics can replace repetitive and manual tasks in manufacturing, leading to job displacement.

   **Customer Service Representatives:** AI chatbots and virtual assistants can handle routine customer inquiries and support tasks, reducing the need for human representatives.

   **Data Entry Clerks:** AI and automation tools can process and input data more quickly and accurately than humans, potentially eliminating the need for manual data entry jobs.

8. **Data:** AI systems are the result of the data that is fed into them. The data used to train the AI system is the first step to check for biasness. The dataset for AI systems should be realistic and need to be of a sufficient size. However, the largest data collected from the real world may also reflect human subjectivity and underlying social biases. The Amazon AI recruitment system is a good example. It was found that their recruitment system was not selecting candidates in a gender-neutral way. The machine learning algorithm was based on the number of resumes submitted over a period of 10 years and most of them were men, so it favoured men over women.

   **Algorithms:** The algorithms themselves do not add bias to an AI model, but they can amplify existing biases. Let's look at an example of an image classifier model trained on images in the public domain—pictures of people's kitchens. It so happens that most of the images are of women rather than men. AI algorithms are designed to maximise accuracy. Therefore, an AI algorithm may decide that the people in the kitchen are women, despite some of the images being of men

9. **Human rights:** This principle emphasises that AI solutions should respect, protect, and uphold fundamental human rights. This includes rights such as privacy, freedom of expression, freedom from discrimination, and the right to a fair trial. AI systems should be designed and implemented in a way that they do not infringe upon these rights and should be held accountable if they do.

   **Bias:** Bias in AI refers to the unfair or unjust treatment of individuals or groups based on characteristics such as race, gender, age, or socioeconomic status. Bias can be unintentionally introduced into AI systems through biased training data, flawed algorithms, or skewed decision-making processes. Addressing bias in AI involves identifying, mitigating, and preventing bias at every stage of the AI development lifecycle, from data collection and preprocessing to model training and deployment.

   **Privacy:** Privacy concerns the protection of individuals' personal data and their right to control how that data is collected, used, and shared. AI systems often rely on vast amounts of data, which may include sensitive information about individuals. It is essential to implement robust privacy measures, such as data anonymisation, encryption, and user consent mechanisms,

to ensure that AI solutions respect individuals' privacy rights and comply with relevant data protection regulations.

**Inclusion:** Inclusion in AI refers to ensuring that AI solutions are accessible, equitable, and beneficial for all members of society, regardless of factors, such as race, gender, disability, or socioeconomic status. This involves considering the diverse needs, perspectives, and experiences of different user groups throughout the design, development, and deployment of AI systems. Inclusive AI design aims to prevent the exacerbation of existing inequalities and to promote equal opportunities and outcomes for all individuals

10. Difference between ethics and morals:

| Aspects | Ethics | Morals |
|---|---|---|
| Definition | Rules provided by an external source | Principles regarding right and wrong held by an individual |
| Source | Institutions, organisations, societal norms | Personal beliefs, cultural norms, religious teachings |
| Application | Specific situations and professional practices | Personal behaviour and conduct |
| Objective | Maintain order and fairness in society | Foster personal integrity and align with personal values |
| Examples | Medical ethics, business ethics, legal ethics | Personal beliefs about honesty, integrity, kindness |
| Origin | External and often codified | Internal and subjective |
| Scope | Consistent within a profession or society | Varies between individuals |
| Enforcement | Enforced by external bodies (e.g., professional organisations, legal systems) | Self-governed and enforced by individual conscience |
| Flexibility | Can change over time to reflect new norms or societal changes | More stable over time, but can evolve with personal growth |

## C. Competency-based/Application-based questions:

1. Recommendations based on user behavior and location data.
2. b. i.
3. a. a. i), ii) and iv)

**Assertion and Reasoning Questions**

4. a. Both A and R are true and R is the correct explanation of A.
5. d. A is false but R is true.

**AI In Life** (Page 240)

Do it yourself

## Deep Thinking (Page 240)

1. The concern that AI might turn evil and harm humans is a topic of significant debate among experts. While AI itself does not have intentions or desires, the way it is designed, deployed, and used can lead to unintended harmful consequences. Here are some factors that could potentially contribute to an AI system causing harm:
   - **Poor Design and Misalignment:** If an AI system is not properly aligned with human values and ethical considerations, it might make decisions that are harmful. For example, an AI designed for maximizing profit might make choices that are detrimental to human welfare.
   - **Bias and Unintended Consequences:** AI systems trained on biased or incomplete data might make unfair or harmful decisions. These biases could be amplified if the AI is used in critical areas like law enforcement or healthcare.
   - **Lack of Oversight:** Without proper monitoring and regulation, AI systems might be used in ways that are unethical or harmful. For instance, AI could be weaponized or used in surveillance to infringe on privacy.
   - **Autonomous Decision-Making:** Highly autonomous AI systems might act in ways that are not anticipated by their creators, especially if they are given the power to make significant decisions without human intervention.
2. Place: [Your City, Country]

   Date: [Today's Date]

   Dear Future Self,

   I hope this letter finds you well in the year 2030. It's fascinating to think about how much has changed since now. Back in 2024, technology was rapidly evolving, and we were on the cusp of breakthroughs in artificial intelligence, quantum computing, and renewable energy.

   By now, I imagine technology has progressed even further. AI likely plays an even more significant role in daily life, seamlessly integrated into everything from personalized education and healthcare to advanced robotics and smart cities. The way we work and interact with technology has probably transformed, with AI taking on more complex tasks and augmenting our capabilities in unprecedented ways.

   I hope you're leveraging these advancements to make a positive impact, continuing to learn and adapt in this fast-paced world. Remember the values and principles we held dear—ethics, creativity, and empathy—as you navigate this future.

   Hope this letter brings back old memories.

   Sincerely,

   xyz

3. **Title:** Navigating Career Changes in the Age of AI

   As we stand on the brink of a new technological era, artificial intelligence (AI) is reshaping our job landscape in profound ways. While AI brings remarkable advancements, it also displaces certain roles, prompting a significant shift in how we approach our careers.

   The rise of AI has led to automation in various sectors, from manufacturing to data analysis. This shift might initially seem daunting, but it opens doors to new opportunities. Workers are increasingly pivoting to roles that emphasize creativity, problem-solving, and human interaction—areas where AI still lacks proficiency.

   For example, roles in AI development, ethical oversight, and human-centric fields like psychology and education are burgeoning. Upskilling and reskilling have become crucial as individuals transition from routine tasks to more strategic and innovative positions.

   While the displacement of jobs due to AI can be challenging, it is also a call to embrace continuous learning and adaptability. By focusing on sectors where human ingenuity is indispensable, we can turn this technological upheaval into an opportunity for growth and fulfillment.

   To navigate this transition successfully, we must invest in education and training programs that prepare individuals for the future workforce, ensuring that everyone has the skills to thrive in an AI-enhanced world.

   Thank you.

## Ai Lab (Page 241)

a. If you don't select any of the given options in Inklewriter, the story will not progress to the next part. The user will be stuck at the current point in the narrative until they make a choice. This design ensures that readers make decisions that shape the story's direction, creating an interactive experience.

b. Yes, users can alter or add new options in the story. Inklewriter allows users to edit the existing options and add new choices, which lets them shape the narrative according to their creative vision. This flexibility helps in creating a more dynamic and personalized interactive story.

c. Yes, you can connect two different plots of the story together in Inklewriter. The platform supports branching narratives where different storylines can converge or diverge based on user choices. This feature allows for complex storytelling where different paths can eventually lead to the same or different outcomes.

d. Inklewriter itself doesn't use AI in the traditional sense of machine learning or data processing. However, the use of AI in similar interactive storytelling tools can be attributed to:

   - **Personalization:** AI can help in analyzing user choices and tailoring the story dynamically to suit individual preferences.
   - **Content Generation:** AI can assist in generating or suggesting narrative elements based on user input, creating more engaging and diverse storylines.

- **Complexity Management:** AI algorithms can manage and track numerous branching storylines and outcomes efficiently, ensuring a coherent and interactive narrative experience.

Inklewriter's focus is more on providing a user-friendly interface for creating interactive stories rather than using AI directly, but similar applications in interactive storytelling can benefit from AI in these ways.

## Class Activity (Page 246)

1. a. Homework Help
   b. Study Schedule
   c. Exam Preparation
   d. Personalized Learning
   e. Virtual Tutoring
   f. Task Reminders
2. a. **LUIS Interpretation:** LUIS identifies the user intent as booking a flight and extracts key information such as the destination ("Cairo"). It would recognize that the user wants to arrange travel plans and might need to integrate with a flight booking system to process the request further.
   b. **LUIS Interpretation:** LUIS detects the intent as placing a food order and extracts details like the quantity ("2") and the item ("pizzas"). It understands that the user wants to order food and would need to integrate with a food delivery service to finalize the order.
   c. **LUIS Interpretation:** LUIS identifies the user intent as setting a reminder and extracts the information about the action ("call my dad") and the time ("tomorrow"). It helps in scheduling the reminder and ensuring the user is notified at the appropriate time.
   d. **LUIS Interpretation:** LUIS understands the intent as finding a location and extracts the relevant entity "nearest club." It processes the query to provide information on the closest club or similar venue, often needing to integrate with location-based services or maps.

## AI Ready .....1

1. Yes, the development of artificial intelligence does raise ethical issues. These concerns include privacy, as AI systems handle extensive personal data, and the potential for bias, which can lead to discriminatory outcomes if algorithms are trained on skewed data. Additionally, AI's impact on autonomy and decision-making can undermine human control, while job displacement due to automation poses significant economic challenges. Security is also a concern, as AI systems can be vulnerable to attacks or misuse. Finally, the complexity of AI algorithms can obscure how decisions are made, impacting transparency and accountability. Addressing these issues is crucial for the responsible advancement of AI technology.

2. While the goal of AI systems is often to replicate certain human-like functions, making them unpredictable and emotional may not be desirable or practical. Human unpredictability and emotions can lead to inconsistency and inefficiency, which are not ideal for many applications of AI. Instead, AI systems are typically designed to be reliable, consistent, and transparent. They can simulate emotional responses to improve user interaction and empathy, but this simulation is usually controlled and predictable to maintain functionality and effectiveness. The focus should be on enhancing AI systems to complement human capabilities while ensuring they operate within clear, ethical guidelines.
3. Yes, data features significantly influence the accuracy of an AI model. Features are the individual measurable properties or characteristics used by the model to make predictions. The quality, relevance, and comprehensiveness of these features determine how well the model can learn from the data and make accurate predictions. Well-chosen features can improve model performance, while irrelevant or poorly selected features can lead to lower accuracy and less effective models. Therefore, careful feature selection and engineering are crucial for building accurate and robust AI models.
4. Yes, limiting the use of smartphones is advisable because various apps can collect and potentially misuse personal data. Many apps gather extensive data on users, including location, contacts, and browsing habits. If this data is not securely managed, it can be exploited for purposes such as targeted advertising, identity theft, or unauthorized sharing with third parties. By being cautious about app permissions, regularly reviewing privacy settings, and limiting unnecessary app usage, individuals can better protect their personal information and reduce the risk of data misuse.

# 2. Data Literacy

**Ai Task** (Page 251)

| | |
|---|---|
| **Wisdom** | Technology in our day to day life, and our inability to avoid it even if we want to. |
| **Knowledge** | Impact of Technology on our social interactions, life style, and convenience. |
| **Information** | Different Technologies available, which are catering to different aspects of life, defense, space etc. |
| **Data** | What references to Technological Innovations can be presented to the audience |

**Ratings Given:**

- First presentation: 'outstanding'
- Second presentation: 'poor'
- Third presentation: 'satisfactory'

**Filtered Data:**

- Ratings: 'outstanding,' 'poor,' 'satisfactory'
- Type: The ratings are qualitative and subjective measures of presentation quality.

**Analysis:**

- The ratings are not of the same type in a quantitative sense but are comparable in terms of their descriptive nature. They provide qualitative feedback on the presentations but do not offer numeric data.

## Ai Task (Page 252)

Do it yourself

## Ai Reboot (Page 254)

1. Data literacy refers to the ability to read, understand, create, and communicate data effectively. It involves understanding data sources, recognizing patterns, interpreting data trends, and using data to make informed decisions.
2. Data literacy is indispensable because it enables informed decision-making, enhances problem-solving, and ensures effective communication and critical evaluation of data.

## Ai Task (Page 254)

1. **Filter** the category by price, setting the filter from low to high to find the least expensive option.
2. **Evaluate** reviews and ratings by checking user feedback and overall ratings to determine the most popular product.
3. **Check** the product details and specifications to ensure it meets your specific needs and requirements.
4. **Review** the estimated delivery dates provided by the seller to plan accordingly.

## Ai Reboot (Page 257)

1. Data Awareness, Data Understanding, Data Analysis, Data Interpretation, Data Communication, Data Decision-Making.

## Ai Task (Page 261)

1. **Use Strong Passwords:** Create complex passwords and change them regularly.

   **Enable Two-Factor Authentication:** Use additional verification methods to secure accounts.

   **Be Cautious with Personal Information:** Avoid sharing sensitive details online and be aware of phishing attempts.

   **Update Software Regularly:** Ensure that all software, including antivirus, is up-to-date to protect against vulnerabilities.

   **Secure Your Devices:** Use security features like firewalls and encryption to protect your devices from unauthorized access.

2. **Respect Others' Privacy:** Avoid sharing or discussing others' personal information without consent.

   **Be Mindful of Communication Tone:** Use appropriate language and avoid using offensive or inappropriate remarks.

   **Verify Information:** Ensure that information shared is accurate and sourced from reliable places.

   **Respect Copyrights:** Do not use or distribute content without proper authorization or giving credit to the original creators.

   **Practice Proper Online Behavior:** Follow guidelines for respectful and constructive interaction in online communities and discussions.

## Ai Reboot (Page 262)

1. Data security protects data from unauthorized access and breaches, while data privacy ensures that personal information is used and shared according to user consent and privacy laws.
2. - Use strong, unique passwords.
   - Enable two-factor authentication.
   - Limit data sharing.
   - Review privacy settings.
   - Secure devices with encryption.
   - Avoid public Wi-Fi for sensitive tasks.
   - Read privacy policies.
   - Update software regularly.

## Ai Task (Page 265)

| Data | Categorise |
|---|---|
| Temperature | Numeric Data |
| Gender | Textual Data |
| Show Size | Numeric Data |
| Comment on social media | Textual Data |
| Favourite colour | Textual Data |
| Newspaper article | Textual Data |
| Population number in a state | Numeric Data |
| Email | Textual Data |
| Heart Rate | Numeric Data |
| Weight of a person | Numeric Data |

**Ai Task** (Page 267)

| Observations | Categories |
|---|---|
| 1. You notice peculiar markings on trees that seem to form a pattern. | Data Discovery |
| 2. You find additional clues hidden under rocks and in hollowed-out tree trunks. | Data Augmentation |
| 3. You create a map based on the patterns and clues you have discovered. | Data Generation |
| 4. You observe changes in the forest's appearance as you get closer to the treasure, like altered vegetation. | Data Discovery |

**Ai Task** (Page 271)

Do it yourself

**Ai Task** (Page 276)

| List of trending sports (top 5) | List of trending movies (top 5) |
|---|---|
| 1. Soccer | 1. "Avatar 3" |
| 2. Basketball | 2. "Guardians of the Galaxy Vol. 4" |
| 3. Tennis | 3. "The Batman 2" |
| 4. Cricket | 4. "Fast & Furious 10" |
| 5. Rugby | 5. "Black Panther: Wakanda Forever Part II" |

**Ai Task** (Page 277)

Do it yourself

**Ai Reboot** (Page 280)

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

**Ai Task** (Page 287)

Do it yourself

## Exercise

### Unsolved Questions

**SECTION A** (Objective Type Questions)

**Ai Quiz**

**A.** 1. a 2. c 3. d 4. a 5. b 6. d
7. a 8. c 9. a 10. b

**B.** 1. Information literacy 2. Critical thinking 3. The DIKW pyramid
4. Secondary data sources 5. Data acquisition
6. Natural Language Processing (NLP) 7. Attributes
8. Skills 9. A strong password 10. Data backup

**C.** 1. False 2. True 3. True 4. False 5. False
6. True 7. False 8. False

**D.** 1. Computer Vision - b. Image Data
2. NLP e. Qualitative Data
3. Textual Data - d. Data history
4. Sources of data a. Data scraping
5. Data Discovery c. Dataset search

**SECTION B** (Subjective Type Questions)

**A.** 1. i. A data pyramid, also known as the DIKW pyramid, represents the hierarchical relationship between data, information, knowledge, and wisdom. It illustrates how raw data can be processed to extract useful information, which in turn can lead to the formation of knowledge and ultimately wisdom.

ii.
- A: Data
- B: Information
- C: Knowledge
- D: Wisdom

iii.
- Data: Raw facts and figures without context.
- Information: Data processed and organized to be meaningful.
- Knowledge: Information analyzed and applied to make decisions.
- Wisdom: The ability to make sound judgments and decisions based on knowledge.

2. It enables individuals to make informed decisions by understanding and interpreting data accurately.

   It enhances critical thinking skills, allowing individuals to question assumptions and analyze data effectively.

3. Pie charts visually represent the proportions of different categories within a dataset, making it easier to compare and understand the relative sizes of each category.
4. Data interpretation provides insights and context to raw data, enabling decision-makers to understand trends, patterns, and correlations, which leads to more accurate and effective decisions.

   Training Data: It is data on which we train our AI project model. It is basically to fit the parameters of the project for the model. In training data, the output is available to the model.

Testing Data: It is used to check the performance of an AI model. In testing data, the data is not seen for which the predictions have to be made.

5.

| Quantitative Data | Qualitative Data |
|---|---|
| Data is depicted in numerical terms. | Data is not depicted in numerical terms. |
| Can be shown in numbers and variables like ratio, percentage, and more. | Could be about the behavioural attributes of a person, or things. |
| Examples: 100%, 1:3, 123 | Examples: loud behaviour, fair skin, soft quality, and more. |

6. Data processing involves tasks to refine raw data for analysis or application, including cleaning, organising, transforming, and summarising information. It ensures data accuracy, relevance, and accessibility for effective decision-making and analysis. It is crucial across various sectors like business, science, and technology, facilitating better utilisation of data assets. Data processing helps computers understand raw data. Use of computers to perform different operations on data is included under data processing.
7. Kaggle is an online platform for data science and machine learning competitions. It provides datasets, code, and community discussions, allowing data enthusiasts to practice and improve their skills, collaborate with others, and gain exposure to real-world problems.
8. Data backup refers to the process of creating copies of data to ensure that it can be restored in the event of data loss due to natural disasters, accidents, cyber-attacks, or other unexpected events. Sometimes physical backup media is used to secure in access-controlled environments. Another method to secure data can be the cloud backup which is considered more reliable.
9. This means the development and enhancement of data literacy skills are not static or one-time event. Instead, they evolve through continuous cycles of learning, application, and refinement.
10. - Understanding what data you have collected, how it is handled, processed, used, and where it is stored.
    - Only necessary data required for a project should be collected.

**B.** 1.
- Take steps to understand and avoid any preferences or partiality in data
- Take necessary permissions before collecting or using an individual's data
- Explain how you intend to use the collected data and do not hide intentions
- Protect the identity of the person who is the source of data
- Take responsibility for your actions in case of misuse of data

2. Cyber attacks are becoming more frequent as a result of the growing volume of data stored in the cloud. The best course of action given the volume of traffic being produced is to

regulate and secure the transmission of private or sensitive data everywhere, that it is known to exist. Avoid entering sensitive information, such as your address, PAN, or Aadhar number on unrecognised and unsafe websites.

The most possible reasons why data security is more important now are:

- A constant fear cyberattacks affect all people.
- The fast-technological changes will boom cyberattacks.
- A persistent fear everyone is impacted by cyberattacks.
- Rapid technical advancements will increase the frequency of cyberattacks.

3. AI systems often rely on vast amounts of data for training and operation. Unauthorised access and tampering could lead to inaccurate AI models and compromised outcomes. Many AI applications process sensitive data, such as personal, financial, or health-related information. Strong data security measures can stop data breaches and unauthorised access.

4. 
- Use strong, unique passwords with a mix of characters for each account.
- Activate Two-Factor Authentication (2FA) for added security.
- Download software from trusted sources only and scan files before opening.

5.` Numeric data can be further classified as:

| Continuous Data | Discrete Data |
|---|---|
| Continuous data can take any numeric value within a specified range. | Discrete data refers to distinct single values. It consists of whole numbers without decimal parts that represent distinct categories or values. |
| Continuous data is measurable. | Discrete data is countable. |
| This type of data can be infinitely subdivided and often includes decimal points. | Discrete data cannot be subdivided meaningfully. |
| Often used to analyse using statistical techniques such as mean, median, standard deviation, and correlation. | It is used to analyse using frequency distributions, bar charts, and probability distributions. |
| Examples: dimensions of classroom, height, weight, temperature, time, etc. | Examples: number of girls and boys in class, number of subjects in class 9th, count of anything. |

6. **Natural Language Processing (NLP)**

NLP is a subfield of AI that enables computers to understand and process human language.

**Types of Data:**

- Textual data: Articles, emails, social media posts.

- Audio data: Spoken language recordings transcribed into text.

**Computer Vision**

Computer Vision uses AI to help computers interpret images and videos.

**Types of Data:**

- Image data: Photos, satellite images, medical scans.
- Video data: Recorded videos.

**Statistical Data**

Statistical data analysis involves interpreting data to find patterns and insights for decision-making.

**Types of Data:**

- Numeric data: Data from tables and spreadsheets.
- Time series data: Data recorded at specific time intervals, like stock prices and weather data.

## C. Competency-based/Application-based questions:

1. a. Quantitative data interpretation involves numerical data that can be measured and quantified, while qualitative data interpretation involves descriptive data that can be observed but not measured. Quantitative data interpretation methods include statistical analysis and graphical representation, which provide objective, precise, and comparable results. However, they may not capture the full context or nuances of the data and require a good understanding of statistical methods. On the other hand, qualitative data interpretation methods such as content analysis and thematic analysis provide in-depth insights and a deeper understanding of context. They capture the complexity of human experiences and perceptions but can be subjective, harder to generalize, and time-consuming.

   b. Quantitative data interpretation involves using descriptive statistics like mean, median, mode, and standard deviation, as well as inferential statistics like hypothesis testing and regression analysis. Visualization techniques such as bar charts, histograms, and scatter plots are also commonly used. These methods offer objectivity, generalizability, and precision but may overlook context and complexity.

   Qualitative data interpretation involves methods like content analysis, which includes coding textual data into manageable categories and identifying patterns, themes, and relationships. Thematic analysis develops themes from the data and analyzes them to interpret meanings and insights, while narrative analysis focuses on the stories and personal accounts in the data. These methods provide depth of understanding and context-rich insights but are subjective, limited in generalizability, and time-consuming.

   By employing these methods and techniques, one can effectively interpret both quantitative and qualitative data, leveraging their respective strengths while being mindful of their limitations.

2. To present the company's sales performance across different regions during a quarterly review meeting, I would use bar graphs, line charts, and pie charts to convey trends and patterns effectively.

   A bar graph will be used to compare total sales across different regions, highlighting which regions are performing well and which are lagging. This visualization will help stakeholders quickly assess regional performance and facilitate discussions on strategic adjustments.

   A line chart will show sales trends over time for each region. This will help stakeholders observe how sales have fluctuated throughout the year, identify any seasonal patterns, and understand long-term trends. By seeing the sales trajectory, stakeholders can better predict future performance and make data-driven decisions.

   A pie chart will illustrate the percentage share of total sales by region, providing a quick visual overview of the sales distribution. This will help stakeholders understand the relative importance of each region to the company's overall sales.

   Using these visualizations, stakeholders will gain a comprehensive understanding of the sales performance across different regions, enabling them to make informed decisions based on clear, visual data insights.

## AI In Life (Page 296)

Do it yourself

## AI Deep Thinking (Page 296)

1. In today's digital age, data is crucial for AI systems, much like gold was for the gold rush. Data fuels AI by:
   - Training Models: Data helps AI algorithms learn patterns and improve accuracy.
   - Enhancing Accuracy: More data leads to better model performance and predictions.
   - Enabling Personalization: AI uses data to customize user experiences and recommendations.
   - Driving Innovation: Data supports the creation of new AI applications and technologies.
   - Improving Decision-Making: AI analyzes data to provide insights and support strategic decisions.

   In essence, data powers AI advancements and transformations, similar to how gold drove economic growth in the past.
2. Clive Humby first described data as "the new gold" to highlight its immense value in today's economy. Unlike gold, which is a finite resource, data is continuously generated and offers limitless potential for economic growth and innovation. Its ability to drive advancements across industries and provide valuable insights makes it exceptionally valuable. While gold has intrinsic worth, data's versatility and scalability often make it even more precious in the modern digital landscape.

## Ai Lab (Page 296)

Do it yourself

### Ai Ready .....2

1. 
   - Data literacy enhances decision-making ability in individuals based on evidence. Based on sources of data, emerging trends and interpretations, individuals can make decisions that are data-driven.
   - Data literacy is able to cultivate critical thinking skills to understand and explore data's implications by questioning assumptions, reaching logical conclusions, identifying patterns, and evaluating evidence and data accuracy.
   - Data literacy helps in analytically producing solutions to problems that help people develop critical thinking skills. It enables user to tackle complex problems and derive meaningful relevance.
   - Data literacy fuels innovation by providing tools and techniques to explore data from different perspectives. It helps in innovating to meet the requirements of emerging trends and market demands.
2. Data privacy is important because:
   - a data breach at a government agency can put top secret information in the hands of an enemy country.
   - a data breach at a hospital can put personal health information in the hands of those who might misuse it.
   - a data breach at a corporation can cause put proprietary data in the hands of a competitor.
   - a data breach at a school can inconvenience to the parents, by getting continuous calls from tuition and coaching centers cause annoyance and stress.
3. The 3 C's of data literacy are:
   - Context: Understanding the background and relevance of the data, including its sources, limitations, and the situation it represents.
   - Critical Thinking: Analyzing and questioning the data, including evaluating its accuracy, reliability, and potential biases.
   - Communication: Effectively conveying insights and findings from the data to others, using appropriate visualizations and explanations.

   We can create decision trees with the help of these points:
4. A cyber attack is an intentional attempt to damage, disrupt, or gain unauthorized access to computer systems or data. An example is the 2017 WannaCry ransomware attack, which encrypted files and demanded ransom payments, affecting organizations worldwide.

# 3. Maths For AI (Statistics & Probability)

**Ai Task** (Page 299)

1. The given pattern appears to involve a series of multiplications of 2 with consecutive odd numbers.
2. 0, 1, 4, 9, 25, 16, 36
3. The skill used to identify the pattern is **pattern recognition** or **analytical reasoning**. This involves observing the sequence, identifying the mathematical relationship or rule governing the pattern, and applying this rule to find the missing elements.

**Ai Task** (Page 300)

1. 8
2. 3, 6, 12, 24, 48, 96,192
3. Highest temperature is 50, at 6 am.
4. 6
5. 2
6. Sphere

**Ai Reboot** (Page 303)

1. 
   - Analysing how students and teachers use educational technology for future implementations.
   - Statistics helps in determining the average skills of students in a particular school or grade. This information shows which areas need more focus to help improve education strategies

**Ai Task** (Page 304)

**Case 1:** a cat

**Case 2:** a toffee

**Case 2:** ½

**Ai Task** (Page 305)

1/4

1/2

**Ai Task** (Page 305)

1. likely
2. unlikely
3. impossible
4. equal probability
5. certainly

# Exercise

## Unsolved Questions

**SECTION A** (Objective Type Questions)

AI Quiz

**A.** 1. b 2. c 3. b 4. b 5. d
6. d 7. c 8. b

**B.** 1. AI 2. Meteorologists 3. Equally likely
4. Zero 5. Probabilistic 6. Equal 7. Probability 8. Epidemiologists

**C.** 1. True 2. False 3. True 4. False 5. True
6. False 7. True 8. True

**D.** 1. d 2. b
3. e (mapping function) (This is misprinted in your book, please correct it)
4. a 5. c

**SECTION B** (Subjective Type Questions)

**A.** 1. Mathematics and AI are interconnected fields, with Mathematics supplying the theoretical foundations for many AI algorithms. Patterns are repeating designs or sequences that can be observed in numbers, shapes, images, languages, or objects in our surroundings. They follow a specific order or arrangement, making them easily recognisable. Mathematics aids in the study of these patterns. These patterns allow you to solve puzzles. They help identify an order or arrangement in lists of images or numbers. They are present everywhere around us.

2. Patterns are regular and repeated ways in which data or events occur. For example, the sequence of even numbers (2, 4, 6, 8) or the seasonal patterns in weather data.

3. Equal probability events are events that have the same chance of occurring. For example, when flipping a fair coin, the probability of getting heads or tails is equal.

4. Collecting data is the first step in statistics and involves gathering relevant information from various sources to analyze and draw conclusions.

5. Two applications of statistics in real life are:
   - Analyzing consumer behavior in marketing to improve product sales.
   - Assessing the effectiveness of medical treatments in healthcare.

6. The probability of wearing a white dress is 313\frac{3}{13}133.

7. One use of statistics in disaster management is to analyze past disaster data to predict and prepare for future events.

8. One use of probability in finance is to assess the risk of investment portfolios and predict future market trends.

**B.** 1. **"Statistics is used for collecting, exploring, and analyzing the data."** Statistics involves several key steps: First, data collection involves gathering relevant information from various sources such as surveys, experiments, or observational studies. For instance, if a company wants to understand customer satisfaction, it would collect data through customer feedback surveys. Next, exploring the data involves summarizing and visualizing it to uncover patterns and trends. This could mean creating charts or tables to see the distribution of satisfaction levels. Finally, analyzing the data involves applying statistical methods to draw conclusions and make predictions. For example, statistical tests might reveal that customers who receive timely support are more satisfied. Thus, statistics helps in making informed decisions based on data.

2. **Three uses of statistics in education:**
   - Analysing test scores and grades to evaluate student learning, identify areas for improvement, and allocate resources effectively.
   - Using data to identify gaps in the curriculum and areas where students need more support.
   - Analysing how students and teachers use educational technology for future implementations.

3. Concept of probability with a deck of 52 cards: Probability measures the likelihood of an event occurring. In a standard deck of 52 cards, there are 4 suits (hearts, diamonds, clubs, spades) with 13 cards each. If you want to calculate the probability of drawing a card from a particular suit, say hearts, you would use the formula for probability:

   Probability=Total number of outcomes/Number of favorable outcomes = 13/52=1/4

   So, the probability of drawing a heart from the deck is 1/4, or 25%.

4. **Likelihood of an event with examples:** The term "likely" describes events that have a high chance of occurring but are not guaranteed. For example, consider the likelihood of drawing a card from a standard deck of 52 cards and it being a face card (Jack, Queen, or King). There are 12 face cards in a deck:

   Probability=Number of face cards/Total number of cards= 12/52

   This probability suggests that while it's not certain, it's relatively likely to draw a face card compared to other outcomes.

5. **Role of probability in estimating road traffic:**
   - **Predicting Peak Traffic Hours:** Probability models help forecast times of day when traffic congestion is most likely based on historical data. For instance, if data shows heavy traffic between 8-9 AM, probability helps in planning routes to avoid congestion.
   - **Traffic Light Timing:** Probability helps in optimizing traffic light timings to minimize delays. If traffic data indicates high vehicle volume at certain times, light cycles can be adjusted to improve flow.

- **Assessing Traffic Jam Risks:** Probability estimates the likelihood of traffic jams during special events or adverse weather conditions. For example, if an event is expected to draw large crowds, probability models can predict increased traffic and help in managing road usage.

6. Likely, unlikely, impossible, and equal probability events:
   - **Tossing a Coin:** Equal probability (both heads and tails have a 50% chance of occurring).
   - **Rolling an 8 on a Standard Die:** Impossible (a standard die only has faces numbered 1 to 6).
   - **Throwing Ten 5's in a Row:** Unlikely (the probability is very low, as the chance of getting a 5 on a single throw is 1/6, and this event occurring consecutively ten times is rare).
   - **Drawing a Card of Any Suit:** Likely (every card drawn from the deck will be of one of the four suits, so it's guaranteed that a suit will be drawn).
7. Examples of impossible and equal probability events:
   - **Impossible Events:**
     - **Rolling a 7 on a Standard Die:** A standard die has only six faces, so rolling a 7 is impossible.
     - **Drawing a Card from an Empty Deck:** If a deck has no cards, drawing one is impossible.
   - **Equal Probability Events:**
     - **Tossing a Fair Coin:** Each side (heads or tails) has an equal chance of landing face up.
     - **Rolling a Fair Six-Sided Die:** Each number (1 through 6) has an equal chance of appearing.
8. Certain Events and Likely Events with Examples:
   - **Certain Events:** These are events that are guaranteed to happen. For example, the sun rising in the east each morning is a certain event.
   - **Likely Events:** These are events that have a high chance of occurring but are not guaranteed. For example, during the winter season in a cold climate, it is likely to snow, but it is not certain every day.

## C. Competency-based/Application-based questions:

1. How will the student use the estimated probabilities to prepare for the exam?

   The student can prioritize studying the topics with the highest probabilities of appearing on the exam. For instance, Topic A with a probability of 0.8 and Topic D with a probability of 0.7 are more likely to be on the exam, so the student should focus more on these topics. This targeted preparation can increase the chances of performing well in the exam by ensuring the student is well-prepared for the most likely topics.

2. Role of statistics in launching a new smartphone:

   Statistics help the company analyze market research data to understand consumer preferences, potential demand, and market trends. By using statistical techniques such as

surveys, regression analysis, and forecasting models, the company can make data-driven decisions about product features, pricing, and marketing strategies. This reduces the risk of product failure and helps in aligning the product with market needs.

3. Applications of probability in predicting earthquakes:
   - **Seismic Risk Assessment:** Probability models estimate the likelihood of earthquakes occurring in different regions based on historical data and fault lines. This helps in identifying areas at higher risk and planning for mitigation.
   - **Aftershock Forecasting:** After a significant earthquake, probability models predict the likelihood and intensity of aftershocks, helping in emergency response and preparedness.
4. Examples of probability theory in artificial intelligence:
   - **Spam Filtering:** AI uses probability to classify emails as spam or not based on the likelihood of certain words or patterns appearing in spam emails. This helps in effectively filtering out unwanted messages.
   - **Recommendation Systems:** Probability models predict which products or content a user is likely to be interested in based on their past behavior and preferences, enhancing the accuracy of recommendations.

## Ai In Life (Page 316)

Do it yourself

## Ai Deep Thinking (Page 316)

Do it yourself

## Class Activity (Page 317)

Do it yourself

## Ai Lab (Page 319)

1. Total Number of Cars Spotted:

   Add the tallies for each color and convert them to numbers. For example:

   - Red: 6 (IIII II)
   - Black: 12 (IIII IIII IIII)
   - White: 11 (IIII IIII IIII III)

   Total cars = 6 (Red) + 12 (Black) + 11 (White) = 29 cars
2. Color Spotted the Maximum Amount of Time:

   Black cars are spotted the most, with 12 sightings.

   The most common color choice for the residents in this area is black, as it was spotted the most frequently.

## Ai Ready .....3

1. Mathematics and AI are interconnected fields, with Mathematics supplying the theoretical foundations for many AI algorithms. Patterns are repeating designs or sequences that can be observed in numbers, shapes, images, languages, or objects in our surroundings. They follow a specific order or arrangement, making them easily recognisable. Mathematics aids in the study of these patterns. These patterns allow you to solve puzzles. They help identify an order or arrangement in lists of images or numbers. They are present everywhere around us.
2. The probability that your feedback is not altered by the chatbot is high because the chatbot is designed to collect your responses as you provide them. As long as there are no technical issues, your feedback is generally recorded as entered.
3. Probability affects the weather forecast system by providing estimates of the likelihood of various weather conditions occurring. Meteorologists use probability to predict the chance of events like rain, snow, or storms, helping to inform the public and guide decision-making. For example, a forecast of "80% chance of rain" means there is an 80% likelihood that rain will occur, helping people plan their activities accordingly.

# 4. Introduction to Generative AI

## Ai Task (Page 322)

| Image 1 | Image 2 |
|---|---|
| 1. Real | 1. AI- generated |
| 2. Real | 2. AI- generated |
| 3. Real | 3. AI- generated |
| 4. AI- generated | 4. Real |
| 5. Real | 5. AI- generated |

Real images are captured by cameras, they are visual representations depicting scenes, objects, or people in the same way as they exist in the real world. They are created on the same side of the lens or mirror as the viewer. These images are either created by or clicked by humans. AI-generated images are created using AI algorithms. These algorithms use large amount of data and learn patterns to create new images that look like real ones. Sometimes AI incorporates small details that don't exist in the original picture to enhance the look of the scene. AI can create images that can be modified and enhanced. It can also create entirely new, imaginative images.

## Ai Reboot (Page 303)

1. Supervised learning is a machine learning where a model is trained on a labelled dataset, implying that each input data point is associated with a corresponding output label. The goal of supervised learning is to learn the mapping between input data and output labels, enabling the model to make predictions on new, unseen data

   Unsupervised learning is a type of machine learning where models are trained using data that does not have labels. This means the model has to find patterns and relationships in the data on its own. The goal of unsupervised learning is to find patterns, structures, or representations in the data without human intervention.

2. - AI-generated images may include elements that seem unrealistic or improbable, such as impossible perspectives, mismatched colours, or objects that defy physics, making the image appear unnatural or inconsistent with the scene.
   - Odd outlines to sharpen or smoothen the edges, stray pixels to cover inconsistency, and abnormal shapes can be easily seen, if an image is zoomed to the maximum, on each of its parts.

## Ai Task (Page 328)

The right hand side image is AI generated because:

i. Inconsistent Details: The image features only one strap of the student's bag visible, which is unusual and may suggest that the image has been artificially generated or altered.

ii. Unnatural Features: The student's lens being broken is an odd detail that might not align with real-world scenarios and could be a result of the AI's attempt to generate realistic but imperfect features.

iii. Imaginative Elements: The combination of the male student wearing a bindi—an element that might not typically be associated with the context or appearance—could indicate the image is AI-generated, as AI often blends or includes unconventional details to create a visually interesting composition.

## Ai Reboot (Page 329)

A "random noise dataset" typically refers to a collection of data points or samples where each data point is generated randomly.

**Example:** In daily life, the static on a TV screen when it's not tuned to a channel is an example of random noise, as it consists of random visual artifacts with no meaningful pattern.

**Video Session** (Page 329)

1. Generative AI refers to artificial intelligence systems designed to create new content, such as images, text, or music, by learning from existing data. These systems use algorithms to generate original outputs that resemble or are inspired by the data they were trained on.

2. **DeepArt:** An AI tool that creates artistic images based on user-provided photos and styles, transforming them into artwork inspired by famous artists' styles.

   **GPT-3:** An advanced language model developed by OpenAI that generates human-like text, useful for tasks such as writing, translation, and conversation.

**Video Session** (Page 336)

1. Respect for Style: Ensure the AI preserves the original art's style and techniques.
2. Cultural Sensitivity: Be mindful of historical and cultural contexts.
3. Ethical Implications: Address issues of authorship and originality.
4. Quality Data: Use diverse, high-quality datasets for training.
5. Transparency: Clearly indicate when art is AI-generated.

**Video Session** (Page 336)

AIVA

**Video Session** (Page 337)

Concerns arising from the use of ChatGPT include privacy issues, potential misuse for generating misleading or harmful content, and ethical considerations around the impact on jobs and human interaction.

**Ai Reboot** (Page 346)

1. **Biases in Generative AI:**

   **Gender Bias:** Generative AI models trained on biased datasets may produce stereotypes, such as associating certain professions with specific genders, as seen in some job-related content.

   **Racial Bias:** AI-generated images or content might depict certain races in stereotypical or limited ways, often reflecting biases present in the training data.

   **Cultural Bias:** Language models might generate content that is culturally insensitive or irrelevant to specific groups, influenced by the predominance of certain cultural perspectives in the data.

2. **Deepfake:**

   Deepfake refers to AI-generated media, such as videos or audio recordings, that manipulate or fabricate content to make it appear as if someone said or did something they didn't. This technology uses deep learning techniques to create realistic but false representations.

## Unsolved Questions

**SECTION A** (Objective Type Questions)

AI Quiz

**A.** 1. c 2. b 3. c 4. c 5. b
6. c 7. b 8. a 9. b

**B.** 1. Unsupervised 2. Ethical 3. Generative AI 4. Bias
5. Generative AI 6. Deepfakes 7. Sequential
8. Real 9. Images 10. Runway ML

**C.** 1. True 2. True 3. False 4. True 5. True
6. False 7. False 8. True 9. False 10. False

**D.** 1. e 2. c 3. a 4. b 5. d

**SECTION B** (Subjective Type Questions)

**A.** 1. Autoencoders compress data into a latent space and then reconstruct the input data, focusing on dimensionality reduction. VAEs, on the other hand, generate new data points by learning the distribution of the input data and sampling from this distribution.

2. **Example 1:** VAE for generating handwritten digits (MNIST dataset).

   **Example 2:** VAE for generating faces using the CelebA dataset.

3. AlphaGo was introduced in October 2015.

4. Example 1: GPT-3 (by OpenAI)

   Example 2: DALL-E (by OpenAI)

   Example 3: StyleGAN (by NVIDIA)

   Example 4: Artbreeder

5. **Generative AI:** Used for creating new content such as text, images, music, and videos. Examples include generating realistic human faces, writing essays, and composing music.

   **Conventional AI:** Typically used for tasks such as classification, regression, prediction, and optimization. Examples include fraud detection, recommendation systems, and speech recognition.

6. Generative AI models require large datasets to capture the variability and complexity of the data distribution they aim to model. The quality and diversity of the generated outputs depend on the richness of the training data. Insufficient data can lead to overfitting and poor generalization, resulting in less realistic or diverse generated content.

7. Generative AI models can perpetuate and amplify biases present in the training data. If the training data contains biased representations or stereotypes, the generated outputs can reflect and reinforce these biases. This can lead to unfair or harmful outcomes, especially in sensitive applications like hiring, law enforcement, or healthcare.

8. **Feature 1:** Allows users to blend and evolve images to create unique artworks.

   **Feature 2:** Provides sliders for users to adjust different attributes of images, such as age, gender, and art style.

9. **Consideration 1:** The potential for misuse in creating deepfakes, which can be used for malicious purposes such as misinformation, fraud, and invasion of privacy.

   **Consideration 2:** The need for transparency and accountability in the use of generative AI, ensuring that users are aware when they are interacting with AI-generated content.

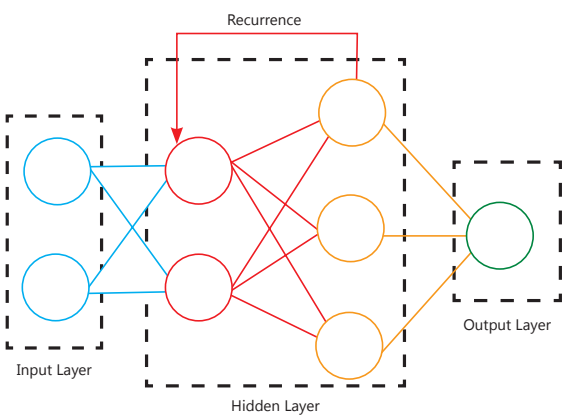
10. Generative AI can pose privacy risks by generating realistic synthetic data that can be used to impersonate individuals or reconstruct private information. Additionally, if generative models are trained on sensitive data without proper anonymization, they can inadvertently leak confidential information, leading to data breaches and misuse.

**B.** 1. Generative AI has transformed music creation and production. Tools like OpenAI's MuseNet can compose music in various genres, while Amper Music generates custom tracks by setting parameters such as mood and tempo, making music production more accessible. Platforms like Endel create personalized soundscapes based on user activities, enhancing listening experiences. In addition, AI can suggest different arrangements and instrumentations, aiding composers in exploring new sounds. AI also improves old recordings by removing noise and filling gaps. AIVA (Artificial Intelligence Virtual Artist) is an example, composing symphonic music for films, ads, and games.

2. Autoencoders (AEs) are neural networks that learn to compress data into a latent space and then reconstruct it. They are used for tasks like dimensionality reduction and feature learning. Key features include:

   - **Dimensionality Reduction:** Compresses data to lower dimensions for easier visualization and reduced computational cost.
   - **Data Denoising:** Removes noise from data, improving quality.
   - **Anomaly Detection:** Identifies outliers by reconstructing normal data poorly.
   - **Feature Learning:** Learns useful features for tasks like classification.

   Examples include image compression, denoising photographs, and fraud detection.

3. 

4. **Architecture:** Generates multiple design variations and optimizes plans, enhancing creativity and efficiency.

   **Coding:** Generates boilerplate code and suggests completions, increasing productivity and reducing development time.

   **Music:** Composes original music and generates background scores, providing new tools for creativity.

   **Content Creation:** Produces high-quality written content, realistic images, and videos, enabling quick production of diverse media.

## C. Competency-based/Application-based questions:

1. **Verify Sources:** Ensure the AI-generated content is cross-referenced with credible sources.

   **Avoid Plagiarism:** Use AI tools to generate ideas and outlines but write the essay in your own words.

   **Understand the Topic:** Use AI for research and learning, but make sure you understand the material thoroughly.

   **Cite Properly:** If using AI-generated content, ensure it is properly cited to avoid plagiarism.

   **Ethical Use:** Avoid using AI to generate the entire essay; instead, use it to enhance your understanding and provide additional perspectives.

2. Generative AI can revolutionize the creative industry by enabling the generation of unique and innovative designs. In art, AI can create new styles and compositions, offering artists novel ideas and expanding their creative horizons. In fashion, AI can design clothing and accessories, predict trends, and customize designs for individual preferences. This technology fosters creativity by providing diverse and original concepts that may not have been conceived by human designers alone.

3. To ensure responsible use of generative AI, it is crucial to establish guidelines and regulations that balance benefits and risks. These guidelines could include:

   Transparency: Ensuring AI-generated content is clearly labeled.

   Accountability: Implementing accountability measures for creators and users of AI.

   Bias Mitigation: Developing methods to detect and mitigate biases in AI-generated content.

   Privacy Protection: Safeguarding personal data used in AI training and generation.

   Ethical Standards: Encouraging adherence to ethical standards in AI development and usage.

   Balancing the potential benefits and risks involves fostering innovation while protecting individuals and society from potential harm.

4. Parameter 1: Human-Like Response

   ChatGPT: Highly conversational and natural language generation.

   Gemini: Focuses on natural language understanding with precise and coherent responses.

   Copilot: Provides code suggestions with a conversational aspect for coding assistance.

Parameter 2: Training Dataset and Underlying Technology

ChatGPT: Trained on a diverse dataset using GPT architecture.

Gemini: Uses proprietary datasets and technology optimized for dialogue.

Copilot: Based on OpenAI Codex, trained on a large dataset of code from GitHub.

Parameter 3: Authenticity of Response

ChatGPT: High-quality responses but may occasionally generate plausible-sounding incorrect information.

Gemini: Emphasizes accurate and reliable information.

Copilot: Focused on accurate code generation and documentation.

Parameter 4: Access to the Internet

ChatGPT: No real-time internet access.

Gemini: Typically does not access the internet in real-time.

Copilot: No real-time internet access, trained on static data.

Parameter 5: User Friendliness and Interface

ChatGPT: User-friendly with intuitive interfaces across platforms.

Gemini: Designed for ease of use in conversational contexts.

Copilot: Integrated into code editors for seamless coding assistance.

Parameter 6: Text Processing: Summarisation, Paragraph Writing, Etc.

ChatGPT: Excellent at summarization and generating coherent paragraphs.

Gemini: Strong in generating concise and relevant text.

Copilot: Primarily focuses on code-related text generation.

Parameter 7: Charges and Price

ChatGPT: Various pricing tiers, including free access with limitations.

Gemini: Pricing depends on usage and integration specifics.

Copilot: Subscription-based model, typically around $10/month.

5. Idea Generation: Use AI to generate initial concepts and inspiration for the bridge design.

   Sketch Variations: Generate multiple design variations to explore different possibilities quickly.

   Refinement: Use AI-generated sketches as a base to refine and develop unique designs.

   Collaborative Tool: Collaborate with classmates or mentors to review and improve AI-generated concepts.

   Ethical Use: Ensure originality by not solely relying on AI-generated designs; use them as a tool for inspiration and enhancement.

6. (a) Both A and R are true and R is the correct explanation of A.

## Ai In Life (Page 316)

Do it yourself

## Ai Deep Thinking (Page 316)

1. The adoption of generative AI will notably impact creative job markets.

   **Positive Impacts:**

   Generative AI enhances creativity by providing inspiration and generating ideas, allowing professionals in art, writing, and music to focus on refining their work. It also creates new job roles, such as AI ethicists and content curators, and makes creative tools more accessible to a wider audience.

   **Negative Impacts:**

   AI may reduce demand for traditional roles in these fields as it takes over more content generation tasks. It could also lead to oversaturation of AI-generated content and widen economic disparities between established and emerging creators.

   **Balancing the Impact:**

   To address these changes, professionals should upskill to integrate AI into their work, and guidelines should be established to ensure ethical use. Emphasizing collaboration between human creativity and AI can foster innovative outcomes.

## Ai Lab (Page 319)

1. Inconsistencies: Look for unusual or inconsistent details, such as distorted objects or irregular patterns.
2. Unnatural Features: AI images may have unnatural or overly smooth features, like oddly shaped faces or hands.
3. Background Anomalies: Check for oddities in the background, such as warped textures or unrealistic elements.
4. Lighting and Shadows: AI images might have inconsistent lighting and shadows that don't match the scene.
5. Over-Detailing: Some AI images may have excessive or unrealistic detail in textures or elements that seem overly polished.

## Ai Ready .....4

1. Data from ChatGPT can be useful but may not always be entirely authentic. While it provides information based on a broad range of sources, it might occasionally generate responses that are incorrect or outdated. Always verify with reliable sources.
2. Gemini often emphasizes natural language understanding and precision in responses, whereas ChatGPT focuses on conversational quality and generating human-like dialogue. Gemini may also have different underlying technologies and training data compared to ChatGPT.

3. Graphic Design: AI can automate design tasks, reducing the need for human graphic designers.

   Illustration: AI tools can generate detailed illustrations and artwork, potentially replacing some illustrator roles.

4. RNN stands for Recurrent Neural Network.

   Applications of RNN:

   Language Modeling: Used for predicting the next word in a sentence.

   Speech Recognition: Helps in converting spoken language into text.