Unit 1: AI Reflection, Project Cycle and Ethics

What does AI stand for?
a) Advanced Interface
b) Artificial Intelligence
c) Automated Intelligence
d) Analytical Information
Answer: b) Artificial Intelligence

What ability is essential for a machine to be considered AI?
a) Flying
b) Learning and improving on its own
c) Producing heat
d) None of the above
Answer: b) Learning and improving on its own

Which one of the following is an example of AI in daily life?
a) Hammer
b) Flashlight
c) Face Lock in smartphones
d) Mechanical Clock
Answer: c) Face Lock in smartphones

What is Natural Language Processing (NLP)?
a) Processing natural elements
b) An AI field focused on understanding and manipulating human language
c) A system for recognizing human faces
d) A mechanism for storing data
Answer: b) An AI field focused on understanding and manipulating human language

What is Computer Vision (CV)?
a) The ability to watch television
b) A system that enables machines to interpret and understand visual data
c) A method for improving computer graphics
d) A part of computer hardware
Answer: b) A system that enables machines to interpret and understand visual data

Which of the following games is based on AI's understanding of patterns and data?
a) Rock, Paper, Scissors
b) Monopoly
c) Chess
d) Football

Answer: a) Rock, Paper, Scissors

Which of the following is an AI application that uses Computer Vision? a) Face recognition in smartphones
b) Listening to music
c) Text messaging
d) Playing video games
Answer: a) Face recognition in smartphones

What is one purpose of AI in healthcare?
a) To replace doctors
b) To assist in the interpretation of medical images
c) To automate physical therapy
d) To develop new medications
Answer: b) To assist in the interpretation of medical images

What is the function of smart assistants like Alexa and Siri?
a) To answer all mathematical questions
b) To recognize speech patterns and provide responses
c) To function as a calculator
d) To guide physical robots
Answer: b) To recognize speech patterns and provide responses

In AI, what does the term “modelling” refer to?
a) Designing a physical model
b) Creating algorithms that can predict outcomes
c) Drawing pictures
d) Painting a model
Answer: b) Creating algorithms that can predict outcomes

What is the purpose of the AI Project Cycle?
a) To predict future trends in technology
b) To guide AI development from problem scoping to deployment
c) To monitor AI performance after deployment
d) To collect data from the internet
Answer: b) To guide AI development from problem scoping to deployment

Which stage in the AI Project Cycle involves gathering data?
a) Problem Scoping
b) Data Acquisition
c) Modelling
d) Evaluation
Answer: b) Data Acquisition

What is problem scoping in AI?
a) Defining the problem that AI is supposed to solve
b) Testing the AI model
c) Training data collection
d) Evaluating AI performance
Answer: a) Defining the problem that AI is supposed to solve

Which type of AI approach adapts its algorithms based on new data?
a) Rule-Based AI
b) Learning-Based AI
c) Fixed AI
d) Reactive AI
Answer: b) Learning-Based AI

What does the term “evaluation” mean in AI?
a) Writing new algorithms
b) Testing AI models against a dataset to check accuracy
c) Creating data features
d) Monitoring users
Answer: b) Testing AI models against a dataset to check accuracy

What is the final stage of the AI Project Cycle?
a) Problem Scoping
b) Data Acquisition
c) Evaluation
d) Deployment
Answer: d) Deployment

What is the primary purpose of the Deployment stage in AI?
a) To collect more data
b) To make the AI model operational in the real world
c) To train the model
d) To test new theories
Answer: b) To make the AI model operational in the real world

What is a key benefit of AI in agriculture?
a) Automating farm machinery
b) Predicting crop infestations and providing solutions
c) Monitoring employee productivity
d) Improving fertilizer composition
Answer: b) Predicting crop infestations and providing solutions

Which of these is not a part of the AI Project Cycle?
a) Modelling

b) Data Exploration
c) System Integration
d) Problem Scoping
Answer: c) System Integration

What does Data Exploration involve?
a) Collecting new data
b) Analyzing collected data to find patterns and trends
c) Running AI models
d) Storing data securely
Answer: b) Analyzing collected data to find patterns and trends

Which AI domain is primarily involved in image recognition?
a) NLP
b) Computer Vision
c) Data Science
d) Data Engineering
Answer: b) Computer Vision

What type of data is used for training an AI model?
a) Static Data
b) Live Data
c) Training Data
d) Experimental Data
Answer: c) Training Data

Which of the following is a challenge when using AI for decision-making?
a) Lack of data
b) Data bias
c) Limited hardware
d) High costs
Answer: b) Data bias

What is one key feature of a Learning-Based AI model?
a) It follows static rules
b) It updates its algorithms with new data
c) It cannot adapt to new situations
d) It requires no data input
Answer: b) It updates its algorithms with new data

What should be avoided during the evaluation of an AI model?
a) Overfitting the model with training data
b) Testing with unseen data
c) Testing different algorithms

d) Improving model accuracy
Answer: a) Overfitting the model with training data

Why is Data Visualization important in AI?
a) It makes data collection faster
b) It helps identify patterns and trends
c) It adds color to reports
d) It decreases the need for algorithms
Answer: b) It helps identify patterns and trends

Which of the following is an ethical concern in AI?
a) AI's high speed
b) AI bias
c) AI memory size
d) AI's hardware limitations
Answer: b) AI bias

What does it mean for AI to follow ethical principles?
a) It follows laws strictly
b) It respects human rights, avoids biases, and ensures privacy
c) It calculates faster than humans
d) It follows machine learning rules
Answer: b) It respects human rights, avoids biases, and ensures privacy

Which is an example of AI being used for healthcare?
a) Automated surgery
b) Analyzing medical images for diagnosis
c) Cooking food for patients
d) Arranging hospital beds
Answer: b) Analyzing medical images for diagnosis

Which of the following should be a feature of an AI project?
a) Random data input
b) Bias towards certain groups
c) Fair and unbiased outcomes
d) Limited data usage
Answer: c) Fair and unbiased outcomes

In AI, what is overfitting?
a) When a model performs well on training data but poorly on new data
b) When a model learns too slowly
c) When a model is too large for a dataset
d) When a model performs well on all datasets
Answer: a) When a model performs well on training data but poorly on new data

What is the purpose of data acquisition in AI projects?
a) To collect relevant and reliable data
b) To analyze existing datasets
c) To visualize trends in data
d) To deploy the AI model
Answer: a) To collect relevant and reliable data

Which of the following is an application of AI in education?
a) Writing books
b) Personalized learning for students
c) Building classrooms
d) Grading manually
Answer: b) Personalized learning for students

Why is privacy a concern in AI development?
a) AI requires secret codes
b) AI systems often collect personal data that could be misused
c) AI is faster than humans
d) AI does not store data
Answer: b) AI systems often collect personal data that could be misused

Which of the following is NOT an AI domain?
a) Natural Language Processing
b) Computer Vision
c) Quantum Mechanics
d) Data Science
Answer: c) Quantum Mechanics

What does bias in AI refer to?
a) AI working faster than humans
b) AI producing skewed or unfair outcomes due to biased data
c) AI learning slower than expected
d) AI storing data incorrectly
Answer: b) AI producing skewed or unfair outcomes due to biased data

Which one of these is a game that uses AI to understand language?
a) Quick Draw
b) Semantris
c) Tetris
d) Chess
Answer: b) Semantris

Which AI domain helps understand and generate human language?
a) Computer Vision

b) Data Science
c) Natural Language Processing
d) Machine Learning
Answer: c) Natural Language Processing

How is AI used in self-driving cars?
a) It generates energy
b) It processes visual data and makes driving decisions
c) It repairs the engine
d) It calculates fuel efficiency
Answer: b) It processes visual data and makes driving decisions

Why is data cleaning important in AI projects?
a) To eliminate unused models
b) To ensure the data is accurate and consistent
c) To deploy faster AI systems
d) To increase AI processing speed
Answer: b) To ensure the data is accurate and consistent

Which of the following is a key ethical issue in AI?
a) Lack of internet
b) Transparency and fairness
c) AI processing speed
d) Data storage costs
Answer: b) Transparency and fairness

What is the purpose of AI-based fraud detection systems in finance?
a) To make loans cheaper
b) To predict and prevent fraudulent activities
c) To manage customer services
d) To automate money transfers

Answer: b) To predict and prevent fraudulent activities
Which of the following AI domains involves learning from data to improve over time?
a) Computer Vision
b) Deep Learning
c) Natural Language Processing
d) Data Mining
Answer: b) Deep Learning

What does it mean for an AI model to “learn”?
a) It memorizes data
b) It improves its performance using data and experience
c) It processes large amounts of information

d) It executes tasks faster than humans
Answer: b) It improves its performance using data and experience

What should you check before using personal data in AI?
a) If it's from a private company
b) If it is publicly available or obtained ethically
c) If the data is stored in a database
d) If it was collected automatically
Answer: b) If it is publicly available or obtained ethically

What happens during the "modelling" phase of the AI Project Cycle?
a) Identifying the problem
b) Developing and training algorithms to solve the problem
c) Cleaning data
d) Visualizing data trends
Answer: b) Developing and training algorithms to solve the problem

What is one major limitation of Rule-Based AI models?
a) They can't learn from new data
b) They are too slow
c) They require internet connectivity
d) They work only with small datasets
Answer: a) They can't learn from new data

What does the term "deployment" refer to in AI projects?
a) Collecting new data
b) Launching the AI model for real-world use
c) Designing new algorithms
d) Testing AI systems
Answer: b) Launching the AI model for real-world use

How does AI help in personalized education?
a) By automating tests
b) By creating customized learning paths based on student performance
c) By replacing teachers
d) By reducing homework
Answer: b) By creating customized learning paths based on student performance

What is the ethical concern of "bias" in AI?
a) AI does not work for everyone equally
b) AI systems consume too much power
c) AI models run too fast
d) AI cannot be programmed properly
Answer: a) AI does not work for everyone equally

Question-Answers :

How can AI be used as a tool to transform the world into a better place?

AI can be used to make the world better by improving productivity, healthcare, education, and accessibility. AI systems can predict and solve critical problems like climate change, help optimize resource use, enhance medical diagnosis with Computer Vision and NLP, improve personalized education, and increase efficiency in various industries. AI can also aid in monitoring environmental changes and managing large-scale social challenges like poverty and food security.

Applications in smartphones that widely use Computer Vision:

- Face Unlock
- Google Lens
- Augmented Reality filters in social media apps (like Snapchat, Instagram)
- Barcode and QR code scanners
- Image search in photo galleries.

Difference between the three domains of AI with respect to the types of data they use:

- Natural Language Processing (NLP): Works with textual and spoken data to understand, generate, and manipulate human language.
- Computer Vision (CV): Works with visual data, including images and videos, to help machines interpret and understand visual content.
- Data Science: Works with numerical, statistical, and structured data to identify patterns and draw insights from large datasets.

Separate the following areas based on the kinds of domains widely used in them:

- Crop productivity: Data Science (for analyzing weather and yield data) and Computer Vision (for pest detection).
- Traffic regulation: Computer Vision (for monitoring and managing traffic).
- Maps and navigation: Data Science (analyzing location data) and NLP (for voice-based navigation commands).
- Text editors and autocorrect: Natural Language Processing.
- Identifying and predicting disease: Computer Vision (for medical imaging) and Data Science (for analyzing patient data).

What are the various stages of Al Project Cycle?

- Problem Scoping: Identify and define the problem. Example: Identifying how to improve crop yield using AI.
- Data Acquisition: Collecting the necessary data. Example: Gathering data on weather conditions and pest attacks.

- Data Exploration: Analyzing the data to find patterns. Example: Exploring how weather impacts crop yield.
- Modeling: Creating a machine-learning model. Example: Building a model to predict the best time for pesticide use.
- Evaluation: Testing the model for accuracy. Example: Testing how well the model predicts crop yields.
- Deployment: Implementing the AI solution. Example: Deploying an AI tool that gives real-time suggestions to farmers.

How is an AI project different from an IT project?
An AI project focuses on building models that can learn and improve over time based on data, whereas an IT project is more static and involves creating software systems based on fixed rules and requirements. AI projects emphasize adaptability and continuous learning, while IT projects prioritize system functionality and efficiency.

Explain the 4Ws problem canvas in problem scoping:
The 4Ws problem canvas helps define the key elements of a problem:

- Who: Identifies the stakeholders affected by the problem.
- What: Describes the problem and evidence supporting its existence.
- Where: Identifies the context and locations where the problem occurs.
- Why: Explains the benefits of solving the problem for the stakeholders.

Why is there a need to use a Problem Statement Template during problem scoping?
The Problem Statement Template helps summarize the core aspects of a problem clearly and concisely, ensuring all key elements (who, what, where, why) are considered. It provides a structured way to focus on the problem, making it easier to develop an appropriate AI solution.

What is Problem Scoping? What are the steps of Problem Scoping?
Problem scoping involves identifying and defining a problem that needs to be solved using AI. Steps include:

- Defining the problem (4Ws problem canvas).
- Collecting relevant information to support the problem's existence.
- Framing a clear goal for the project.

Who are the stakeholders in the problem scoping stage?
Stakeholders are individuals or groups affected by the problem and would benefit from the AI solution. Examples include customers, businesses, government entities, and users impacted by the problem.

How will you differentiate between Training Data and Testing Data?

- Training Data: Data used to train the AI model, allowing it to learn and make predictions.
- Testing Data: Data used to evaluate the AI model's performance to see how well it generalizes to new data.

Example: In a facial recognition AI, training data would be a set of labeled facial images, while testing data would be new facial images the model hasn't seen before.

Name various methods for collecting data.

- Surveys: Used in customer sentiment analysis.
- Sensors: Used in smart agriculture to monitor environmental conditions.
- Web scraping: Used for gathering publicly available data from websites (e.g., market trends).
- APIs: Used in financial applications to collect real-time stock market data.

What must you keep in mind while collecting data so it is useful?
Ensure that the data is relevant, accurate, unbiased, and obtained from reliable sources. The data should also comply with privacy laws and be suitable for training AI models.

Imagine you are responsible to enable farmers from a village to take their produce to the market for sale. Can you draw a system map that encompasses all the steps and factors involved?
A system map would include:

- Farmers gathering their produce.
- Transportation methods to the market.
- Market logistics and price monitoring.
- Payment and transaction systems for farmers.

Name a few government websites from where you can get open-source data:

- data.gov.in
- india.gov.in
- data.gov (USA)
- open.canada.ca.

What is the significance of Data Exploration after you have acquired the data for the problem
Data exploration helps identify patterns, trends, and insights from the collected data, enabling better decision-making and model development. For example, exploring data on weather conditions helps identify trends that affect crop yields.

Relevance of Data Visualization in AI:
Data visualization makes it easier to interpret complex data, identify trends, and communicate insights to stakeholders. It is crucial for understanding the outcomes of AI models and improving their performance.

Five graphs used for data visualization:

- Bar Chart
- Line Graph
- Pie Chart

- Scatter Plot
- Histogram.

How is Data Exploration different from Data Acquisition?
Data Acquisition refers to collecting data, while Data Exploration involves analyzing and interpreting the collected data to extract meaningful patterns and trends.

Example of a Data Visualization technique:
Line Graph: Used to show changes over time. For example, it can be used to visualize the sales growth of a company over several months.

Stages of the AI Project Cycle explained with examples:
Same as Question 6.

What is Artificial Intelligence? Give an example where AI is used in day-to-day life:
Artificial Intelligence is the ability of machines to mimic human intelligence, such as learning, problem-solving, and decision-making. Example: AI-powered virtual assistants like Siri or Alexa.

How is Machine Learning related to Artificial Intelligence?
Machine Learning is a subset of AI that enables machines to learn from data and improve their performance over time without being explicitly programmed for each task.

Compare Rule-based and Learning-based approach in AI modeling:
Rule-based AI: Operates on predefined rules. Example: Chess AI that follows specific game rules.
Learning-based AI: Learns from data and adapts over time. Example: Self-driving cars that improve navigation based on experience.

What is Evaluation?
Evaluation is the process of testing an AI model to assess its accuracy and performance by comparing predictions with real outcomes.

What are various Model evaluation techniques?
- Accuracy
- Precision
- Recall
- F1 Score

Why is model evaluation important in AI projects?
It ensures the model is functioning correctly, avoids overfitting, and meets the intended goals of solving the problem effectively.

What do you understand by the terms True Positive and False Positive?

- True Positive: Correctly predicting a positive outcome (e.g., correctly detecting a disease).
- False Positive: Incorrectly predicting a positive outcome when it doesn't exist (e.g., diagnosing a disease when it is absent).

Differentiate between Ethics and Morals with suitable examples:

- Ethics: Refers to principles that guide behavior and decision-making in a professional or social context. Ethics are often codified into laws or guidelines. For example, it is unethical for a doctor to share a patient's medical details without consent.
- Morals: Refers to personal beliefs about right and wrong. Morals are subjective and vary among individuals. For example, a person may believe it is morally wrong to lie, regardless of the situation.

30. Define principles of AI:
The key principles of AI include:

- Human Rights: AI should not violate basic human rights.
- Bias and Fairness: AI should be free of biases that might unfairly discriminate against individuals or groups.
- Transparency: AI systems should be transparent, making it clear how decisions are made.
- Accountability: Developers should be accountable for AI systems and their outcomes.
- Inclusivity: AI should benefit all populations equally without excluding any particular group.

Explain Data Privacy:
Data privacy refers to the ethical handling of individuals' personal data. It involves ensuring that personal information is collected, stored, and used responsibly, with the consent of the individual, and safeguarding against misuse. AI systems that handle personal data, such as biometric information or social media activity, must follow strict privacy regulations to protect users' rights.

Craft a description of how considerations for inclusivity are addressed during the development of AI models.

- To address inclusivity during AI development:
- Ensure datasets are diverse and represent all groups to avoid bias.
- Engage with different stakeholders, including underrepresented communities, during the design phase.
- Regularly audit AI models to ensure they provide fair outcomes across all demographics.
- Make AI systems accessible to users with different needs, such as those with disabilities.

33. Write Major Issues around AI Ethics.

Some major ethical concerns in AI include:

- Bias and Discrimination: AI models may perpetuate or amplify societal biases present in the data.
- Privacy Violations: The use of AI for data collection and analysis can lead to invasions of personal privacy.
- Transparency and Accountability: It may be difficult to understand how AI systems make decisions, leading to issues with accountability.
- Job Displacement: AI automation has the potential to replace human jobs, leading to economic and social challenges.

34. A company had been working on a secret AI recruiting tool. The machine-learning specialists uncovered a big problem: their new recruiting engine did not like women chefs. The system taught itself that male candidates are preferable. It penalised resumes that included the word "women chef". This led to the failure of the tool.

a. What aspect of AI ethics is illustrated in the given scenario?

b. What could be the possible reasons for the ethical concern identified?

Ans: The scenario highlights bias in AI systems, specifically gender bias in recruitment. b. Possible reasons for the ethical concern:
The training data used likely reflected societal biases, leading the AI system to prefer male candidates. This bias could be due to the historical underrepresentation of women in the workforce or in leadership roles, which the AI learned from its training data.

As Artificially Intelligent machines become more and more powerful, their ability to accomplish tedious tasks is becoming better. Hence, it is now that AI machines have started replacing humans in factories. While people see it in a negative way and say AI has the power to bring mass unemployment and one day, machines would enslave humans, on the other hand, other people say that machines are meant to ease our lives. If machines over take monotonous and tedious tasks, humans should upgrade their skills to remain their masters always. What according to you is a better approach towards this ethical concern? Justify your answer.

Ans: Better approach towards the ethical concern of AI replacing humans in jobs:
A balanced approach would be to focus on upskilling workers so that they can take on new roles as AI takes over repetitive tasks. Instead of fearing job losses, society should focus on education and training programs that help workers transition into roles that require human creativity, emotional intelligence, and problem-solving skills, areas where AI is currently limited. This approach ensures that humans remain in control of technology and its applications.