Concept Quiz Over Week 7 Material

Due Nov 19 at 11:59pm **Points** 1 **Questions** 8
Available Nov 15 at 11:15am - Nov 19 at 11:59pm **Time Limit** None

Score for this survey: **1** out of 1
Submitted Nov 18 at 6:45pm
This attempt took 1,861 minutes.

Question 1

We've discussed training neural networks with gradient descent. To compute the gradients of the loss with respect to our parameters, we proposed the backpropagation algorithm. Explain the benefits of backpropagation.

Your Answer:

The benefits of backpropagations are it can help neural networks adjust the weights and biases to optimal(minimal), also the method is straightforward to program, when we train the neural network, we can avoid repeat computations.

Backpropagation is an efficient way to compute gradients of the loss with respect to model parameters. Firstly, it is a reverse-mode differentiation and computes the product of intermediate Jacobians from the output of the network backwards -- reducing cost of matrix multiplication in computing gradients. Secondly and more important, the backwards pass allows us to store and reuse loss gradients as we work our way backwards through the network.

Question 2

What is a Jacobian?

Your Answer:

Jacobian is the matrix of a vector-valued function (https://en.wikipedia.org/wiki/Vector-valued_function) of several variables and is the matrix of all its first-order partial derivatives.

We refer to the gradient of vector-valued functions with respect to vector inputs as a Jacobian matrix. If y(x) is a function that outputs a vector given an input vector x, then the Jacobian dy(x)/dx would be a matrix where the i,j'th entry would be the partial derivative of the i'th element of y(x) with respect to the j'th element of x.

Question 3

Neural networks are universal approximators regardless of their size.

- True
- False

ou Answered

False. For any given function and error tolerance, there exists a neural network of finite size that achieves that level of error; however, a fixed-size network may or may not be large enough for any given function.

Question 4

What is a computational graph and how can it be used to implement backpropagation?

Your Answer:

A computation graph is an acyclic graph with vertices corresponding to computation and edges to intermediate results of the computation.

A computational graph is a directed acyclic graph with node corresponding to units of computation and edges corresponding to the results of these computations. If each node implements both a forward and backward (i.e. computing a Jacobian of output with respect to input) operation, then the graph can be used to calculate derivatives of the output of arbitrary combinations of operations via backpropagation.

Question 5

Convolutional neural networks make the assumption that relevant features in an input can be found by examining local regions of the input -- e.g. windows of time in a sequence or regions of an image.

ou Answered

- (●) True
- ( ) False

True! The locality assumption is a key part of convolutional neural networks.

True

Question 6

Decision trees are composed of internal nodes that provide label outputs and leaf nodes that implement tests to divide datapoints.

ou Answered

- (●) True
- ( ) False

False. The other way around -- internal nodes implement tests to divide datapoints and leaf nodes are labels.

Question 7

Splits in standard decision trees can be diagonal lines.

- ( ) True

ou Answered

- (●) False

False. In standard decision trees, the splits are axis-aligned because they test only single attributes.

Question 8

Finding a decision tree with minimum depth that achieves minimum error on training data has polynomial computational complexity.

- True
- False

ɔu Answered

False. This problem is NP-Hard because all possible combinations of tree structures need to be considered.

Survey Score: 1 out of 1