Week 5 Graded Quiz

Total points 12/15

Topics: Neural Networks and Unsupervised Learning

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12 of 15 points

✓ In a feedforward neural network, which of the three nodes is responsible for the calculations and has no interaction with the outside world? * 1/1

- ○ Input node
- ◉ Hidden node ✓
- ○ Output node
- ○ Radial node

✗ Since computers can only understand binary code, what had to be introduced so that a machine could interpret the human language? * 0/1

- ○ Word vectors
- ○ Neural networks
- ○ Machine learning
- ◉ Deep learning ✗

✓ 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? * 1/1

- 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

✓ 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 * 1/1

- A. 1, 2, 3, 4, 5
- B. 5, 4, 3, 2, 1
- C. 3, 2, 1, 5, 4
- D. 4, 3, 1, 5, 2 ✓

✓ A neural network is a (crude) mathematical representation of a brain, which consists of smaller components called neurons.Each neuron has an input, a processing function, and an output.These neurons are stacked together to form a network, which can be used to approximate any function.To get the best possible neural network, we can use techniques like gradient descent to update our neural network model.Given above is a description of a neural network. When does a neural network model become a deep learning model? * 1/1

- (●) A. When you add more hidden layers and increase depth of neural network ✓
- ( ) B. When there is higher dimensionality of data
- ( ) C. When the problem is an image recognition problem
- ( ) D. None of these

✓ Can a neural network model the function (y=1/x)? * 1/1

- (●) A. Yes ✓
- ( ) B. No

✓ Instead of trying to achieve absolute zero error, we set a metric called bayes error which is the error we hope to achieve. What could be the reason for using bayes error? * 1/1

- ( ) A. Input variables may not contain complete information about the output variable

B. System (that creates input-output mapping) may be stochastic

C. Limited training data

D. All the above ✓

✓ The number of neurons in the output layer should match the number of classes (Where the number of classes is greater than 2) in a supervised learning task. True or False? * 1/1

A. True

B. False ✓

✓ What is a dead unit in a neural network? * 1/1

A. A unit which doesn't update during training by any of its neighbour ✓

B. A unit which does not respond completely to any of the training patterns

C. The unit which produces the biggest sum-squared error

D. None of these

✓ For a classification task, instead of random weight initializations in a neural network, we set all the weights to zero. Which of the following statements is true? * 1/1

A. There will not be any problem and the neural network will train properly

B. The neural network will train but all the neurons will end up recognizing the same thing ✓

C. The neural network will not train as there is no net gradient change

D. None of these

✓ Which of the following is a reasonable way to select the number of principal components k?(Recall that n is the dimensionality of the input data and m is the number of input examples.) * 1/1

- (●) Choose k to be the smallest value so that at least 99% of the variance is retained. ✓
- ( ) Choose k to be the smallest value so that at least 1% of the variance is retained.
- ( ) Choose k to be 99% of n (i.e., k = 0.99 ∗ n, rounded to the nearest integer).
- ( ) Choose k to be the largest value so that at least 99% of the variance is retained
- ( ) Use the elbow method.
- ( ) Choose k to be 99% of m (i.e., k = 0.99 ∗ m, rounded to the nearest integer).

✓ Which of the following are recommended applications of PCA? Select all that apply. * 1/1

- [ ] To get more features to feed into a learning algorithm.
- [x] Data compression: Reduce the dimension of your data, so that it takes up less memory / disk space. ✓
- [ ] Preventing overfitting: Reduce the number of features (in a supervised learning problem), so that there are fewer parameters to learn.
- [x] Data visualization: Reduce data to 2D (or 3D) so that it can be plotted. ✓
- [x] Data compression: Reduce the dimension of your input data x^{(i)}, which will be used in supervised learning algorithm (i.e., use PCA so that your supervised learning algorithm runs faster). ✓
- [ ] As a replacement for (or alternative to) linear regression: For most learning applications, PCA and linear regression give sustantially similar results.
- [ ] Data visualization: To take 2D data, and find a different way of plotting it in 2D (using

k=2)

✗ A two layer (one input layer, one output layer; no hidden layer) neural network can represent the XOR function. * 0/1

- (●) True ✗
- ( ) False

✗ The activation values of the hidden units in a neural network, with the sigmoid activation function applied at every layer, are always in the range (0, 1). * 0/1

- ( ) True
- (●) False ✗

✓ Any logical function over binary-valued (0 or 1) inputs x1 and x2 can be (approximately) represented using some neural network. * 1/1

- (●) True ✓
- ( ) False

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