Total No. of Questions : 8]

SEAT No. :

PD-4859

[Total No. of Pages : 3

[6404]-390
B.E. (AI & DS)
DEEP LEARNING
(2019 Pattern) (Semester - VIII) (417532D) (Elective - V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer four questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the basic architecture of a Convolutional Neural Network (CNN) and describe the role of each key component within the architecture. **[9]**

b) Define padding and strides in CNNs, and explain their impact on the output size of feature maps in convolutional layers. **[8]**

OR

Q2) a) Discuss the role of the ReLU layer in CNNs. How does ReLU differ from other activation functions, and why is it preferred in convolutional layers? **[9]**

b) Describe the concept of pooling in CNNs and explain how it contributes to spatial dimensionality reduction. What are some common pooling methods, and how do they differ? **[8]**

Q3) a) Explain the structure of Recurrent Neural Networks (RNNs) and the concept of unfolding computational graphs. How do RNNs handle sequential data, and what challenges arise with long-term dependencies? **[9]**

b) Discuss the Bidirectional RNN and Encoder-Decoder Sequence-to-Sequence Architecture. How do these architectures enhance the ability of RNNs to handle complex sequential tasks? **[9]**

OR

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Q4) a) Outline practical methodologies for evaluating the performance of recurrent neural networks (RNNs). Describe commonly used performance metrics, baseline models, and strategies for selecting hyperparameters in RNN-based models. **[9]**

b) Describe the role of Long Short-Term Memory (LSTM) networks and other gated RNNs in addressing the limitations of standard RNNs. How do LSTM networks manage long-term dependencies, and what are some alternative strategies for handling multiple time scales? **[9]**

Q5) a) What is a deep generative model, and how does it differ from discriminative models? Provide examples of deep generative models and their applications. **[9]**

b) Describe the structure and functioning of a Boltzmann Machine (BM). What is the concept of energy in a Boltzmann Machine, and how does it guide the learning **[8]**

OR

Q6) a) What is a Generative Adversarial Network (GAN), and how do the generator and discriminator networks interact in the GAN framework? Describe their roles and training process. **[9]**

b) Discuss the various types of GAN architectures and provide examples of applications where GANs have proven effective. **[8]**

Q7) a) What is deep reinforcement learning, and how does it extend traditional reinforcement learning techniques? Discuss its significance in AI and real-world applications. **[6]**

b) Explain the concept of a Markov Decision Process (MDP) and describe its components. How does an MDP serve as a foundation for reinforcement learning? **[6]**

c) Describe the basic framework of reinforcement learning, including key concepts such as agents, environments, actions, states, rewards, and policies. **[6]**

OR

Q8) a) What are the main challenges faced in reinforcement learning, and what techniques are commonly used to address them? **[6]**

b) Explain Q-Learning and how Deep Q-Networks (DQN) improve upon traditional Q-Learning for complex environments. **[6]**

c) How can reinforcement learning be applied to solve a simple game like Tic-Tac-Toe? Describe the learning process and strategy. **[6]**

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