Business analytics and data mining Modeling using R: Week-11

09 April 2023 08:03

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Assessment scores

Week 1 : Assignment 1: **95.0**
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Week 4 : Assignment 4: **100.0**
Week 5 : Assignment 5: **100.0**
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Week 8: Assignment 8: **100.0**
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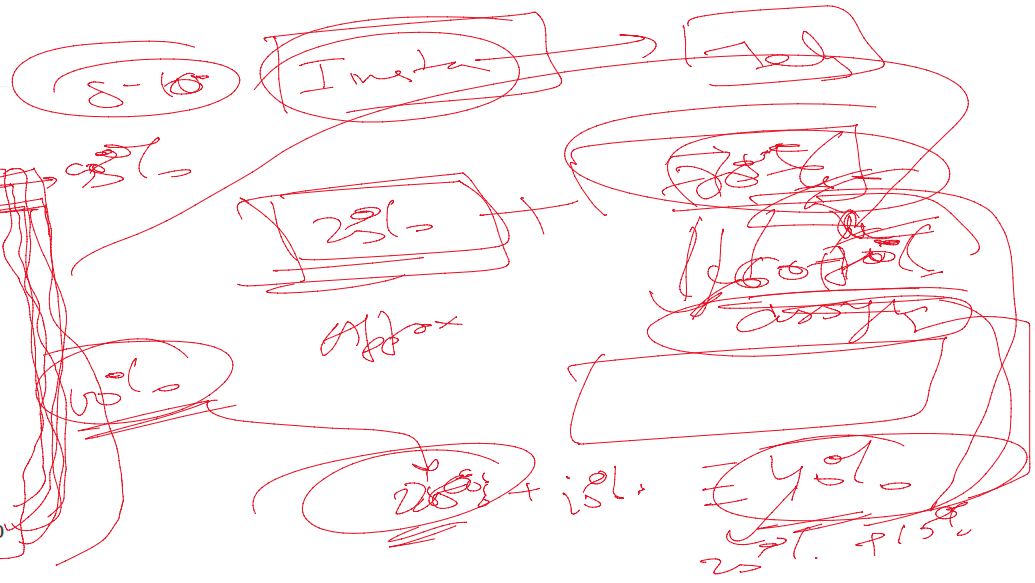

1) What is the backpropagation algorithm?

- ○ It is another name given to the curvy function in the perceptron
- ○ It is the transmission of error back through the network to adjust the inputs
- ○ It is the transmission of error back through the network to allow weights to be adjusted so that the network can learn
- ○ None of the above

(C)

C) It is the transmission of error back through the network to allow weights to be adjusted so that the network can learn.

The backpropagation algorithm is a widely used method for training artificial neural networks. It is a supervised learning algorithm that works by iteratively adjusting the weights of the network based on the error between the actual output and the desired output. In backpropagation, the error is propagated backwards through the network from the output layer to the input layer, allowing the weights to be adjusted in a way that minimizes the error.

2) Which of the following defines neural networks?

- ☐ Complex linear functions with many parameters
- ☐ Complex nonlinear functions with many parameters
- ☐ Complex discrete functions with many parameters
- ☐ None of the above

(A,B,C)

Neural networks are a type of machine learning model that are inspired by the structure and function of the human brain. They consist of layers of interconnected nodes, or neurons, that process information and learn to make predictions or decisions based on input data. Neural networks are capable of modeling complex nonlinear relationships between inputs and outputs, and they typically have many parameters that are adjusted during training to improve their performance on a given task. Therefore, option B, complex nonlinear functions

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3) Which of the following can be an application of neural network?

- [ ] Sales forecasting
- [ ] Fact checking
- [ ] Risk analysis
- [ ] None of the above

(A,B,C)

A) Sales forecasting, B) Fact checking, and C) Risk analysis can all be applications of neural networks.

Neural networks can be used in a wide range of applications, including but not limited to:

- Sales forecasting: Neural networks can analyze past sales data to predict future sales trends and improve inventory management.
- Fact checking: Neural networks can be trained to detect fake news and misinformation by analyzing large amounts of text data.
- Risk analysis: Neural networks can be used in finance and insurance industries to assess risk, identify fraud, and predict market trends.

Therefore, options A, B, and C are all correct answers.

4) Which of the following is true about multilayer feedforward neural networks?

- ○ Not fully connected
- ○ Same transfer or activation function in each layer
- ○ Only one hidden layer is allowed
- ○ None of the above

(D): None of the above

5) Which of the following does not happen in the backpropagation algorithm?

- ○ Error in output is propagated backwards to update weight values
- ○ Error in output is propagated backwards to update bias values
- ○ Backpropagation is done iteratively for many epochs
- ○ None of the above

(D): None of the above

6) Which of the following is not true about multilayer feedforward neural networks?

- ○ Consists of three main types of layers
- ○ Input layer typically has input nodes equal to the number of input features
- ○ Hidden layers are allowed a fixed number of nodes only
- ○ None of the above

(C):

C) Hidden layers are allowed a fixed number of nodes only is not true about multilayer feedforward neural networks.

Multilayer feedforward neural networks, also known as multilayer perceptrons (MLPs), consist of an input layer, one or more hidden layers, and an output layer. The input layer typically has input nodes equal to the number of input features, and the output layer has nodes equal to the number of output features. The number of nodes in the hidden layers can vary and is typically determined by experimentation and tuning.

Therefore, option C is the incorrect answer, and options A, B, and D are all true about multilayer feedforward neural networks.

7) Which of the following is the most commonly used neural network architecture among feedforward networks?

- ○ Multi layer perceptron
- ○ Perceptron
- ○ Radial basis function network
- ○ None of the above

(A)

A) Multi layer perceptron is the most commonly used neural network architecture among feedforward networks.

The multi-layer perceptron (MLP) is the most commonly used feedforward neural network architecture, and it is widely used in many applications such as image recognition, natural language processing, and speech recognition. MLPs consist of multiple layers of nodes, or neurons, with connections between adjacent layers. In MLPs, each neuron in a layer is connected to every neuron in the next layer, but not necessarily to every neuron in the previous layer. MLPs can have multiple hidden layers, although the number of hidden layers is typically smaller than the number of input or output layers.

Option B, Perceptron, is a single-layer feedforward neural network and is a simple type of neural network that can only be used for linearly separable data. Option C, Radial basis function network, is another type of neural network that is used for clustering, classification, and function approximation, but it is not a feedforward network architecture.

Therefore, option A is the correct answer.

8) For which of the following neural networks, information does not move only in one direction?

- ○ Multi layer perceptron
- ○ Feedforward network
- ○ Recurrent neural network
- ○ None of the above

(C)

C) Recurrent neural network (RNN) is the type of neural network for which information does not move only in one direction.

In a feedforward neural network, also known as a multi-layer perceptron, information flows only in one direction, from the input layer to the output layer. Each layer processes the information from the previous layer and passes it to the next layer until it reaches the output layer.

In contrast, in a recurrent neural network (RNN), the output of a neuron is fed back to itself and to other neurons in the same layer or previous layers, creating a loop that allows information to be stored and used over time. RNNs are commonly used in applications where the input data is a sequence, such as speech recognition, natural language processing, and time series analysis.

Therefore, option C is the correct answer.

9) Which of the following is the recommended data normalization in neural networks?

- ○ Z-score normalization or standardization
- ○ Min-max normalization
- ○ Both of them
- ○ None of the above

(B)

Normalization is a technique used to scale numerical data to a specific range or distribution. It is an important preprocessing step in many machine learning algorithms, including neural networks.

Min-max normalization, also known as feature scaling, is one of the most commonly used normalization techniques in machine learning. It scales the data to a fixed range between 0 and 1 by subtracting the minimum value of the feature and dividing by the difference between the maximum and minimum values. The formula for min-max normalization is:

X_norm = (X - X_min) / (X_max - X_min)

where X is the original feature, X_min and X_max are the minimum and maximum values of the feature, and X_norm is the normalized feature.

The advantage of min-max normalization is that it preserves the relative relationships between the data points, which can be important in some applications. However, it can be sensitive to outliers and can compress data that has a wide range of values.

Z-score normalization or standardization is another commonly used normalization technique in neural networks. It transforms the data to have a mean of zero and a standard deviation of one by subtracting the mean and dividing by the standard deviation of the feature. This technique is recommended for data that is normally distributed and can help to reduce the impact of outliers.

In summary, both min-max normalization and z-score normalization are commonly used in neural networks, and the choice between them depends on the characteristics of the data being used.

10) What is the transfer function?

- ○ It is used to add noise in the feedforward neural networks
- ○ It is the transmission of error back through the network to adjust the inputs
- ○ It is applied on the weighted sum of incoming values to produce the outgoing values for a layer
- ○ None of the above

(C)

C) It is applied on the weighted sum of incoming values to produce the outgoing values for a layer.

The transfer function, also known as the activation function, is a mathematical function that is applied to the weighted sum of the inputs of a neuron to produce its output. The purpose of the activation function is to introduce nonlinearity into the network, allowing it to learn complex patterns in the data.

The activation function takes the weighted sum of the inputs, adds a bias term, and applies a non-linear transformation to produce the output. The output of the activation function is then passed on to the next layer of the network.

There are many different types of activation functions that can be used in neural networks, including sigmoid, tanh, ReLU, and softmax. Each activation function has its own strengths and weaknesses, and the choice of activation function depends on the specific problem being solved.

In summary, the transfer function is a key component of neural networks, as it allows the network to introduce nonlinearity and learn complex patterns in the data.