

Unit-2: Advanced Concepts of Modelling in AI

Part A: Objective Questions (MCQs)

1. Which of the following is an example of **classification modelling**?
 - a) Predicting tomorrow's temperature
 - b) Identifying whether an email is spam or not
 - c) Calculating the average rainfall
 - d) Estimating the price of a house
2. In AI modeling, **regression** is used when:
 - a) The output is categorical
 - b) The output is continuous
 - c) The data is missing
 - d) The model is unsupervised
3. Which of these is NOT a type of AI model?
 - a) Classification
 - b) Regression
 - c) Clustering
 - d) Encryption
4. **Confusion Matrix** is mainly used to evaluate:
 - a) Regression models
 - b) Classification models
 - c) Clustering models
 - d) Data acquisition

Q8. Identify the type of model (classification, regression, clustering, association model) are the following case studies most likely based on?

- a) A bank wants to predict whether a loan applicant will "default" or "non-default" on their loan payments. They have a dataset containing information such as income, credit score, loan amount, and employment status.
- b) A real estate agency wants to predict the selling price of houses based on various features such as size, location, number of bedrooms, and bathrooms. They have a dataset containing historical sales data.
- c) A marketing company wants to segment its customer base into distinct groups based on purchasing behavior for targeted marketing campaigns. They have a dataset containing information such as purchase history, frequency of purchases, and amount spent.
- d) A grocery store wants to identify associations between different products purchased by customers to understand which products are commonly bought together. They have a transaction dataset containing records of items purchased together during each transaction.

Part B: Short Answer Questions

5. Define Classification **modelling** with one real-life example.
6. What is the difference between **supervised** and **unsupervised learning**?
7. Explain the term **overfitting** in AI models.
8. Why is **data splitting** (training and testing sets) important in modeling?

Part C: Long Answer / Analytical Questions

9. Compare **classification** and **regression** models with suitable examples.
10. Discuss the importance of **evaluation metrics** (like accuracy, precision, recall, F1-score) in AI modeling.

Part D: Case Study Question

11. A school wants to build an AI model to predict whether a student will pass or fail based on attendance and test scores.
 - Identify which type of model (classification/regression) should be used.
 - Suggest how the school can avoid **bias** in the model.
 - Explain one evaluation metric that would help measure the model's performance.

UNIT- 3 EVALUATING MODELS

Part A: Objective Questions (MCQs)

1. Which of the following is an evaluation metric for **classification models**? a) Mean Squared Error b) Accuracy c) R^2 (Coefficient of Determination) d) Root Mean Squared Error
2. **Precision** measures: a) The proportion of correctly predicted positive cases out of all actual positives b) The proportion of correctly predicted positive cases out of all predicted positives c) The proportion of correctly predicted negatives out of all predicted negatives d) The overall correctness of the model
3. In regression models, **Mean Absolute Error (MAE)** is used to: a) Measure the average squared difference between predicted and actual values b) Measure the average absolute difference between predicted and actual values c) Measure the percentage of correct predictions d) Measure the correlation between variables
4. A **confusion matrix** is used to evaluate: a) Regression models b) Classification models c) Clustering models d) Data acquisition

Part B: Short Answer Questions

5. Define **model evaluation** in AI.
6. What is the difference between **precision** and **recall**?
7. Explain the importance of a **confusion matrix** in classification tasks.
8. Why is it necessary to evaluate models before deployment?

Part C: Long Answer / Analytical Questions

9. Discuss the role of **accuracy, precision, recall, and F1-score** in evaluating classification models. Provide examples.
10. Compare **Mean Squared Error (MSE)** and **Mean Absolute Error (MAE)** in regression model evaluation. Which situations are they best suited for?

Part D: Case Study Question

11. A hospital develops an AI model to predict whether patients have a certain disease. The model shows high accuracy but low recall.
 - What does this mean in practical terms?
 - Why might low recall be dangerous in this scenario?
 - Suggest one way to improve the model's recall.

Unit -5 Computer Vision

Part A: Objective Questions (MCQs)

1. Computer Vision is a field of AI that focuses on: a) Understanding human language b) Enabling machines to interpret and analyze visual data c) Designing computer hardware d) Managing databases
2. Which of the following is a common application of Computer Vision? a) Speech recognition b) Image classification c) Text summarization d) Data encryption
3. **Image segmentation** refers to: a) Dividing an image into meaningful regions b) Compressing image size c) Enhancing image brightness d) Converting text to image
4. Which technique is often used in Computer Vision for **object detection**? a) Regression b) Convolutional Neural Networks (CNNs) c) Decision Trees d) K-Means Clustering

Part B: Short Answer Questions

5. Define **Computer Vision** in your own words.
6. Give two real-life examples of Computer Vision applications.
7. What is the difference between **image classification** and **object detection**?
8. Explain the role of **feature extraction** in Computer Vision.

Part C: Long Answer / Analytical Questions

9. Discuss how **Convolutional Neural Networks (CNNs)** help in image recognition tasks.
10. Explain the importance of **training datasets** in building Computer Vision models. What challenges arise if the dataset is biased?

Part D: Case Study Question

11. A city government wants to use Computer Vision to monitor traffic violations (e.g., detecting vehicles crossing red lights).
 - Identify which Computer Vision techniques would be useful.
 - Discuss the ethical concerns related to privacy and surveillance.
 - Suggest measures to ensure fairness and accuracy in the system.

Unit 6: Natural Language Processing

Part A: Objective Questions (MCQs)

1. Natural Language Processing (NLP) is a branch of AI that deals with:
a) Image recognition b) Understanding and processing human language c) Data encryption d) Hardware design
2. Which of the following is an example of **NLP application**?
a) Face detection b) Speech-to-text conversion c) Weather forecasting d) Image segmentation
3. **Tokenization** in NLP refers to:
a) Breaking text into smaller units like words or sentences b) Translating text into another language c) Removing irrelevant data from text d) Converting speech into text
4. Which technique is commonly used for **sentiment analysis**?
a) Regression b) Classification c) Clustering d) Reinforcement learning

Part B: Short Answer Questions

5. Define **Natural Language Processing** in your own words.
6. Give two real-life examples of NLP applications.
7. What is the difference between **speech recognition** and **text-to-speech**?
8. Explain the role of **stop words removal** in NLP.

Part C: Long Answer / Analytical Questions

9. Discuss how **NLP enables machines to understand human language**. Provide examples of tasks like translation, summarization, and chatbots.
10. Explain the importance of **training datasets** in NLP. What challenges arise if the dataset contains biased or incomplete language samples?

Part D: Case Study Question

11. A company develops an NLP-based chatbot to handle customer queries. However, customers complain that the chatbot often misunderstands their intent and gives irrelevant answers.
 - Identify which NLP challenges might be causing this issue.
 - Suggest improvements to make the chatbot more effective.
 - Discuss one ethical concern related to deploying NLP chatbots in customer service.