|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Roll No |  |  |  |  |  |  |  |  |  |  |  |  |

****

**Presidency University**

**Bengaluru**

**SCHOOL OF COMPUTER SCIENCE AND ENGINEERING**

**MAKEUP EXAMINATION JULY-2024**

**Semester**: VII

**Course Code**: CSE 235

**Course Name**: Introduction to Deep Learning

**Program:** Makeup

**Date**: 8.07.2024

**Time**: 09:30am to 12:30pm

**Max Marks**: 100

**Weightage**:50%

**Instructions:**

1. *Read the all questions carefully and answer accordingly.*
2. *Answers should be precise*

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each question carries Fourmarks. (6Qx 4M=24M)**

1. Discuss the Sigmoid activation function in brief. (C.O.No.1) [Knowledge]
2. Outline the four hyper parameters needed to set before training an Auto.

(C.O.No.2) [Knowledge]

1. Discuss batch normalization. (C.O.No.1) [Knowledge]
2. List the types of RNNs with example applications of each. (C.O.No.2) [Knowledge]
3. State the differences between Machine Learning and Deep Learning. (C.O.No.1) [Knowledge]
4. Briefly describe Hopfield Neural Networks. (C.O.No.2) [Knowledge]

**Part B [Thought Provoking Questions]**

**Answer all the Questions. Each question carries Eight marks. (5Qx8M=40M)**

1. An AI/ML startup has bagged a project which requires watermark removal as one of the tasks. Describe the architecture of the specific unsupervised deep neural network that is suitable for purpose. Answer should be accompanied with a relevant diagram.

(C.O.No.3) [Comprehension]

1. “The backpropagation in RNN is not same as backpropagation in feed forward networks”- Review the statement with proper explanation. (C.O.No.2) [Comprehension]
2. A model needs to be built for a long-term time-series event prediction. Explain the architecture of the appropriate supervised deep neural net for the purpose with relevant diagram. Also write the expressions related to the architecture. (C.O.No.3) [Comprehension]
3. Identify the unsupervised deep neural network that is suitable for collaborative filtering and topic modelling. Discuss the architecture in brief with a relevant diagram. (C.O.No.2) [Comprehension]
4. Model weights grow exponentially and become NaN in the training phase. Identify the problem and summarize few solutions. (C.O.No.2) [Comprehension]

**Part C [Problem Solving Questions]**

**Answer all the Questions. Each question carries Twelve marks. (3Qx12M=36M)**

12. Given the following artificial neural network, using Sigmoid as the activation function in both hidden and output layers, answer the following for 1 epoch.

**i1  = 2**

**i2 = 1**

**w1  = 0.1**

**w2  =0.2**

**w3  = 0.3**

a) Find the predicted output for the inputs i1=2 and i2=1

b) Calculate the error assuming the actual output as 0.2

c) Using backpropagation, find the updated weights after the first epoch, assuming learning rate=0.05 (C.O.No.3) [Application]

13. Apply the filter on the given input image and perform convolution operation with stride 1. Show the resulting feature matrix. Also, demonstrate result after applying Relu activation function. Then apply average pooling of window size 2X2 with stride 1 and show the final result after flattening.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Input image | | | | | | |
| 3 | 4 | 0 | 5 | 7 | 6 | 2 |
| 2 | 1 | 8 | 6 | 2 | 9 | 1 |
| 8 | 9 | 6 | 2 | 8 | 4 | 5 |
| 4 | 7 | 6 | 3 | 2 | 9 | 1 |
| 0 | 5 | 3 | 7 | 5 | 7 | 0 |
| 3 | 2 | 5 | 1 | 6 | 3 | 9 |
| 5 | 3 | 6 | 7 | 5 | 0 | 8 |

|  |  |  |
| --- | --- | --- |
| Filter | | |
| 1 | 0 | -1 |
| 1 | 0 | -1 |
| 1 | 0 | -1 |

14. Construct KSOM on the input 1110 and 0011.

Number of clusters are 2

Learning rate: 0.5

Initial weight matrix: 0.1 0.2

0.3 0.4

0.5 0.6

0.7 0.8

Find the cluster to which the pattern 1001 belongs to. (C.O.No.3) [Application]