



ELIZADE UNIVERSITY, ILARA-MOKIN, ONDO STATE
FACULTY OF ENGINEERING
DEPARTMENT OF INFORMATION AND COMMUNICATION
TECHNOLOGY

FIRST SEMESTER EXAMINATION, 2020/2021 ACADEMIC SESSION

COURSE TITLE: ARTIFICIAL NEURAL NETWORKS

COURSE CODE: ECT 413

EXAMINATION DATE: MARCH, 2021

COURSE LECTURER: ENGR. T. T. ADEYEMO

TIME ALLOWED: 3 HOURS

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HOD's SIGNATURE

INSTRUCTIONS:

1. ANSWER FIVE QUESTIONS ONLY
2. SEVERE PENALTIES APPLY FOR MISCONDUCT, CHEATING, POSSESSION OF UNAUTHORIZED MATERIALS DURING EXAM.
3. YOU ARE NOT ALLOWED TO BORROW ANY WRITING MATERIALS DURING THE EXAMINATION.

Question 1

- a. Write short notes on at least five (5) types of Artificial Neural Network (ANN). [5 Marks]
- b. What is an activation function? Define four (4) of the commonly used activation functions in respect to their equations and graphical representations. [5 Marks]
- c. Mention two (2) main methods used in unsupervised learning. [2 Marks]

Question 2

- a. What are the stages involved in training a neural network using Back propagation algorithm? [5 Marks]
- b. Explain the three (3) mode used in dividing a neural network training dataset into batches. [3 Marks]
- c. Explain with the aid of a diagram, the differences between local minima, convergence, and global minima. [4 Marks]

Question 3

- a. Distinguish between ADALINE and MADALINE. [2 Marks]
- b. Discuss the seven (7) major components that make up an artificial neuron. [7 Marks]
- c. Finding the most optimal hyperparameters in machine learning algorithms, discuss briefly three (3) basic methods that can be used. [3 Marks]

Question 4

- a. Distinguish between binary sigmoid function and bipolar sigmoid Functions. [4 Marks]
- b. Define optimization. Discuss the two (2) basic forms of optimization. [3 Marks]
- c. What are the prominent advantages of backpropagation? Discuss briefly the two (2) types of backpropagation neural networks. [5 Marks]

Question 5

- a. Choosing the right activation function, list the basic properties an activation function should possess. [3 Marks]
- b. Write short notes on seven (7) hyper-parameter terms related to neural network structure. [7 Marks]
- c. Calculate the output of a 4-input neuron which has weights 2, 4, 8 and 10. The transfer function is linear with the constant of proportionality being equal to 2. The inputs are 5, 4, 10 and 15 respectively. [2 Marks]

Question 6

- a. Explain chain rule in ANN and mention the overall steps involve in applying it. [4 Marks]
- b. Why are Hyperparameters essential? Mention two (2) benefits of choosing an appropriate hyperparameters for a neural network. [3 Marks]
- c. Explain the basic concept of the following learning rules,
 - i. Perceptron learning rule;
 - ii. Delta learning rule;
 - iii. Hebbian learning rule;
 - iv. Competitive learning rule; and
 - v. Outstar Learning Rule. [5 Marks]

Question 7

- a. What are the factors to consider when choosing and applying a learning algorithm to a neural network? [7 Marks]
- b. Mention three (3) properties of a Feed Forward Neural Network. [3 Marks]
- c. What are the two (2) major choices that must be made when performing Bayesian optimization. [2 Marks]