EE628WS Midterm

Name:

Q1. Which of the following statement(s) correctly represents a concept of neuron?

(a) A neuron has a single input and a single output only

(b) A neuron has multiple inputs but a single output only

(c) A neuron has a single input but multiple outputs

(d) A neuron has multiple inputs and multiple outputs

(e) All of the above statements are valid

Q2.

- Once a dataset's dimensionality has been reduced, is it possible to reverse the operation? If so, how? If not, why?
- Can principal component analysis (PCA) can be used to reduce the dimensionality of a highly nonlinear dataset? Justify your answer.
- Does it make sense to chain two different dimensionality reduction algorithm?

Q3. In a neural network, knowing the weight and bias of each neuron is the most important step. If you can somehow get the correct value of weight and bias for each neuron, you can approximate any function. What would be the best way to approach this?

(a) Assign random values and pray to God they are correct

(b) Search every possible combination of weights and biases till you get the best value

(c) Iteratively check that after assigning a value how far you are from the best values, and slightly change the assigned values values to make them better

(d) None of these

Q4.

- For a fully-connected deep network with one hidden layer, increasing the number of hidden units should have what effect on bias and variance? Explain briefly.

Q5. What are the steps for using a gradient descent algorithm?

1. Calculate error between the actual value and the predicted value
2. Reiterate until you find the best weights of network
3. Pass an input through the network and get values from output layer
4. Initialize random weight and bias
5. Go to each neurons which contributes to the error and change its respective values to reduce the error

(a) 1, 2, 3, 4, 5

(b) 5, 4, 3, 2, 1

(c) 3, 2, 1, 5, 4

(d) 4, 3, 1, 5, 2

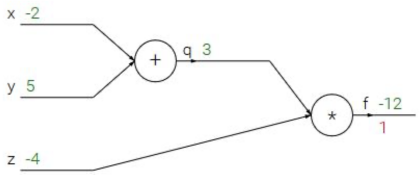
Q.6 Choose the true statements about text tokens:

(a) Stemming can be done with heuristic rules

(b) Lemmatization is always better than stemming

(c) Lemmatization needs more storage than stemming to work

(d) A model without stemming/lemmatization can be the best



Q7. Suppose you have inputs as x, y, and z with values -2, 5, and -4 respectively. You have a neuron "q" and neuron "f" with functions:

$$q = x + y$$
$$f = q * z$$

Graphical representation of the functions is as above:

What is the gradient of f with respect to x, y, and z?

(HINT: To calculate gradient, you must find $(df/dx), (df/dy) and (df/dz)$)

(a) (-3, 4, 4)

(b) (4, 4, 3)

(c) (-4, -4, 3)

(d) (3, -4, -4)

Q8. Which of the following gives non-linearity to a neural network?

(a) Stochastic Gradient Descent

(b) Rectified Linear Unit

(c) Convolution function

(d) None of the above

Q9. Which gradient technique is more advantageous when the data is too big to handle in RAM simultaneously?

(a) Full Batch Gradient Descent

(b) Stochastic Gradient Descent

Q10. Which of the following is true about model capacity (where model capacity means the ability of neural network to approximate complex functions) ?

(a) As number of hidden layers increase, model capacity increases

(b) As dropout ratio increases, model capacity increases

(c) As learning rate increases, model capacity increases

(d) None of these

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