

Package ‘RcppDL’

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Title Deep Learning Methods via Rcpp

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Description This package is based on the C++ code from Yusuke Sugomori, which implements basic machine learning methods with many layers (deep learning), including dA (Denoising Autoencoder), SdA (Stacked Denoising Autoencoder), RBM (Restricted Boltzmann machine) and DBN (Deep Belief Nets).

License GPL-3

Imports methods, Rcpp (>= 0.11.2)

LinkingTo Rcpp

URL <https://github.com/thirdwing/RcppDL>

BugReports <https://github.com/thirdwing/RcppDL/issues>

NeedsCompilation yes

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R topics documented:

RcppDL-package	2
datasets	2
deeplearning-class	3
deeplearning-methods	5
metadata	6
Index	7

RcppDL-package

Deep Learning Methods via Rcpp

Description

This package is based on the C++ code from Yusuke Sugomori, which implements basic machine learning methods with many layers (deep learning), including dA (Denosing Autoencoder), SdA (Stacked Denosing Autoencoder), RBM (Restricted Boltzmann machine) and DBN (Deep Belief Nets).

Details

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Author(s)

Qiang Kou, Yusuke Sugomori

Maintainer: Qiang Kou <qkou@umail.iu.edu>

References

Y. Bengio, P. Lamblin, D. Popovici, H. Larochelle: Greedy Layer-Wise Training of Deep Networks, Advances in Neural Information Processing Systems 19, 2007

P. Vincent, H. Larochelle, Y. Bengio, P.A. Manzagol: Extracting and Composing Robust Features with Denosing Autoencoders, ICML' 08, 1096-1103, 2008

datasets

Testing dataset for deep learning methods

Description

A testing dataset for deep learning methods:

Usage

```
data(test)
```

Details

- `train_X`. The training dataset.
- `train_y`. The labels for training dataset.
- `test_X`. The testing dataset.
- `hidden`. The number of hidden representation in each layer.

deeplearning-class *Class deeplearning and sub-classes*

Description

The class `deeplearning` is the main class for deep learning methods in this package. It is a virtual class and thus not supposed to be instantiated directly.

The sub-classes implement four methods: `da` for denoising autoencoder; `sda` for stacked denoising autoencoder; `rbm` for restricted Boltzmann machine; `dbn` for deep belief net.

Methods

Methods currently implemented for `da`

summary signature(object = "da"): ...

train signature(object = "da"): ...

CorruptionLevel signature(object = "da"): ...

LearningRate signature(object = "da"): ...

reconstruct signature(object = "da", test = "matrix"): ...

setCorruptionLevel signature(object = "da", x = "numeric"): ...

setTrainingEpochs signature(object = "da", x = "numeric"): ...

setLearningRate signature(object = "da", x = "numeric"): ...

setHiddenRepresentation signature(object = "da", x = "numeric"): ...

Methods currently implemented for `sda`

summary signature(object = "sda"): ...

pretrain signature(object = "sda"): ...

finetune signature(object = "sda"): ...

predict signature(object = "sda", test = "matrix"): ...

CorruptionLevel signature(object = "sda"): ...

LearningRate signature(object = "sda"): ...

FinetuneEpochs signature(object = "sda"): ...

FinetuneLearningRate signature(object = "sda"): ...

setCorruptionLevel signature(object = "sda", x = "numeric"): ...

setFinetuneEpochs signature(object = "sda", x = "numeric"): ...
setFinetuneLearningRate signature(object = "sda", x = "numeric"): ...
setPretrainLearningRate signature(object = "sda", x = "numeric"): ...
setPretrainEpochs signature(object = "sda", x = "numeric"): ...

Methods currently implemented for rbm

summary signature(object = "rbm"): ...
train signature(object = "rbm"): ...
LearningRate signature(object = "rbm"): ...
reconstruct signature(object = "rbm", test = "matrix"): ...
setStep signature(object = "rbm", x = "numeric"): ...
setHiddenRepresentation signature(object = "rbm", x = "numeric"): ...
setLearningRate signature(object = "rbm", x = "numeric"): ...
setTrainingEpochs signature(object = "rbm", x = "numeric"): ...

Methods currently implemented for dbn

summary signature(object = "dbn"): ...
pretrain signature(object = "dbn"): ...
finetune signature(object = "dbn"): ...
predict signature(object = "dbn", test = "matrix"): ...
LearningRate signature(object = "dbn"): ...
FinetuneEpochs signature(object = "dbn"): ...
FinetuneLearningRate signature(object = "dbn"): ...
setFinetuneEpochs signature(object = "dbn", x = "numeric"): ...
setFinetuneLearningRate signature(object = "dbn", x = "numeric"): ...
setStep signature(object = "dbn", x = "numeric"): ...
setPretrainEpochs signature(object = "dbn", x = "numeric"): ...
setPretrainLearningRate signature(object = "dbn", x = "numeric"): ...

Author(s)

Qiang Kou

Examples

```
data(test)
sda_test <- Rsda(train_X, train_Y, hidden)
summary(sda_test)
LearningRate(sda_test)
pretrain(sda_test)
finetune(sda_test)
predict(sda_test, test_X)
```

deeplearning-methods *Create deeplearning objects from training set.*

Description

Rda, Rsda, Rrbm and Rdbn will return an instantiated deeplearning object for denoising autoencoder, stacked denoising autoencoder, restricted Boltzmann machine and deep belief net. train and reconstruct are for training and reconstructing from denoising autoencoder and restricted Boltzmann machine; pretrain, finetune and predict are used for pretraining, finetuning and predicting using stacked denoising autoencoder and deep belief net.

Usage

```
Rda(x)
Rsda(x, y, hidden)
Rrbm(x)
Rdbn(x, y, hidden)
train(object)
pretrain(object)
finetune(object)
reconstruct(object, test)
predict(object, test)
```

Arguments

x	The training dataset.
y	The labels for training dataset.
test	The testing dataset.
hidden	The number of hidden representation in each layer.
object	An instantiated deeplearning object.

Author(s)

Qiang Kou

Examples

```

data(test)
dbn_test <- Rdbn(train_X, train_Y, hidden)
summary(dbn_test)
LearningRate(dbn_test)
pretrain(dbn_test)
finetune(dbn_test)
predict(dbn_test, test_X)

```

metadata

Access the metadata from a deeplearning object.

Description

Accessors to the metadata of a deeplearning object. `summary` will show a summary of the paramters as a named list, and other functions will return corresponding features.

Usage

```

LearningRate(object)
PretrainLearningRate(object)
CorruptionLevel(object)
TrainingEpochs(object)
PretrainingEpochs(object)
FinetuneLearningRate(object)
FinetuneEpochs(object)
Step(object)
HiddenRepresentation(object)
setCorruptionLevel(object, x)
setFinetuneEpochs(object, x)
setFinetuneLearningRate(object, x)
setHiddenRepresentation(object, x)
setLearningRate(object, x)
setPretrainEpochs(object, x)
setPretrainLearningRate(object, x)
setStep(object, x)
setTrainingEpochs(object, x)

```

Arguments

<code>object</code>	An instantiated deeplearning object.
<code>x</code>	A numeric number to set.

Author(s)

Qiang Kou

Index

- * **classes**
 - deeplearning-class, 3
- * **datasets**
 - datasets, 2
- * **package**
 - RcppDL-package, 2
- class:da (deeplearning-class), 3
- class:deeplearning
 - (deeplearning-class), 3
- class:Rcpp_dA (deeplearning-class), 3
- class:Rcpp_Sda (deeplearning-class), 3
- class:sda (deeplearning-class), 3
- CorruptionLevel (metadata), 6
- CorruptionLevel, da-method
 - (deeplearning-class), 3
- CorruptionLevel, sda-method
 - (deeplearning-class), 3
- dA (deeplearning-class), 3
- da-class (deeplearning-class), 3
- datasets, 2
- Dbn (deeplearning-class), 3
- dbn-class (deeplearning-class), 3
- deeplearning-class, 3
- deeplearning-methods, 5
- finetune (deeplearning-methods), 5
- finetune, dbn-method
 - (deeplearning-class), 3
- finetune, sda-method
 - (deeplearning-class), 3
- FinetuneEpochs (metadata), 6
- FinetuneEpochs, dbn-method
 - (deeplearning-class), 3
- FinetuneEpochs, sda-method
 - (deeplearning-class), 3
- FinetuneLearningRate (metadata), 6
- FinetuneLearningRate, dbn-method
 - (deeplearning-class), 3
- FinetuneLearningRate, sda-method
 - (deeplearning-class), 3
- hidden (datasets), 2
- HiddenRepresentation (metadata), 6
- HiddenRepresentation, da-method
 - (deeplearning-class), 3
- HiddenRepresentation, rbm-method
 - (deeplearning-class), 3
- LearningRate (metadata), 6
- LearningRate, da-method
 - (deeplearning-class), 3
- LearningRate, dbn-method
 - (deeplearning-class), 3
- LearningRate, rbm-method
 - (deeplearning-class), 3
- LearningRate, sda-method
 - (deeplearning-class), 3
- metadata, 6
- predict (deeplearning-methods), 5
- predict, dbn, matrix-method
 - (deeplearning-class), 3
- predict, sda, matrix-method
 - (deeplearning-class), 3
- pretrain (deeplearning-methods), 5
- pretrain, dbn-method
 - (deeplearning-class), 3
- pretrain, sda-method
 - (deeplearning-class), 3
- PretrainingEpochs (metadata), 6
- PretrainingEpochs, dbn-method
 - (deeplearning-class), 3
- PretrainingEpochs, sda-method
 - (deeplearning-class), 3
- PretrainLearningRate (metadata), 6
- PretrainLearningRate, dbn-method
 - (deeplearning-class), 3

- PretrainLearningRate, sda-method
(deeplearning-class), 3
- Rbm (deeplearning-class), 3
- rbm-class (deeplearning-class), 3
- Rcpp_dA-class (deeplearning-class), 3
- Rcpp_Dbn-class (deeplearning-class), 3
- Rcpp_Rbm-class (deeplearning-class), 3
- Rcpp_Sda-class (deeplearning-class), 3
- RcppDL (RcppDL-package), 2
- RcppDL-package, 2
- Rda (deeplearning-methods), 5
- Rdbn (deeplearning-methods), 5
- reconstruct (deeplearning-methods), 5
- reconstruct, da, matrix-method
(deeplearning-class), 3
- reconstruct, rbm, matrix-method
(deeplearning-class), 3
- Rrbm (deeplearning-methods), 5
- Rsda (deeplearning-methods), 5
- Sda (deeplearning-class), 3
- sda-class (deeplearning-class), 3
- setCorruptionLevel (metadata), 6
- setCorruptionLevel, da, numeric-method
(deeplearning-class), 3
- setCorruptionLevel, sda, numeric-method
(deeplearning-class), 3
- setFinetuneEpochs (metadata), 6
- setFinetuneEpochs, dbn, numeric-method
(deeplearning-class), 3
- setFinetuneEpochs, sda, numeric-method
(deeplearning-class), 3
- setFinetuneLearningRate (metadata), 6
- setFinetuneLearningRate, dbn, numeric-method
(deeplearning-class), 3
- setFinetuneLearningRate, sda, numeric-method
(deeplearning-class), 3
- setHiddenRepresentation (metadata), 6
- setHiddenRepresentation, da, numeric-method
(deeplearning-class), 3
- setHiddenRepresentation, rbm, numeric-method
(deeplearning-class), 3
- setLearningRate (metadata), 6
- setLearningRate, da, numeric-method
(deeplearning-class), 3
- setLearningRate, rbm, numeric-method
(deeplearning-class), 3
- setPretrainEpochs (metadata), 6
- setPretrainEpochs, dbn, numeric-method
(deeplearning-class), 3
- setPretrainEpochs, sda, numeric-method
(deeplearning-class), 3
- setPretrainLearningRate (metadata), 6
- setPretrainLearningRate, dbn, numeric-method
(deeplearning-class), 3
- setPretrainLearningRate, sda, numeric-method
(deeplearning-class), 3
- setStep (metadata), 6
- setStep, dbn, numeric-method
(deeplearning-class), 3
- setStep, rbm, numeric-method
(deeplearning-class), 3
- setTrainingEpochs (metadata), 6
- setTrainingEpochs, da, numeric-method
(deeplearning-class), 3
- setTrainingEpochs, rbm, numeric-method
(deeplearning-class), 3
- Step (metadata), 6
- Step, dbn-method (deeplearning-class), 3
- Step, rbm-method (deeplearning-class), 3
- summary, da-method (deeplearning-class),
3
- summary, dbn-method
(deeplearning-class), 3
- summary, rbm-method
(deeplearning-class), 3
- summary, sda-method
(deeplearning-class), 3
- test_X (datasets), 2
- train (deeplearning-methods), 5
- train, da-method (deeplearning-class), 3
- train, rbm-method (deeplearning-class), 3
- train_X (datasets), 2
- train_Y (datasets), 2
- TrainingEpochs (metadata), 6
- TrainingEpochs, da-method
(deeplearning-class), 3
- TrainingEpochs, rbm-method
(deeplearning-class), 3