Birla Institute of Technology and Sciences, Pilani

Comprehensive Examination 2023

Subject: Deep Learning for Business (MPBA –G514) (Part-A)

Duration: 45mins

Full Marks = 20

Name: …….. Roll No ……

Instructions

- *Choose the correct option from the multiple choice questions.*
- *Mark the correct option in the boxes given below.*

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
11.	12.	13.	14.	15.	16.	17.	18.	19.	20.

1. **What is the primary purpose of dropout in neural networks?**
   A) Increase training speed
   B) Reduce overfitting
   C) Enhance convergence
   D) Boost model complexity

2. **During training, which units are randomly deactivated in dropout?**
   A) All units
   B) Input units
   C) Hidden units
   D) Output units

3. **Which regularization technique is dropout often compared to?**
   A) L1 regularization
   B) L2 regularization
   C) Batch normalization
   D) Weight tying

4. **How does dropout simulate model averaging?**
   A) By training multiple independent models
   B) By randomly deactivating neurons
   C) By adjusting learning rates
   D) By increasing layer width

5. **What parameter controls the fraction of dropped-out neurons in dropout?**
   A) Learning rate
   B) Momentum
   C) Dropout rate

D) Batch size

6. **What is the primary advantage of LSTM networks over traditional RNNs?**
   A) Improved training speed
   B) Better handling of long-term dependencies
   C) Simpler architecture
   D) Lower memory requirements

7. **Which component of an LSTM is responsible for remembering and forgetting information?**
   A) Input gate
   B) Output gate
   C) Forget gate
   D) Memory cell

8. **In an LSTM, what is the purpose of the hidden state**?
   A) Store long-term information
   B) Make predictions
   C) Update weights
   D) Capture short-term dependencies

9. **Which of the following is a potential application where LSTMs excel?**
   A) Image classification
   B) Sentiment analysis
   C) Audio synthesis
   D) Tabular data processing

10. **What problem does the vanishing gradient issue in traditional RNNs cause, which LSTMs address?**
    A) Slow training
    B) Overfitting
    C) Difficulty in learning long-range dependencies
    D) Lack of parallelization

11. **What is the primary advantage of using convolutional layers in CNNs for image processing?**
    A) Faster training
    B) Increased interpretability
    C) Capturing local spatial patterns
    D) Better handling of temporal data

12. **In CNNs, what does the pooling layer do?**
    A) Increases spatial resolution
    B) Reduces the number of parameters
    C) Reduce spatial dimension
    D) Applies convolution operations

13. **What is the purpose of stride in convolutional layers?**
    A) Controls the size of the filter
    B) Adjusts the learning rate
    C) Defines the step size of the filter

D) Sets the dropout rate

14. In CNNs, what is the purpose of the activation function in the convolutional layers?

A) Control overfitting
B) Reduce spatial dimensions
C) Introduce non-linearity
D) Define filter parameters

15. In transfer learning with CNNs, what is typically re-used from a pre-trained model?

A) Pooling layers
B) Fully connected layers
C) Convolutional layers
D) Activation functions

16. What is the primary challenge of traditional RNNs when learning sequential data?

A) Difficulty in parallelization
B) Lack of activation functions
C) Vanishing gradient problem
D) Excessive memory requirements

17. How do LSTMs address the vanishing gradient problem in traditional RNNs?

A) By using different activation functions
B) By introducing pooling layers
C) By adding skip connections
D) By incorporating a memory cell

18. What is the role of the hidden state in an RNN?

A) Store long-term information
B) Make predictions
C) Update weights
D) Capture short-term dependencies

19. Which type of neural network is best suited for tasks involving sequential data, such as time-series prediction?

A) CNN
B) RNN
C) LSTM
D) Autoencoder

20. What problem does the vanishing gradient issue in traditional RNNs cause, hindering their ability to capture long-term dependencies?

A) Slow convergence
B) Difficulty in training
C) Increased memory usage
D) Lack of parallelization

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Comprehensive Examination 2023

Subject: Deep Learning for Business (MPBA –G514) (Part-B)

Duration: 2hrs 15mins

Full Marks = 60

Answer any **FOUR** Questions

1.
   a. What is feature co-adaptation? How it affects neural models? (4+4)

   b. What is dropout? How does dropout help in neural network model training? (3+4)

2.
   a. Draw a simple RNN network and define its workings. Discuss the limitations of traditional RNN. Discuss any advancements or alternative architectures that address these limitations. (6+3+2)

   b. Explain why Recurrent Neural Networks (RNNs) are often referred to as "time-layered" networks. (4)

3.
   a. Discuss about different gates and states in LSTM architecture. (8)

   b. Mention the tasks where LSTMs have shown significant success in general. Explain how the unique properties of LSTMs contribute in these applications. (3+4)

4.
   a. What are the basic difference between GRU and LSTM? What is convolution operation? (4+4)

   b. What will be the output size of convolution operation of 64x64 image with a filter size of 5x5? What will be the output size if stride of 2 is being used? (4+3)

5.
   a. Illustrate the workings of the RNN in next word prediction task with an example sentence. (8)

   b. What is the need of padding in CNN? Discuss the purpose of pooling layer in CNN architecture. (3+4)