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EC - 733 DeepLearning & AI for VLSI

Attempt all the questions. Steps and calculations carry marks

29/11/22

(10)

Max time: 180mins

Max Marks: 50

1. Explain the concept of "deep learning" and how it differs from traditional machine learning. Discuss the advantages and limitations of deep learning and provide examples of problems where deep learning is particularly effective. Give one example of a VLSI dataset where deeplearning is effective compared to machine learning methods. [10]
2. Discuss the backpropagation algorithm and its role in training deep neural networks. How do optimization algorithms like SGD, mini-batch, batch differ, and in what scenarios might one be preferred over the others? [10]
3. You are given a waveform dataset which has varied sequence lengths. The sequence length is between 5 and 10. Discuss data preparation steps to clean and pre-process the data. Build an RNN model to predict the next sequence, given the current sequence. Discuss the various things to consider while building the model and all the elements in the model. Assume any other information required and mention them before discussion. [10]
4. Consider the CNN model below. Discuss about what the model can do and cannot do, for what kind of data, input and output. If something has to be fixed, show what and why. Calculate the parameters in each layer and the input and output share for each layer. [10]

```
model = Sequential()  
model.add(Conv2D(32, kernel_size=(3, 3), activation='sigmoid', input_shape=(64, 64, 3)))  
model.add(MaxPooling2D(pool_size=(2, 2)))  
model.add(Conv2D(64, kernel_size=(3, 3), activation='sigmoid'))  
model.add(MaxPooling2D(pool_size=(2, 2)))  
model.add(Flatten())  
model.add(Dense(128, activation='sigmoid'))  
model.add(Dense(20, activation='sigmoid')) # Assuming a 20-class classification problem
```

5. Write detailed notes on autoencoders. Explain their purpose and their applications. Build a cnn based autoencoder with at least 6 layers for cifar dataset using keras. Draw a diagram with layers to show the shape of each layer. [10]