2024

UCSE713 NEURAL NETWORK AND DEEP LEARNING

Full Marks: 100 Time: Three hours

*Answer **any five** questions.*

1. a) Explain the similarities and differences between the human brain and artificial neural networks. 10

   b) Describe the main types of network architectures in neural networks and their applications. 10

2. a) Explain the limitations of a single-layer perceptron. Why can't it solve the XOR problem? 10

   b) What is an activation function, and why is it important in neural networks? Describe any two commonly used activation functions. 10

3. a) Describe the backpropagation process in a multilayer perceptron (MLP). Why is gradient descent used in this process? 10

   b) What is a self-organizing map (SOM), and how does it differ from other types of neural networks? 10

4. a) Explain how deep learning differs from traditional machine learning. Provide examples to support your answer. 10

   b) What is a Recurrent Neural Network (RNN), and how does it handle sequential data differently from other neural networks? 10

5. a) What are Long Short-Term Memory (LSTM) networks, and how do they improve upon traditional RNNs? 10

   b) Describe the main components of a Convolutional Neural Network (CNN) and their functions. How are CNNs particularly useful for image processing tasks? 10

6. a) Explain how deep learning is used in image processing. Mention at least two applications and describe how they work. 10

   b) Describe the role of deep learning in natural language processing (NLP). Provide examples of tasks in NLP where deep learning models are particularly effective. 10

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