國立成功大學

114學年度碩士班招生考試試題

編　號：138

系　所：電腦與通信工程研究所

科　目：人工智慧概論

日　期：0210

節　次：第 1 節

注　意：1.不可使用計算機
2.請於答案卷(卡)作答，於試題上作答，不予計分。

Multiple-choice questions on Artificial Intelligence. For each question, you need to write down your answer and reason.

1. (10%)Which of the following is NOT a common challenge in developing robust AI systems?

(a) Data bias and fairness issues (b) Explainability and interpretability of models (c) Computational cost and scalability (d) Achieving perfect accuracy in all scenarios

2. (10%)In Graph Neural Networks (GNNs), what is the primary role of the aggregation function?

(a) To normalize the node features (b) To combine information from neighboring nodes (c) To update the model's weights (d) To generate new nodes in the graph

3. (10%)A convolutional neural network (CNN) uses which type of layer to reduce dimensionality and extract features from images? (Assume a typical CNN architecture)

(a) Fully Connected Layer (b) Recurrent Layer (c) Max Pooling Layer (d) Dropout Layer

4. (10%)You are given a dataset of 1000 data points in 10-dimensional space. You want to use a dimensionality reduction technique to reduce it to 2 dimensions while preserving as much variance as possible. Which technique is most suitable?

(a) Principal Component Analysis (PCA) (b) Linear Discriminant Analysis (LDA) (c) t-distributed Stochastic Neighbor Embedding (t-SNE) (d) Autoencoders

5. (10%) In the context of machine learning, what is regularization used for?

(a) To increase the training speed (b) To prevent overfitting (c) To reduce the bias of the model (d) To improve the interpretability of the model

6. (10%)Consider a logistic regression model. The cost function for a single data point is given by: $J(\theta) = -y\log(h_\theta(x)) - (1-y)\log(1-h_\theta(x))$, where y is the true label (0 or 1), and $h_\theta(x) = 1/(1 + \exp(-\theta^T x))$ is the predicted probability. What is the primary goal of the optimization process, and what algorithm is commonly used to achieve this goal?

(a) Minimize $J(\theta)$; Gradient Descent (b) Maximize $J(\theta)$; Gradient Descent (c) Minimize $J(\theta)$; K-means clustering (d) Maximize $J(\theta)$; K-means clustering

7. (10%)Which of the following activation functions is known for its ability to mitigate the vanishing gradient problem in deep neural networks?

(a) Sigmoid (b) Tanh (c) ReLU (d) Softmax

8. (10%)What is the primary goal of unsupervised learning?

(a) To predict a target variable (b) To classify data into predefined categories (c) To discover patterns and structures in data (d) To learn from labeled examples

9. (10%)In reinforcement learning, what does Q-learning aim to estimate?

(a) The value of a state (b) The optimal policy (c) The Q-value (action-value function) (d) The reward function

10. (10%)Which algorithm is commonly used for training Support Vector Machines (SVMs), and what is a key characteristic of the resulting decision boundary?

(a) Gradient Descent; Linear (b) K-means clustering; Circular (c) Sequential Minimal Optimization (SMO); Maximal margin (d) Expectation-Maximization (EM); Non-linear