(Weeks 1-12)

Week 1

1. What is meant by Artificial Intelligence (AI) ?

   a) AI is a field aiming to make humans more intelligent

   b) AI is a field aimed at improving security

   c) AI is a field aiming to mine the data

   d) AI is a field aimed at developing intelligent machines

   Answer: d) AI is a field aimed at developing intelligent machines

2. What was originally called 'the Imitation game' ?

   a) LISP

   b) The Turing test

   c) The Halting Problem

   d) Vanishing gradient problem

   Answer: b) The Turing test

3. Who was responsible for inventing the LISP language?

   a) Aurthur Samuel

   b) John McCarthy

   c) Marvin Minsky

   d) Nils Nilsson

   Answer: b) John McCarthy

4. Which of the following is the function of an AI agent?

a) To map the goal sequence to an action

b) To work without direct interference from any external factor

c) To map the percept sequence to an action

d) To map the environment to a percept

Answer: c) To map the percept sequence to an action

5. What is the key characteristic of an intelligent agent?

a) Redundancy

b) Complexity

c) Autonomy

d) Inflexibility

Answer: c) Autonomy

6. In intelligent agents, the term "percepts" refers to :

a) Instructions given to the agent

b) Data received from the environment

c) Internal state of the agent

d) Actions taken by the agent

Answer: b) Data received from the environment

7. Which type of agent makes judgements based on current perceptions while ignoring previous perceptions?

a) Utility-based agents

b) Model-based agents

c) Simple reflex agents

d) Goal-based agents

Answer: c) Simple reflex agents

8. What is a key characteristic of an informed search algorithm?

   a) It uses no additional information beyond the problem definition

   b) It uses problem-specific knowledge to guide the search

   c) It explores all possible paths without any prioritization

   d) It is guaranteed to find the optimal solution

   Answer: b) It uses problem-specific knowledge to guide the search

9. Which definition correctly define 'move' for an AI agent?

   a) When the agent goes from one state to another, it is known as a move

   b) When the agent moves from one place to another, then it is called the move of the agent

   c) When the agent moves from start to goal state, it is known as a move

   d) When the agent moves from a state to the start state, it is known as a move

   Answer: a) When the agent goes from one state to another, it is known as a move

10. A problem-solving approach works well for

    a) Adding two numbers

    b) 8-queens problem

    c) Finding the inverse of a matrix

    d) Solving simultaneous equations

    Answer: b) 8-queens problem

Week 2

1. If b is the branching factor and d is the depth of the search tree, the space complexity of BFS is

   a) O(bd)

b) O(bd)

c) O(b)

d) O(d)

Answer: a) O(bd)

2. If b is the branching factor and m is the maximum depth of the search tree, what is the space complexity of breadth first search?

   a) O(b)

   b) O(m)

   c) O(bm)

   d) O()

   Answer: c) O(bm)

3. What is another name for blind search?

   a) Informed search

   b) Uninformed search

   c) Greedy search

   d) Heuristic search

   Answer: b) Uninformed search

4. Uniform cost search expands the node n with the _____

   a) Highest path cost

   b) Heuristic cost

   c) Average path cost

   d) Lowest path cost

   Answer: d) Lowest path cost

5. Depth-first search always expands the _____ node among the leaf nodes of the search tree

   a) Shallowest

   b) Child node

   c) Deepest node

   d) Minimum cost node

   Answer: c) Deepest node

6. Breadth-first search always expands the _____ node among the leaf nodes of the search tree

   a) Shallowest

   b) Child node

   c) Deepest node

   d) Minimum cost node

   Answer: a) Shallowest

7. What search strategy is used for game-playing?

   a) Linear search

   b) Minimax search

   c) Random search

   d) None of these

   Answer: b) Minimax search

8. The node chosen for expansion in the greedy search is the _____ node

   a) Shallowest

   b) Deepest

   c) One estimated to be closest to goal

d) Minimum heuristic cost

Answer: c) One estimated to be closest to goal

9. What type of search algorithm is used in minimax search?

   a) Hill-climbing search

   b) Depth-first search

   c) Breadth-first search

   d) Local search

   Answer: b) Depth-first search

10. Which of the following search algorithm searches forward from initial state and backward from goal state till both meet to identify a common state?

    a) Uniform cost strategy

    b) Iterative deepening depth-first search strategy

    c) Greedy search

    d) Bidirectional search

    Answer: d) Bidirectional search

Week 3

1. In game playing, the "minimax" algorithm is used to

   a) Find the optimal move for a single player

   b) Find the optimal move for a multi-player game by considering all possible outcomes

   c) Determine the complexity of a game

   d) Prune the search tree to reduce computational cost

   Answer: b) Find the optimal move for a multi-player game by considering all possible outcomes

2. What is the main goal of "alpha-beta pruning" in game-tree search?

   a) To expand the search tree as much as possible

   b) To avoid exploring branches that are guaranteed to be suboptimal

   c) To increase the branching factor of the game tree

   d) To guarantee finding the optimal solution

   Answer: b) To avoid exploring branches that are guaranteed to be suboptimal

3. In many problems, the path to the goal is irrelevant, and the focus is solely on finding a goal state. This class of problems can be solved using

   a) Informed search techniques

   b) Uninformed search techniques

   c) Local search techniques

   d) Informed and uninformed search techniques

   Answer: c) Local search techniques

4. Which phase of a genetic algorithm involves the creation of new individuals for the next generation?

   a) Evolution

   b) Crossover

   c) Mutation

   d) Reproduction

   Answer: d) Reproduction

5. Which of the following is a key characteristic of genetic algorithms?

   a) They are deterministic algorithms

   b) They are population-based algorithms

   c) They always guarantee the optimal solution

d) They are typically used for small, well-defined problems

Answer: b) They are population-based algorithms

6. In Genetic Programming, what does a "chromosome" typically represent?

   a) A single instruction within a program

   b) The entire program or solution structure

   c) A parameter value in the program

   d) The fitness score of a program

   Answer: b) The entire program or solution structure

7. Mutation in a genetic algorithm is used to:

   a) Introduce diversity and prevent premature convergence

   b) Select the best individuals from a population

   c) Combine genetic information from parents

   d) Evaluate the quality of a solution

   Answer: a) Introduce diversity and prevent premature convergence

8. In Simulated Annealing, the "cooling schedule" refers to:

   a) The rate at which the temperature parameter decreases

   b) The method of generating new candidate solutions

   c) The criteria for accepting or rejecting a new solution

   d) The way the algorithm initializes the solution

   Answer: a) The rate at which the temperature parameter decreases

9. In Simulated Annealing, the probability of accepting a worse solution is

   a) Always zero

   b) Proportional to the temperature parameter

c) Inversely proportional to the temperature parameter

d) Determined by a fixed threshold

Answer: b) Proportional to the temperature parameter

10. What is a "tabu list" in Tabu Search?

    a) A list of optimal solutions found so far

    b) A list of aspiration criteria for accepting tabu moves

    c) A list of parameters for the neighborhood function

    d) A list of forbidden moves or previously visited solutions to prevent cycling

    Answer: d) A list of forbidden moves or previously visited solutions to prevent cycling

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Week 4

1. Which form is called as a conjunction of disjunction of literals?

    a) Conjunctive normal form

    b) Disjunctive normal form

    c) Normal form

    d) Unit clause

    Answer: a) Conjunctive normal form

2. The mathematical notation to describe logical entailment of a sentence “α entails another sentence β” is:

    a) $\alpha \subseteq \beta$

    b) $\alpha \models \beta$

    c) $\beta \models \alpha$

    d) $\beta \subseteq \alpha$

    Answer: b) $\alpha \models \beta$

3. Which of the following option is used to build complex sentences in knowledge representation?

   a) Symbols

   b) Connectives

   c) Quantifiers

   d) Variables

   Answer: b) Connectives

4. Let L(x,y) be the statement “x loves y” where the domain for both x and y consists of all people. Express the statement “Joy is loved by everyone”

   a) $\forall yL(Joy,y)$

   b) $\forall xL(x,Joy)$

   c) $\exists y\forall xL(x,y)$

   d) $\exists x\neg L(Joy,x)$

   Answer: b) $\forall xL(x,Joy)$

5. If f(x) means “x is my friend” and p(x) means “x is perfect”, then the correct translation of the statement “some of my friends are not perfect” is

   a) $\forall x(f(x)\wedge\neg p(x))$

   b) $\neg(f(x)\wedge\neg p(x))$

   c) $\exists x(f(x)\wedge\neg p(x))$

   d) $\exists x(\neg f(x)\wedge\neg p(x))$

   Answer: c) $\exists x(f(x)\wedge\neg p(x))$

6. Let A, B, and C be true, false and true respectively. Which of the following is true?

   a) $A\wedge B\wedge C$

   b) $A\wedge\neg B\wedge\neg C$

c) $B \rightarrow (A \wedge C)$

d) $A \rightarrow (B \wedge C)$

Answer: c) $B \rightarrow (A \wedge C)$

7. Translate $\forall x \exists y(x>y)$ in English, considering the domain as a real number for both the variables.

   a) For every real number y there exists a real number x such that x is greater than y

   b) For all real numbers x there exists a real number y such that x is greater than y

   c) For each and every real number x and y, x is greater than y

   d) For some real number x there exists a real number y such that x is greater than y

   Answer: b) For all real numbers x there exists a real number y such that x is greater than y

8. Negation of the proposition $\exists x H(x)$ is

   a) $\exists x \neg H(x)$

   b) $\forall x H(x)$

   c) $\neg x H(x)$

   d) $\forall x \neg H(x)$

   Answer: d) $\forall x \neg H(x)$

9. What is the key idea behind resolution?

   a) It is a refutation complete inference procedure

   b) It is a method to prove the truth of a statement

   c) It is a way to convert sentences into Conjunctive Normal Form (CNF)

   d) It is a type of logical connective

   Answer: a) It is a refutation complete inference procedure

10. What does the "empty clause" signify in resolution?

    a) A true statement

    b) A false statement or contradiction

    c) A valid statement

    d) An indeterminate statement

    Answer: a) A true statement

    Note: The provided "Accepted Answer" was 'A true statement'. This has been corrected. In resolution, reaching an empty clause signifies a contradiction, which proves the original negated statement is false.

Week 5

1. An expert system without the knowledge base is called :

    a) Tool

    b) Shell

    c) Expert system

    d) Knowledge

    Answer: b) Shell

2. In an expert system, what represents the facts and rules?

    a) Knowledge base

    b) Inference engine

    c) Operating system

    d) Input interface

    Answer: a) Knowledge base

3. What is a planning graph used for in AI planning?

    a) Representing the state space of a problem

b) Finding the optimal solution to a problem

c) Representing possible states and actions in a compact form

d) Solving constraint satisfaction problems

Answer: c) Representing possible states and actions in a compact form

4. In partial-order planning, what is the main difference compared to total-order planning?

   a) Actions are sequenced all at once

   b) Actions are sequenced in a specific order

   c) Actions are not sequenced at all

   d) Actions are sequenced in a partial order, allowing flexibility

   Answer: d) Actions are sequenced in a partial order, allowing flexibility

5. _____ planning allows the agent to take advice from the domain designer in the form of decomposition rules

   a) GraphPlan

   b) Hierarchical Task Network (HTN)

   c) SatPlan

   d) Partial Order Plan

   Answer: b) Hierarchical Task Network (HTN)

6. Which of the following search belongs to totally ordered plan search?

   a) Forward state-space search

   b) Hill-climbing search

   c) Depth-first search

   d) Breadth-first search

   Answer: a) Forward state-space search

7. What are present in the empty plan?

   a) Start state

   b) Goal state

   c) Start and goal state

   d) Some of the states

   Answer: c) Start and goal state

8. What is the main goal of resource optimization in AI?

   a) To minimize the cost of running the AI system

   b) To maximize the accuracy of the AI system

   c) To achieve the best possible performance with the available resources

   d) To reduce the complexity of the AI system

   Answer: c) To achieve the best possible performance with the available resources

9. In the context of planning, "execution monitoring" refers to:

   a) Observing the execution of the plan to detect and respond to discrepancies

   b) Monitoring network traffic during planning

   c) Monitoring data encryption processes

   d) Checking the efficiency of data storage during planning

   Answer: a) Observing the execution of the plan to detect and respond to discrepancies

10. "Replanning" in Planning is necessary when:

    a) There is a network failure

    b) Data encryption needs to be updated

    c) Data storage algorithms change

d) The initial plan encounters unforeseen obstacles or changes

Answer: d) The initial plan encounters unforeseen obstacles or changes

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Week 6

1. Ontological engineering is concerned with:

   a) Designing algorithms for planning

   b) Representing knowledge using formal ontologies

   c) Solving constraint satisfaction problems

   d) Performing adversarial search

   Answer: b) Representing knowledge using formal ontologies

2. In knowledge representation, categories are used to:

   a) Group objects with similar properties

   b) Define algorithms for inference

   c) Solve planning problems

   d) Perform local search

   Answer: a) Group objects with similar properties

3. Which of the following best describes a semantic network?

   a) A type of programming language used in AI

   b) A method of organizing data in a hierarchical structure

   c) A graphical representation of knowledge using nodes and arcs

   d) A mathematical model for representing logical inferences

   Answer: c) A graphical representation of knowledge using nodes and arcs

4. A semantic network can be represented as a:

   a) Linear list

b) Tree structure

c) Stack

d) Directed graph

Answer: d) Directed graph

5. Scripts in AI are primarily used to represent:

   a) Static facts about objects

   b) Hierarchical relations between concepts

   c) Sequence of events or stereotypical situations

   d) Probabilistic relationships between variables

   Answer: c) Sequence of events or stereotypical situations

6. A key advantage of using scripts in AI is:

   a) They simplify representing procedural knowledge and action sequences

   b) They are easy to visualize graphically

   c) They excel at representing exceptions to rules

   d) They are the most efficient way to handle uncertainty

   Answer: a) They simplify representing procedural knowledge and action sequences

7. Which of the following best describes monotonic reasoning in the context of Artificial Intelligence?

   a) Reasoning where new knowledge can invalidate previous conclusions

   b) Reasoning where adding new knowledge can never invalidate previous conclusions

   c) Reasoning that only applies to specific domains like mathematics and logic

   d) Reasoning that is typically used in expert systems

Answer: b) Reasoning where adding new knowledge can never invalidate previous conclusions

8. Which of the logic-based approach is most suitable for nonmonotonic reasoning?

   a) Classical logic

   b) Default logic

   c) Modal logic

   d) Fuzzy logic

   Answer: b) Default logic

9. Which reasoning approach allows for revising existing beliefs in light of new evidence?

   a) Monotonic reasoning

   b) Nonmonotonic reasoning

   c) Deductive reasoning

   d) Inductive reasoning

   Answer: b) Nonmonotonic reasoning

10. _____ theory is based on the use of primitive concepts and rules to represent any natural language statement

    a) Script

    b) Associative network

    c) Conceptual dependencies

    d) Frames

    Answer: c) Conceptual dependencies

Week 7

1. How the Bayesian network can be used to answer any query?

a) Full distribution

b) Joint distribution

c) Partial distribution

d) None of these

Answer: b) Joint distribution

2. A decision network extends a belief network by including:

   a) Decision nodes and utility functions

   b) Probabilistic dependencies

   c) Only decision nodes

   d) Only utility nodes

   Answer: a) Decision nodes and utility functions

3. What does a utility function in a decision network represent?

   a) The probability of a state occurring

   b) The action taken by an agent

   c) The value or preference associated with a particular outcome

   d) The uncertainty associated with a random variable

   Answer: c) The value or preference associated with a particular outcome

4. If we have variables x1,x2,x3,...,xn, then the probabilities of a different combination of x1,x2,x3,...,xn, are known as ?

   a) Table of conditional probabilities

   b) Casual Component

   c) Actual numbers

   d) Joint probability distribution

   Answer: d) Joint probability distribution

5. What does the notation P(A|B) represent?

   a) The probability of event A occurring, regardless of event B

   b) The probability of event B occurring, given that event A has already occurred

   c) The probability of event A occurring, given that event B has already occurred

   d) The joint probability of events A and B occurring

   Answer: c) The probability of event A occurring, given that event B has already occurred

6. What is the primary use of Bayes' rule in AI?

   a) To calculate the probability of a single event

   b) To update beliefs or probabilities based on new evidence

   c) To determine if two events are independent

   d) To find the most likely outcome in a given scenario

   Answer: b) To update beliefs or probabilities based on new evidence

7. Two unbiased coins are tossed. What is the probability of getting at most one head?

   a) 3/4

   b) 1/6

   c) 1/3

   d) 1/2

   Answer: a) 3/4

8. If P(C)=5/13, P(D)=7/13, and P(C∩D)=3/13, evaluate P(C|D)

   a) 2/7

   b) 3/5

   c) 3/7

d) 1/7

Answer: c) 3/7

9. Efficient representation of conditional distributions in Bayesian networks involves:

   a) Using conditional probability tables

   b) Solving constraint satisfaction problems

   c) Performing adversarial search

   d) Using only propositional logic

   Answer: a) Using conditional probability tables

10. In a Dynamic Belief Network, what does the "unrolled" network represent?

    a) A single time slice of the network

    b) A simplified version of the network with fewer nodes

    c) A network with only static dependencies

    d) The entire sequence of time slices in the network

    Answer: d) The entire sequence of time slices in the network

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Week 8

1. In kNN algorithm, which distance metric is most commonly used?

   a) Cosine similarity

   b) Jaccard index

   c) Euclidean distance

   d) Hamming distance

   Answer: c) Euclidean distance

2. The Euclidean distance between two points (10,13,6)t and (7,11,2)t is the square root of

a) 24

b) 35

c) 29

d) 30

Answer: c) 29

3. What is the primary advantage of rule-based classification?

   a) High accuracy

   b) Ability to handle complex relationships

   c) Explainability and transparency

   d) Fast training time

   Answer: c) Explainability and transparency

4. What is the main objective of a Support Vector Machine (SVM) in classification?

   a) To minimize the classification error on the training data

   b) To find the optimal hyperplane that maximizes the margin between different classes

   c) To cluster data points into groups based on similarity

   d) To predict continuous values for a given input

   Answer: b) To find the optimal hyperplane that maximizes the margin between different classes

5. What is the "margin" in SVM?

   a) The distance between the decision boundary and the origin

   b) The decision between the decision boundary and farthest data point

   c) The number of support vectors used in the model

   d) The distance between the decision boundary and the nearest data points (support vectors) of each class

Answer: d) The distance between the decision boundary and the nearest data points (support vectors) of each class

6. What is the primary goal of ensemble learning?

   a) To reduce model complexity

   b) To increase training time

   c) To improve model performance and robustness

   d) To eliminate the need for feature engineering

   Answer: c) To improve model performance and robustness

7. Given entropy of parent = 1, weights averages = (3/4, 1/4) and entropy of children = (0.9, 0). What is the information gain?

   a) 0.675

   b) 0.75

   c) 0.325

   d) 0.1

   Answer: c) 0.325

8. In a neural network, what is the purpose of the activation function?

   a) To initialize weights

   b) To compute gradients

   c) To optimize the learning rate

   d) To introduce non-linearity

   Answer: d) To introduce non-linearity

9. In a feed forward network, the number of nodes in the input layer is 10 and the hidden layer has 5 nodes. The maximum number of connections from the input layer to the hidden layer are:

   a) Less than 50

b) 50

c) More than 50

d) It is an arbitrary value

Answer: b) 50

10. In the context of classification, what does "overfitting" refer to?

    a) The model performs poorly on both training and test data

    b) The model performs poorly on training data but well on test data

    c) The model performs well on both training and test data

    d) The model performs well on training data but poorly on test data

    Answer: d) The model performs well on training data but poorly on test data

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Week 9

1. What is an Artificial Neural Network (ANN)?

    a) A computational model inspired by the human brain

    b) A machine learning algorithm used for image processing

    c) A statistical analysis technique for data clustering

    d) A programming language for neural network implementation

    Answer: a) A computational model inspired by the human brain

2. What is the function of the input layer in an ANN?

    a) It performs mathematical computations on the input data

    b) It stores the trained weights and biases of the network

    c) It receives input data and passes it to the hidden layers

    d) It predicts the output of the network

    Answer: c) It receives input data and passes it to the hidden layers

3. Which layer of an ANN is responsible for making predictions or producing the final output?

   a) Input layer

   b) Hidden layer

   c) Output layer

   d) All layers contribute equally

   Answer: c) Output layer

4. What is the purpose of the backpropagation algorithm in ANN training?

   a) To initialize the weights and biases of the network

   b) To update the weights and biases based on the prediction error

   c) To determine the number of hidden layers

   d) To determine the number of neurons in the hidden layer

   Answer: b) To update the weights and biases based on the prediction error

5. What is the purpose of the forward pass in ANN training?

   a) To adjust the weights and biases using gradient descent

   b) To identify misclassified samples and update the model

   c) To update the parameters of the network

   d) To compute the predicted output based on the current weights and biases

   Answer: d) To compute the predicted output based on the current weights and biases

6. Learning rate controls:

   a) Loss function

   b) How fast model updates weights

   c) Input data size

d) Training duration

Answer: b) How fast model updates weights

7. What does the term "class imbalance" refer to in the context of machine learning?

   a) A situation where the model's performance is low

   b) A situation where the data has a large number of features

   c) A situation where the number of samples in each class is not equal

   d) A situation where the data is not properly cleaned

   Answer: c) A situation where the number of samples in each class is not equal

8. What is the primary challenge posed by class imbalance in machine learning?

   a) Increased model complexity

   b) Biased predictions towards the majority class

   c) Difficulty in data processing

   d) Reduced model accuracy

   Answer: b) Biased predictions towards the majority class

9. Which of the following is a potential drawback of using undersampling to address class imbalance?

   a) Loss of valuable information from the majority class

   b) Increased computational cost

   c) Overfitting the model to the minority class

   d) Difficulty in creating synthetic samples

   Answer: a) Loss of valuable information from the majority class

10. Which evaluation metric is generally not recommended for assessing model performance on imbalanced datasets?

    a) F1 score

b) Recall

c) Accuracy

d) Precision

Answer: c) Accuracy

Week 10

1. What is an epoch in deep learning?1

   a) The number of layers in a neural network2

   b) The number of training examples in a dataset3

   c) The number of times the entire dataset is passed through the neural network during training4

   d) The number of neurons in a layer5

   Answer: c) The number of times the entire dataset is passed through the neural network during training6

2. What is the purpose of data normalization in deep learning?

   a) To scale the input data to a fixed range

   b) To improve the convergence of the optimization problem

   c) To make the input data more interpretable

   d) To preprocess the data for visualization

   Answer: a) To scale the input data to a fixed range

3. What is the advantage of using convolutional layers in a CNN?

   a) They can capture local spatial patterns in the input data

   b) They can handle sequential data

   c) They can generate synthetic data

   d) They can handle variable-length inputs

Answer: a) They can capture local spatial patterns in the input data

4. Which layer type is used to reduce the spatial dimensions in a CNN?

   a) Convolutional layer

   b) Pooling layer

   c) Fully connected layer

   d) Activation layer

   Answer: b) Pooling layer

5. What is the purpose of the fully connected layers in CNN?

   a) To capture global patterns and make predictions

   b) To reduce the spatial dimensions of the input data

   c) To apply non-linear transformations to the feature maps

   d) To initialize the weights and biases of the network

   Answer: a) To capture global patterns and make predictions

6. What are the two main components of a GAN?

   a) Generator and encoder

   b) Discriminator and encoder

   c) Generator and discriminator

   d) Encoder and discriminator

   Answer: c) Generator and discriminator

7. What is the training process in a GAN called?

   a) Supervised learning

   b) Reinforcement learning

   c) Unsupervised learning

d) Adversarial learning

Answer: d) Adversarial learning

8. What is mode collapse in GANs?

   a) When the generator produces limited variations of samples

   b) When the discriminator fails to distinguish between real and generated samples

   c) When the GAN training process becomes unstable

   d) When the generator and discriminator achieve perfect equilibrium

   Answer: a) When the generator produces limited variations of samples

9. What is the role of the discriminator in a GAN during the training process?

   a) To generate synthetic samples

   b) To adjust the learning rate during training

   c) To provide feedback to the generator and help it improve

   d) To update the latent variable

   Answer: c) To provide feedback to the generator and help it improve

10. Which type of neural network is primarily designed to process sequential data, such as text or time series?

    a) Convolutional Neural Network (CNN)

    b) Recurrent Neural Network (RNN)

    c) Feedforward Neural Network (FNN)

    d) Generative Adversarial Network (GAN)

    Answer: b) Recurrent Neural Network (RNN)

Week 11

1. What distinguishes GPTs (Generative Pre-trained Transformers) from search engines?

   a) Search engines are trained on labeled data, while GPTs are not

   b) GPTs use supervised learning, while search engines use unsupervised learning

   c) GPTs can generate new content, while search engines retrieve existing content

   d) There is no difference between GPTs and search engines

   Answer: c) GPTs can generate new content, while search engines retrieve existing content

2. What is the main advantage of using Generative AI in natural language processing tasks?

   a) Improved accuracy in text classification

   b) Faster processing speeds compared to traditional methods

   c) Ability to generate human-like text

   d) Reduced need for labeled training data

   Answer: c) Ability to generate human-like text

3. What is the primary architectural innovation of the Transformer model?

   a) Recurrent connections

   b) Convolutional layers

   c) Pooling layers

   d) Self-attention mechanism

   Answer: d) Self-attention mechanism

4. What is the purpose of the "self-attention" mechanism in a Transformer?

   a) To process sequential data like RNNs

b) To weigh the importance of different parts of the input sequence when encoding or decoding

c) To reduce the dimensionality of the input data

d) To generate new text based on the input

Answer: b) To weigh the importance of different parts of the input sequence when encoding or decoding

5. In a Transformer, what does the "multi-head" aspect of multi-head attention refer to?

   a) Multiple layers of attention mechanisms

   b) Multiple input sequences processed in parallel

   c) Multiple output sequences generated by the decoder

   d) Multiple sets of learned linear transformations for queries, keys and values

   Answer: d) Multiple sets of learned linear transformations for queries, keys and values

6. What is the form of fuzzy logic?

   a) Two-valued logic

   b) Crisp set logic

   c) Many-valued logic

   d) Binary set logic

   Answer: c) Many-valued logic

7. The truth values of traditional set theory is _____ and that of fuzzy set theory is _____

   a) Between 0 and 1, either 0 or 1

   b) Either 0 or 1, between 0 and 1

   c) Between 0 and 1, between 0 and 1

   d) Either 0 or 1, either 0 or 1

Answer: b) Either 0 or 1, between 0 and 1

8. In fuzzy logic, what does the term "membership function" represent?

   a) The degree to which an element belongs to a crisp set

   b) The degree to which an element belongs to a fuzzy set

   c) The probability of an event occurring

   d) The certainty of a rule's conclusion

   Answer: b) The degree to which an element belongs to a fuzzy set

9. Which of the following is a key step in defuzzification?

   a) Applying fuzzy rules

   b) Calculating the output of each rule

   c) Converting fuzzy sets into crisp values

   d) Combining fuzzy sets

   Answer: c) Converting fuzzy sets into crisp values

10. What does the term "alpha-cut" refer to in fuzzy set theory?

    a) A crisp set derived from a fuzzy set by selecting elements with membership values greater than or equal to a threshold (alpha)

    b) The highest membership value in a fuzzy set

    c) A fuzzy set with a membership value of 1 for all elements

    d) A fuzzy set with a membership value of 0 for all elements

    Answer: a) A crisp set derived from a fuzzy set by selecting elements with membership values greater than or equal to a threshold (alpha)

Week 12

1. What is the primary goal of natural language processing?

   a) Understanding and generating human language

b) Translating languages

c) Analyzing data patterns

d) Creating conversational agents

Answer: a) Understanding and generating human language

2. Which technique aims to identify and extract the main ideas or topics from a collection of documents?

   a) Sentiment analysis

   b) Text summarization

   c) Named entity recognition

   d) Document clustering

   Answer: b) Text summarization

3. What is a common concern regarding AI's impact on employment?

   a) AI will increase the number of manual labor jobs

   b) AI will lead to job displacement as tasks become automated, affecting workers in routine and repetitive jobs

   c) AI will create more manual jobs than it replaces

   d) AI will solely benefit high-tech industry workers

   Answer: b) AI will lead to job displacement as tasks become automated, affecting workers in routine and repetitive jobs

4. What is a major concern when AI systems aggregate and analyze large-scale personal data without proper safeguards?

   a) The system may become inefficient in processing data

   b) The system may not be able to handle real-time data

   c) The system might lead to excessive data fragmentation

   d) The potential for breaches of individual privacy and misuse of sensitive information increases

Answer: d) The potential for breaches of individual privacy and misuse of sensitive information increases

5. In the context of Swarm Intelligence, what is meant by "self-organization"?

   a) The system is controlled by a central authority

   b) The system is designed with pre-defined rules for every possible scenario

   c) The system relies on a complex mathematical model to guide its behavior

   d) The system emerges from the interactions of its individual components

   Answer: d) The system emerges from the interactions of its individual components

6. In intelligent agents, the term "percepts" refers to :

   a) Instructions given to the agent

   b) Data received from the environment

   c) Internal state of the agent

   d) Actions taken by the agent

   Answer: b) Data received from the environment

7. What is the primary mechanism used by ants to communicate and find optimal paths in ACO?

   a) Visual cues

   b) Auditory signals

   c) Pheromone deposition and detection

   d) Chemical trails

   Answer: c) Pheromone deposition and detection

8. What is a key characteristic of a Multi-Agent System (MAS)?

   a) A single, centralized agent controlling all actions

   b) Multiple autonomous agents interacting to achieve a common goal

c) Agents with limited or no interaction

d) Agents operating independently without any environment

Answer: b) Multiple autonomous agents interacting to achieve a common goal

9. What is stigmergy in the context of MAS?

   a) A form of direct communication between agents

   b) A method of conflict resolution between agents

   c) Indirect communication through changes in the environment

   d) A technique for agents to learn from each other's actions

   Answer: c) Indirect communication through changes in the environment

10. Which of the following is an example of indirect communication in a multi-agent system?

    a) Sending a message directly to another agent

    b) Observing the actions of other agents and adjusting behavior accordingly

    c) Directly interacting with a central database

    d) Ignoring the actions of other agents

    Answer: b) Observing the actions of other agents and adjusting behavior accordingly