Package 'deepnet'

October 13, 2022

Type Package

Title Deep Learning Toolkit in R

Version 0.2.1

Date 2014-03-20

Author Xiao Rong

Maintainer Xiao Rong <runxiao@gmail.com>

Description Implement some deep learning architectures and neural network algorithms, including BP,RBM,DBN,Deep autoencoder and so on.

License GPL

NeedsCompilation no

Repository CRAN

Date/Publication 2022-06-24 12:29:27 UTC

R topics documented:

dbn.dnn.train *Training a Deep neural network with weights initialized by DBN*

Description

Training a Deep neural network with weights initialized by DBN

Usage

```
dbn.dnn.train(x, y, hidden = c(1), activationfun = "sigm", learningrate = 0.8,
    momentum = 0.5, learningrate_scale = 1, output = "sigm", numepochs = 3,
    batchsize = 100, hidden_dropout = 0, visible_dropout = 0, cd = 1)
```

Arguments

x	matrix of x values for examples
y	vector or matrix of target values for examples
hidden	vector for number of units of hidden layers.Default is c(10).
activationfun	activation function of hidden unit.Can be "sigm","linear" or "tanh".Default is "sigm" for logistic function
learningrate	learning rate for gradient descent. Default is 0.8.
momentum	momentum for gradient descent. Default is 0.5 .
learningrate_scale	learning rate will be mutiplied by this scale after every iteration. Default is 1 .
numepochs	number of iteration for samples Default is 3.
batchsize	size of mini-batch. Default is 100.
output	function of output unit, can be "sigm","linear" or "softmax". Default is "sigm".
hidden_dropout	drop out fraction for hidden layer. Default is 0.
visible_dropout	drop out fraction for input layer Default is 0.
cd	number of iteration for Gibbs sample of CD algorithm.

Author(s)

Xiao Rong

Examples

```
Var1 <- c(rnorm(50, 1, 0.5), rnorm(50, -0.6, 0.2))
Var2 <- c(rnorm(50, -0.8, 0.2), rnorm(50, 2, 1))
x <- matrix(c(Var1, Var2), nrow = 100, ncol = 2)
y <- c(rep(1, 50), rep(0, 50))
dnn <- dbn.dnn.train(x, y, hidden = c(5, 5))
## predict by dnn
```

```
test_Var1 <- c(rnorm(50, 1, 0.5), rnorm(50, -0.6, 0.2))
test_Var2 <- c(rnorm(50, -0.8, 0.2), rnorm(50, 2, 1))
test_x <- matrix(c(test_Var1, test_Var2), nrow = 100, ncol = 2)
nn.test(dnn, test_x, y)
```

`load.mnist` *Load MNIST DataSet*

Description

Load MNIST DataSet

Usage

```
load.mnist(dir)
```

Arguments

`dir`	dir of minst dataset

Value

mnist dataset train$n number of train samples train$x pix of every train sample image train$y label of every train sample image train$yy one-of-c vector of label of train sample image test$n number of test samples test$x pix of every test sample image test$y label of every test sample image test$yy one-of-c vector of label of test sample image

Author(s)

Xiao Rong

`nn.predict` *Predict new samples by Trainded NN*

Description

Predict new samples by Trainded NN

Usage

```
nn.predict(nn, x)
```

Arguments

`nn`	nerual network trained by function nn.train
`x`	new samples to predict

Value

return raw output value of neural network.For classification task,return the probability of a class

Author(s)

Xiao Rong

Examples

```
Var1 <- c(rnorm(50, 1, 0.5), rnorm(50, -0.6, 0.2))
Var2 <- c(rnorm(50, -0.8, 0.2), rnorm(50, 2, 1))
x <- matrix(c(Var1, Var2), nrow = 100, ncol = 2)
y <- c(rep(1, 50), rep(0, 50))
nn <- nn.train(x, y, hidden = c(5))
## predict by nn
test_Var1 <- c(rnorm(50, 1, 0.5), rnorm(50, -0.6, 0.2))
test_Var2 <- c(rnorm(50, -0.8, 0.2), rnorm(50, 2, 1))
test_x <- matrix(c(test_Var1, test_Var2), nrow = 100, ncol = 2)
yy <- nn.predict(nn, test_x)
```

---

nn.test *Test new samples by Trainded NN*

Description

Test new samples by Trainded NN,return error rate for classification

Usage

```
nn.test(nn, x, y, t = 0.5)
```

Arguments

nn	nerual network trained by function nn.train
x	new samples to predict
y	new samples' label
t	threshold for classification. If nn.predict value >= t then label 1,else label 0

Value

error rate

Author(s)

Xiao Rong

Examples

```
Var1 <- c(rnorm(50, 1, 0.5), rnorm(50, -0.6, 0.2))
Var2 <- c(rnorm(50, -0.8, 0.2), rnorm(50, 2, 1))
x <- matrix(c(Var1, Var2), nrow = 100, ncol = 2)
y <- c(rep(1, 50), rep(0, 50))
nn <- nn.train(x, y, hidden = c(5))
test_Var1 <- c(rnorm(50, 1, 0.5), rnorm(50, -0.6, 0.2))
test_Var2 <- c(rnorm(50, -0.8, 0.2), rnorm(50, 2, 1))
test_x <- matrix(c(test_Var1, test_Var2), nrow = 100, ncol = 2)
err <- nn.test(nn, test_x, y)
```

`nn.train` *Training Neural Network*

Description

Training single or mutiple hidden layers neural network by BP

Usage

```
nn.train(x, y, initW = NULL, initB = NULL, hidden = c(10), activationfun = "sigm",
    learningrate = 0.8, momentum = 0.5, learningrate_scale = 1, output = "sigm",
    numepochs = 3, batchsize = 100, hidden_dropout = 0, visible_dropout = 0)
```

Arguments

`x`	matrix of x values for examples
`y`	vector or matrix of target values for examples
`initW`	initial weights. If missing chosen at random
`initB`	initial bias. If missing chosen at random
`hidden`	vector for number of units of hidden layers.Default is c(10).
`activationfun`	activation function of hidden unit.Can be "sigm","linear" or "tanh".Default is "sigm" for logistic function
`learningrate`	learning rate for gradient descent. Default is 0.8.
`momentum`	momentum for gradient descent. Default is 0.5 .
`learningrate_scale`	learning rate will be mutiplied by this scale after every iteration. Default is 1 .
`numepochs`	number of iteration for samples Default is 3.
`batchsize`	size of mini-batch. Default is 100.
`output`	function of output unit, can be "sigm","linear" or "softmax". Default is "sigm".
`hidden_dropout`	drop out fraction for hidden layer. Default is 0.
`visible_dropout`	drop out fraction for input layer Default is 0.

Author(s)

Xiao Rong

Examples

```
Var1 <- c(rnorm(50, 1, 0.5), rnorm(50, -0.6, 0.2))
Var2 <- c(rnorm(50, -0.8, 0.2), rnorm(50, 2, 1))
x <- matrix(c(Var1, Var2), nrow = 100, ncol = 2)
y <- c(rep(1, 50), rep(0, 50))
nn <- nn.train(x, y, hidden = c(5))
```

---

rbm.down *Generate visible vector by hidden units states*

Description

Generate visible vector by hidden units states

Usage

```
rbm.down(rbm, h)
```

Arguments

rbm	an rbm object trained by function train.rbm
h	hidden units states

Value

generated visible vector

Author(s)

Xiao Rong

Examples

```
Var1 <- c(rep(1, 50), rep(0, 50))
Var2 <- c(rep(0, 50), rep(1, 50))
x3 <- matrix(c(Var1, Var2), nrow = 100, ncol = 2)
r1 <- rbm.train(x3, 3, numepochs = 20, cd = 10)
h <- c(0.2, 0.8, 0.1)
v <- rbm.down(r1, h)
```

rbm.train *Training a RBM(restricted Boltzmann Machine)*

Description

Training a RBM(restricted Boltzmann Machine)

Usage

```
rbm.train(x, hidden, numepochs = 3, batchsize = 100, learningrate = 0.8,
   learningrate_scale = 1, momentum = 0.5, visible_type = "bin", hidden_type = "bin",
    cd = 1)
```

Arguments

x	matrix of x values for examples
hidden	number of hidden units
visible_type	activation function of input unit.Only support "sigm" now
hidden_type	activation function of hidden unit.Only support "sigm" now
learningrate	learning rate for gradient descent. Default is 0.8.
momentum	momentum for gradient descent. Default is 0.5 .
learningrate_scale	learning rate will be mutiplied by this scale after every iteration. Default is 1 .
numepochs	number of iteration for samples Default is 3.
batchsize	size of mini-batch. Default is 100.
cd	number of iteration for Gibbs sample of CD algorithm.

Author(s)

Xiao Rong

Examples

```
Var1 <- c(rep(1, 50), rep(0, 50))
Var2 <- c(rep(0, 50), rep(1, 50))
x3 <- matrix(c(Var1, Var2), nrow = 100, ncol = 2)
r1 <- rbm.train(x3, 10, numepochs = 20, cd = 10)
```

rbm.up — *Infer hidden units state by visible units*

Description

Infer hidden units states by visible units

Usage

```
rbm.up(rbm, v)
```

Arguments

rbm	an rbm object trained by function train.rbm
v	visible units states

Value

hidden units states

Author(s)

Xiao Rong

Examples

```
Var1 <- c(rep(1, 50), rep(0, 50))
Var2 <- c(rep(0, 50), rep(1, 50))
x3 <- matrix(c(Var1, Var2), nrow = 100, ncol = 2)
r1 <- rbm.train(x3, 3, numepochs = 20, cd = 10)
v <- c(0.2, 0.8)
h <- rbm.up(r1, v)
```

sae.dnn.train — *Training a Deep neural network with weights initialized by Stacked AutoEncoder*

Description

Training a Deep neural network with weights initialized by Stacked AutoEncoder

Usage

```
sae.dnn.train(x, y, hidden = c(1), activationfun = "sigm", learningrate = 0.8,
   momentum = 0.5, learningrate_scale = 1, output = "sigm", sae_output = "linear",
    numepochs = 3, batchsize = 100, hidden_dropout = 0, visible_dropout = 0)
```

Arguments

x	matrix of x values for examples
y	vector or matrix of target values for examples
hidden	vector for number of units of hidden layers.Default is c(10).
activationfun	activation function of hidden unit.Can be "sigm","linear" or "tanh".Default is "sigm" for logistic function
learningrate	learning rate for gradient descent. Default is 0.8.
momentum	momentum for gradient descent. Default is 0.5 .
learningrate_scale	learning rate will be mutiplied by this scale after every iteration. Default is 1 .
numepochs	number of iteration for samples Default is 3.
batchsize	size of mini-batch. Default is 100.
output	function of output unit, can be "sigm","linear" or "softmax". Default is "sigm".
sae_output	function of autoencoder output unit, can be "sigm","linear" or "softmax". Default is "linear".
hidden_dropout	drop out fraction for hidden layer. Default is 0.
visible_dropout	drop out fraction for input layer Default is 0.

Author(s)

Xiao Rong

Examples

```
Var1 <- c(rnorm(50, 1, 0.5), rnorm(50, -0.6, 0.2))
Var2 <- c(rnorm(50, -0.8, 0.2), rnorm(50, 2, 1))
x <- matrix(c(Var1, Var2), nrow = 100, ncol = 2)
y <- c(rep(1, 50), rep(0, 50))
dnn <- sae.dnn.train(x, y, hidden = c(5, 5))
## predict by dnn
test_Var1 <- c(rnorm(50, 1, 0.5), rnorm(50, -0.6, 0.2))
test_Var2 <- c(rnorm(50, -0.8, 0.2), rnorm(50, 2, 1))
test_x <- matrix(c(test_Var1, test_Var2), nrow = 100, ncol = 2)
nn.test(dnn, test_x, y)
```

Index