B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E   **Semester: VI**
Branch: Information Science and Engineering   **Duration: 3 hrs.**
Course Code: 20IS6PEDLG   **Max Marks: 100**
Course: Deep Learning   **Date: 20.09.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) Explain the concept of a Perceptron with a neat diagram. Using suitable equations describe the following: **10**
    i.   Computing the outputs of a fully connected layer.
    ii.   Perceptron learning rule (weight update).

  b) Explain any two popular activation functions with suitable drawings. **05**

  c) Suppose you have an MLP composed of one input layer with 10 passthrough neurons, followed by one hidden layer with 50 artificial neurons, and finally one output layer with 3 artificial neurons. All artificial neurons use the ReLU activation functions. **05**
    1. What is the shape of the input matrix X?
    2. What about the shape of the hidden layer's weight vector Wh, and the shape of its bias vector bh?
    3. What is the shape of the output layer's weight vector Wo, and its bias vector bo?
    4. What is the shape of the network's output matrix Y?
    5. Write the equation that computes the network's output matrix Y as a function of X, Wh, bh, Wo and bo.

OR

2 a) Build a complex model by considering below diagram to handle multiple outputs for Fake News Detection Dataset for the given model parameters: **10**
    i.   suppose we want to send 5 features through the deep path (features 0 to 4), and 6 features through the wide path (features 2 to 7).
    ii.   Activation function: Relu
    iii. Dense layer output units: 30
    iv. loss=mse
    v.   optimizer="sgd"
    vi. epochs: 20
    vii. loss_weights= [0.9, 0.1]
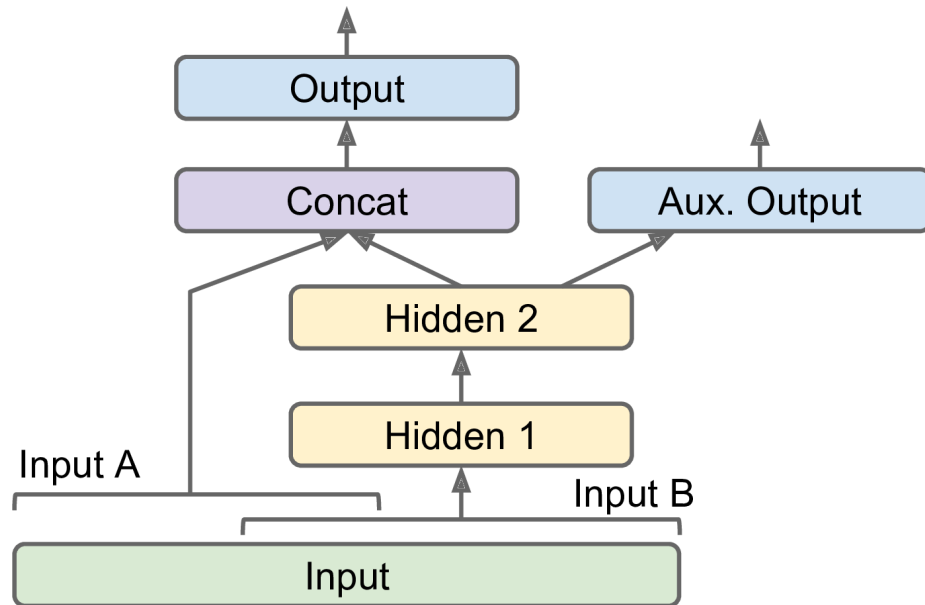
b) Explain the concept of Fine-Tuning Neural Network Hyperparameters for the following: **10**
   i.   Number of Hidden Layers
   ii. Number of Neurons per Hidden Layer

UNIT - II

3 a) Brief out the concept of vanishing gradient problem. Explain the No saturating Activation Functions such as leaky ReLU and ELU. **10**

   b) Deep neural networks prone to overfit, illustrate how dropout and ℓ1 & ℓ2 regularization helps to solve this problem. **10**

UNIT - III

4 a) Define tensor. Explain general architecture of a TensorFlow and describe the following tensor flow operations with suitable examples. **10**
   i.   Tf.constant()
   ii. Tf.square()
   iii. Tf.transpose
   iv. tf.variable()
   v.   tf.RaggedTensor()

   b) Demonstrate computing gradients using autodiff with suitable examples. **10**

OR

5 a) a) Write a python code to explain categorical and cross categorical features. **10**
   b) Explain the ways of encoding categorical features using one hot encoders and word embeddings with suitable python code

   b) Explain how TensorFlow generates graphs using AutoGraph and tracing with the suitable example. **05**

   c) Define protocol buffers. Illustrate with an example. **05**

UNIT - IV

6 a) Identify and describe the architecture that has won the ILSVRC 2012 challenge. **10**

b) Elucidate CNN architecture. Build your own CNN from scratch and try to achieve the highest possible accuracy on fashion MNIST dataset. **10**

UNIT - V

7 a) Explain RNN architecture with suitable diagrams related to input and output sequence. List out the advantages of RNN over feed forward neural networks. **10**

b) Justify and explain how LSTM can maintain information in memory for long periods of time with a neat diagram. **10**

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