

# Package ‘scAnnotate’

August 9, 2022

**Type** Package

**Title** An Automated Cell Type Annotation Tool for Single-Cell  
RNA-Sequencing Data

**Version** 0.0.3

**Description** An entirely data-driven cell type annotation tools, which requires training data to learn the classifier, but not biological knowledge to make subjective decisions. It consists of three steps: preprocessing training and test data, model fitting on training data, and cell classification on test data. See Xiangling Ji, Danielle Tsao, Kailun Bai, Min Tsao, Li Xing, Xuekui Zhang.(2022)<[doi:10.1101/2022.02.19.481159](https://doi.org/10.1101/2022.02.19.481159)> for more details.

**Depends** R(>= 4.0.0)

**License** GPL-3

**URL** <https://doi.org/10.1101/2022.02.19.481159>

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.1.2

**Suggests** knitr, testthat (>= 3.0.0), rmarkdown

**VignetteBuilder** knitr

**Imports** glmnet, stats, MTPS, Seurat (>= 4.0.5), harmony

**Config/testthat/edition** 3

**NeedsCompilation** no

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**Repository** CRAN

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eva_cal	<i>eva_cal</i>
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### Description

calculate the F1 score of each cell population, mean of F1 score and overall accuracy

### Usage

```
eva_cal(prediction, cell_label)
```

### Arguments

prediction      A vector of annotate cell type labels  
 cell\_label      A vector of original cell type labels

### Value

A matrix contain the F1 score of each cell population, mean of F1 score and overall accuracy

### Examples

```
data(predict_label)
data(pbmc2)
eva_cal(prediction = predict_label, cell_label = pbmc2[,1])
```

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pbmc1

*pbmc1*

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**Description**

A subset of human Peripheral Blood Mononuclear Cells (PBMC) scRNA-seq data that was sequenced using Drop-seq platform. The Seurat(version 4.0.5) package was used for normalized using the NormalizeData function with the "LogNormalize" method and a scale factor of 10,000. After modeling the mean-variance relationship with the FindVariableFeautre function within "vst" methods, we selected the top 2,000 highly variable genes and only used this selection going forward. The dataframe of the cell type label and a gene expression matrix of 598 cells in the row and 2,000 genes in the column.

**Usage**

```
data(pbmc1, package="scAnnotate")
```

**Format**

a data frame

**References**

Ding, J.et al.(2019). Systematic comparative analysis of single cellrna-sequencing methods.bioRxiv

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pbmc2

*pbmc2*

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**Description**

A subset of human PBMC scRNA-seq data that was sequenced using inDrops platform. The Seurat(version 4.0.5) package was used for normalized using the NormalizeData function with the "LogNormalize" method and a scale factor of 10,000. After modeling the mean-variance relationship with the FindVariableFeautre function within "vst" methods, we selected the top 2,000 highly variable genes and only used this selection going forward. The dataframe of the cell type label and a gene expression matrix of 644 cells in the row and 2,000 genes in the column.

**Usage**

```
data(pbmc2, package="scAnnotate")
```

**Format**

a data frame

**References**

Ding, J.et al.(2019). Systematic comparative analysis of single cellrna-sequencing methods.bioRxiv

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predict_label	<i>predict_label</i>
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### Description

Cell type annotation of pbmc2 data that training from pbmc1 data by 'scAnnotate'.

### Usage

```
data(predict_label, package="scAnnotate")
```

### Format

a data frame

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scAnnotate	<i>scAnnotate</i>
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### Description

Annotate cell type labels of test data using a trained mixture model from training data

### Usage

```
scAnnotate(
  train,
  test,
  distribution = c("normal", "dep"),
  correction = c("auto", "harmony", "seurat"),
  screening = c("wilcox", "t.test"),
  threshold = 0,
  lognormalized = TRUE
)
```

### Arguments

train	A data frame of cell type label in the first column and a gene expression matrix where each row is a cell and each column is a gene from training data
test	A data matrix where each row is a cell and each column is a gene from test data
distribution	A character string indicate the distribution assumption on positive gene expression, should be one of "normal"(default), or "dep"
correction	A character string indicate the batch effect removal, should be one of "auto"(default), "seurat", or "harmony". "auto" will automatically select the batch effect removal follow our suggestion using Seurat for big data (all cell population sample size greater than 100 except one cell population less than 100 and greater than 20) and using harmony for small data.

screening	A character string indicate the gene screening methods, should be one of "wilcox"(default) or "t.test" .
threshold	A numeric number indicate the threshold used for probabilities to classify cells into classes,should be number from "0"(default) to "1". If there's no probability higher than the threshold associated to a cell type, the cell will be labeled as "unassigned"
lognormalized	A logical string indicate if both input data are log-normalized or not. TRUE (default) indicates input data are log-normalized, FALSE indicates input data are raw data.

**Value**

A vector contain annotate cell type labels for test data

**Examples**

```
data(pbmc1)
data(pbmc2)
predict_label=scAnnotate(train=pbmc1,
                          test=pbmc2[,-1],
                          distribution="normal",
                          correction ="harmony",
                          screening ="wilcox",
                          threshold=0,
                          lognormalized=TRUE)
```

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