Unit 03:

RNN and CNN

CNN (Convolution Neural Network)

https://medium.com/inveterate-learner/deep-learning-book-chapter-9-convolutional-networks-45e43bfc718d

https://cedar.buffalo.edu/~srihari/CSE676/9.0%20CNN-Overview.pdf

Convolutional Neural Networks, Explained | Towards Data Science

Reference Questions(All the answers have a weightage of 5Marks) please refer the above links for more content. Questions might be asked on the above topic

1. What is convolution neural network? Explain the convolution operation with the help of a diagram.
2. Explain in brief: Sparse Interactions and Parameter Sharing.
3. What is pooling? What are the various types of pooling?
4. Describe the variation in convolution functions
5. What is a weight prior?
6. Compare ANN with CNN
7. What are the various data types used in CNN based on the number of spatial dimensions and channels?
8. Design a CNN for MNIST dataset. Convolutional Neural Networks, Explained | Towards Data Science

Convolution

larly convolutional neural networks (CNNs), a convolution is a mathematical operation that acts as a filter to extract specific features from input data, such as images. This process involves sliding small matrices called filters or kernels across the input data, performing element-wise multiplication and summing the results to create a feature map. By using multiple filters, a CNN can learn to detect increasingly complex features, like edges, textures, and ultimately, objects.

Deep Learning

Explain in brief about:

1. Padding
2. Onehot encoding
3. Convolution
4. Stride
5. Kernel/ Filter
6. Application of CNN

RNN(Recurrent Neural Network)

Chapter 10: DeepNLP - Recurrent Neural Networks with Math. | by Madhu Sanjeevi (Mady) | Deep Math Machine learning.ai | Medium concept, diagram and equation

Building a Recurrent Neural Network From Scratch | by Long Nguyen | Medium example and one hot encoding

https://github.com/VikParuchuri/zero_to_gpt/blob/master/explanations/rnn.ipynb for practical forward and backward pass

https://youtu.be/atYPhweJ7ao?si=OC11mqj2NyDxvz1H Bidirectional RNN

Q.1 Explain RNN with an example.
2. Explain the architecture of RNN
3. Compare and contrast RNN with CNN
4. What is forward pass and backward pass in RNN? Explain with the help of code.
5. Explain in brief: one hot encoding and back propagation through time.
6. Demonstrate Bidirectional RNN with a suitable diagram.
https://www.scaler.com/topics/deep-learning/bidirectional-rnn/

GRU (Gated Recurrent Unit)

Understanding Gated Recurrent Unit (GRU) in Deep Learning | by Anishnama | Medium (study all the gates of GRU, LSTM and RNN)

1. What is Gated Recurrent Unit(GRU) ?
2. How GRU Works?
3. Explain GRU Architecture with diagram.
4. What are the Pros and Cons of GRU?

LSTM(Long Short-Term Memory Networks)

Introduction to Long Short-Term Memory(LSTM) | Simplilearn.

1. What is LSTM?
2. Types of Gates in LSTM
3. Structure of LSTM
4. Applications of LSTM
5. Compare LSTM with RNN

Bi-LSTM(Bidirectional Long Short-Term Memory Networks)

Bidirectional RNN | BiLSTM | Bidirectional LSTM | Bidirectional GRU

Understanding Bidirectional LSTM for Sequential Data Processing | by Anishnama | Medium

1. What is Bi-LSTM and How it works?
2. Explain the architecture of Bi-LSTM with a proper diagram.
3. What are the Pros and Cons of using Bidirectional- LSTM?
4. Write the Python Implementation of Bi-LSTM using the Keras library.
5. Compare the pros and cons of Bi-LSTM and LSTM.