

Package ‘deepnet’

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Type Package

Title Deep Learning Toolkit in R

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

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NeedsCompilation no

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 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 mutliplied 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 Trained NN

Description

Predict new samples by Trained 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 Trained NN

Description

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

Usage

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

Arguments

nn	neural network trained by function nn.train
x	new samples to predict
y	new samples' label
t	threshold for classification. If nn.predict value \geq 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 mutple 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 mutliplied 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)

```

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