Package: VectorForgeML (via r-universe)

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Type Package

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Description Machine learning utilities for fast vectorized model training. Methods are based on standard statistical learning references such as Hastie et al. (2009) <doi:10.1007/978-0-387-84858-7>.

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`accuracy_score` *Accuracy Score*

Description

Computes classification accuracy.

Usage

```
accuracy_score(y_true, y_pred)
```

Arguments

`y_true`	true labels
`y_pred`	predicted labels

Details

Provides functionality for accuracy_score operations.

Value

numeric accuracy

See Also

VectorForgeML-package

Examples

```
y_true <- c(1,0,1,1)
y_pred <- c(1,0,0,1)
accuracy_score(y_true, y_pred)
```

ColumnTransformer-class

Column Transformer

Description

Applies transformations to specific columns.

Details

Provides functionality for ColumnTransformer operations.

Value

ColumnTransformer object

See Also

VectorForgeML-package

Examples

```
model <- ColumnTransformer$new(num_cols="A", cat_cols="B")
```

confusion_matrix *Confusion Matrix*

Description

Computes confusion matrix.

Usage

```
confusion_matrix(y_true, y_pred)
```

Arguments

y_true	true labels
y_pred	predicted labels

Details

Provides functionality for confusion_matrix operations.

Value

matrix

See Also

VectorForgeML-package

Examples

```
y_true <- c(1,0,1,1)
y_pred <- c(1,0,0,1)
confusion_matrix(y_true, y_pred)
```

confusion_stats *Confusion Matrix Statistics*

Description

Calculates accuracy, precision, recall, F1 from confusion matrix.

Usage

```
confusion_stats(cm)
```

Arguments

cm	confusion matrix

Details

Provides functionality for confusion_stats operations.

Value

list

See Also

VectorForgeML-package

Examples

```
cm <- matrix(c(10, 2, 1, 15), nrow=2)
try({ confusion_stats(cm) })
```

DecisionTree-class *Decision Tree Model*

Description

Tree-based classification/regression algorithm.

Details

Provides functionality for DecisionTree operations.

Value

DecisionTree object

See Also

VectorForgeML-package

Examples

```
model <- DecisionTree$new()
X <- matrix(rnorm(20), nrow=10)
y <- sample(0:1, 10, replace=TRUE)
model$fit(X,y)
model$predict(X)
```

drop_constant_columns *Drop Constant Columns*

Description

Removes columns with zero variance.

Usage

```
drop_constant_columns(X, eps = 1e-12)
```

Arguments

X	input matrix/dataframe
eps	for param eps

Details

Provides functionality for drop_constant_columns operations.

Value

cleaned matrix

See Also

VectorForgeML-package

Examples

```
x <- data.frame(a=c(1,1,1), b=c(1,2,3))
drop_constant_columns(x)
```

f1_score *F1 Score*

Description

Harmonic mean of precision and recall.

Usage

```
f1_score(y_true, y_pred, positive = NULL)
```

Arguments

y_true	true labels
y_pred	predicted labels
positive	positive class label

Details

Provides functionality for f1_score operations.

Value

numeric f1 score

See Also

VectorForgeML-package

Examples

```
y_true <- c(1,0,1,1)
y_pred <- c(1,0,0,1)
f1_score(y_true, y_pred)
```

---

find_best_k *Find Best K*

Description

Finds optimal K value for KNN.

Usage

```
find_best_k(X, y, k_values = seq(1, 15, 2))
```

Arguments

X	features
y	labels
k_values	for k value

Details

Provides functionality for find_best_k operations.

Value

numeric best k

See Also

VectorForgeML-package

Examples

```
x <- matrix(rnorm(200), nrow=100)
y <- sample(0:1, 100, replace=TRUE)
find_best_k(x, y, k_values=c(1,3,5))
```

`fit_linear_model` *Fit Linear Model (Fast C++ backend)*

Description

Internal helper for linear regression training.

Usage

```
fit_linear_model(X, y)
```

Arguments

`X`	numeric matrix
`y`	numeric vector

Details

Provides functionality for fit_linear_model operations.

Value

model object

See Also

VectorForgeML-package

Examples

```
X <- matrix(rnorm(20), nrow=10)
y <- rnorm(10)
try({ fit_linear_model(X, y) })
```

KMeans-class *KMeans Clustering*

Description

Unsupervised clustering algorithm.

Details

Provides functionality for KMeans operations.

Value

KMeans object

See Also

VectorForgeML-package

Examples

```
x <- matrix(rnorm(20), nrow=10)
model <- KMeans$new()
model$fit(x)
```

KNN-class *K-Nearest Neighbors Model*

Description

Instance-based learning algorithm.

Details

Provides functionality for KNN operations.

Value

KNN object

See Also

VectorForgeML-package

Examples

```
model <- KNN$new(k=3, mode="classification")
X <- matrix(rnorm(20), nrow=10)
y <- sample(0:1, 10, replace=TRUE)
model$fit(X,y)
model$predict(X)
```

LabelEncoder-class *Label Encoder*

Description

Converts categorical labels into numeric values.

Details

Provides functionality for LabelEncoder operations.

Value

LabelEncoder object

See Also

VectorForgeML-package

Examples

```
enc <- LabelEncoder$new()
x <- c("a", "b", "a")
enc$fit(x)
enc$transform(x)
```

LinearRegression-class *Linear Regression Model*

Description

Fast linear regression implemented in C++ backend.

Details

Provides functionality for LinearRegression operations.

Value

LinearRegression object

See Also

VectorForgeML-package

Examples

```
model <- LinearRegression$new()
X <- matrix(rnorm(100),50,2)
y <- rnorm(50)
model$fit(X,y)
model$predict(X)
```

LogisticRegression-class

Logistic Regression Model

Description

Binary classification logistic regression.

Details

Provides functionality for LogisticRegression operations.

Value

LogisticRegression object

See Also

VectorForgeML-package

Examples

```
model <- LogisticRegression$new()
X <- matrix(rnorm(20), nrow=10)
y <- sample(0:1, 10, replace=TRUE)
model$fit(X,y)
model$predict(X)
```

macro_f1 *Macro Precision*

Description

Computes macro-averaged precision.

Usage

```
macro_f1(y_true, y_pred)
```

Arguments

y_true	true labels
y_pred	predicted labels

Details

Provides functionality for macro_f1 operations.

Value

numeric score

See Also

VectorForgeML-package

macro_precision *Macro Precision*

Description

Computes macro-averaged precision.

Usage

```
macro_precision(y_true, y_pred)
```

Arguments

y_true	true labels
y_pred	predicted labels

Details

Provides functionality for macro_precision operations.

Value

numeric score

See Also

VectorForgeML-package

`macro_recall` *Macro Precision*

Description

Computes macro-averaged precision.

Usage

```
macro_recall(y_true, y_pred)
```

Arguments

`y_true`	true labels
`y_pred`	predicted labels

Details

Provides functionality for macro_recall operations.

Value

numeric score

See Also

VectorForgeML-package

MinMaxScaler-class *Standard Scaler*

Description

Standardizes features by removing mean and scaling to unit variance.

Details

Provides functionality for MinMaxScaler operations.

Value

StandardScaler object

See Also

VectorForgeML-package

Examples

```
s <- MinMaxScaler$new()
x <- matrix(rnorm(20), nrow=10)
s$fit(x)
s$transform(x)
```

mse *Mean Squared Error*

Description

Calculates regression error.

Usage

```
mse(y_true, y_pred)
```

Arguments

y_true	true values
y_pred	predicted values

Details

Provides functionality for mse operations.

Value

numeric mse

See Also

VectorForgeML-package

OneHotEncoder-class *One Hot Encoder*

Description

Converts categorical variables into binary vectors.

Details

Provides functionality for OneHotEncoder operations.

Value

OneHotEncoder object

See Also

VectorForgeML-package

Examples

```
enc <- OneHotEncoder$new()
df <- data.frame(a=c("x","y","x"))
enc$fit(df)
enc$transform(df)
```

PCA-class *Principal Component Analysis*

Description

Dimensionality reduction technique.

Details

Provides functionality for PCA operations.

Value

PCA object

See Also

VectorForgeML-package

Examples

```
model <- PCA$new(n_components=2)
X <- matrix(rnorm(30), nrow=10)
model$fit(X)
model$transform(X)
```

Pipeline-class *Pipeline*

Description

Chains preprocessing and model steps.

Details

Provides functionality for Pipeline operations.

Value

Pipeline object

See Also

VectorForgeML-package

Examples

```
model <- Pipeline$new(list(StandardScaler$new()))
```

plot_confusion_matrix *Plot Confusion Matrix*

Description

Visualizes confusion matrix.

Usage

```
plot_confusion_matrix(cm, normalize = TRUE)
```

Arguments

cm	confusion matrix
normalize	Normlize

Details

Provides functionality for plot_confusion_matrix operations.

Value

plot

See Also

VectorForgeML-package

Examples

```
cm <- matrix(c(10, 2, 1, 15), nrow=2)
try({ plot_confusion_matrix(cm) })
```

precision_score *Precision Score*

Description

Computes precision metric.

Usage

```
precision_score(y_true, y_pred, positive = NULL)
```

Arguments

y_true	true labels
y_pred	predicted labels
positive	positive class label

Details

Provides functionality for precision_score operations.

Value

numeric precision

See Also

VectorForgeML-package

Examples

```
y_true <- c(1,0,1,1)
y_pred <- c(1,0,0,1)
precision_score(y_true, y_pred)
```

---

predict_linear_model *Predict Linear Model*

Description

Predict values using trained linear model.

Usage

```
predict_linear_model(model, X)
```

Arguments

model	trained model
X	matrix

Details

Provides functionality for predict_linear_model operations.

Value

numeric vector

See Also

VectorForgeML-package

Examples

```
X <- matrix(rnorm(20), nrow=10)
y <- rnorm(10)
model <- fit_linear_model(X, y)
predict_linear_model(model, X)
```

---

r2_score *R2 Score*

Description

Coefficient of determination.

Usage

```
r2_score(y_true, y_pred)
```

Arguments

y_true	true values
y_pred	predicted values

Details

Provides functionality for r2_score operations.

Value

numeric r2 score

See Also

VectorForgeML-package

RandomForest-class *Random Forest Model*

Description

Ensemble of decision trees.

Details

Provides functionality for RandomForest operations.

Value

RandomForest object

See Also

VectorForgeML-package

Examples

```
model <- RandomForest$new(ntrees=5)
X <- matrix(rnorm(20), nrow=10)
y <- sample(0:1, 10, replace=TRUE)
model$fit(X,y)
model$predict(X)
```

recall_score *Recall Score*

Description

Computes recall metric.

Usage

```
recall_score(y_true, y_pred, positive = NULL)
```

Arguments

y_true	true labels
y_pred	predicted labels
positive	positive class label

Details

Provides functionality for recall_score operations.

Value

numeric recall

See Also

VectorForgeML-package

Examples

```
y_true <- c(1,0,1,1)
y_pred <- c(1,0,0,1)
recall_score(y_true, y_pred)
```

RidgeRegression-class *Ridge Regression Model*

Description

Linear regression with L2 regularization.

Details

Provides functionality for RidgeRegression operations.

Value

RidgeRegression object

See Also

VectorForgeML-package

Examples

```
model <- RidgeRegression$new()
X <- matrix(rnorm(20), nrow=10)
y <- rnorm(10)
model$fit(X,y,lambda=1.0)
model$predict(X)
```

rmse *Root Mean Squared Error*

Description

Square root of MSE.

Usage

```
rmse(y_true, y_pred)
```

Arguments

y_true	true values
y_pred	predicted values

Details

Provides functionality for rmse operations.

Value

numeric rmse

See Also

VectorForgeML-package

SoftmaxRegression-class *Softmax Regression Model*

Description

Multiclass logistic regression.

Details

Provides functionality for SoftmaxRegression operations.

Value

SoftmaxRegression object

See Also

VectorForgeML-package

Examples

```
model <- SoftmaxRegression$new()
X <- matrix(rnorm(20), nrow=10)
y <- sample(0:2, 10, replace=TRUE)
model$fit(X,y)
model$predict(X)
```

StandardScaler-class *Drop Constant Columns*

Description

Removes columns with zero variance.

Arguments

X	input matrix/dataframe

Details

Provides functionality for StandardScaler operations.

Value

cleaned matrix

See Also

VectorForgeML-package

Examples

```
s <- StandardScaler$new()
x <- matrix(rnorm(20), nrow=10)
s$fit(x)
s$transform(x)
```

`train_test_split` *Train Test Split*

Description

Splits dataset into training and testing sets.

Usage

```
train_test_split(X, y, test_size = 0.2, seed = NULL)
```

Arguments

`X`	features
`y`	labels
`test_size`	proportion for test set
`seed`	for random seed

Details

Provides functionality for train_test_split operations.

Value

list

See Also

`VectorForgeML-package`

Examples

```
X <- matrix(rnorm(20), nrow=10)
y <- sample(0:1, 10, replace=TRUE)
train_test_split(X, y, test_size=0.2)
```

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