

Package ‘MOutliers’

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Title Multivariate Outlier Detection Methods

Version 0.1.1

Description Provides methods for detecting multivariate outliers in numeric datasets. The package implements classical Mahalanobis distance, robust Minimum Covariance Determinant (MCD), and Principal Component Analysis (PCA)-based approaches. Visualization functions are included to aid interpretation of detected outliers. Mahalanobis distance calculations are accelerated using 'C++' through 'Rcpp'.

URL https://github.com/SenuYasara/Multivariate_Outlier_Detection_R_Package

BugReports

https://github.com/SenuYasara/Multivariate_Outlier_Detection_R_Package/issues

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Encoding UTF-8

RoxygenNote 7.3.3

LinkingTo Rcpp

Imports Rcpp, stats, MASS, ggplot2, gridExtra, cowplot, rlang

Suggests knitr, rmarkdown, testthat (>= 3.0.0)

Config/testthat/edition 3

VignetteBuilder knitr

NeedsCompilation yes

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Repository CRAN

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`detect_multivariate_outliers`*Detect Multivariate Outliers*

Description

Detects multivariate outliers using Mahalanobis, Minimum Covariance Determinant (MCD), or PCA-based distances. Supports robust detection by computing distance scores for each observation and comparing them against a chi-squared cutoff at a specified significance level.

Usage

```
detect_multivariate_outliers(data, method = "mahalanobis", alpha = 0.975)
```

Arguments

<code>data</code>	A numeric data frame or matrix.
<code>method</code>	Outlier detection method: "mahalanobis", "mcd", or "pca".
<code>alpha</code>	Significance level (default = 0.975).

Value

A data frame combining the original input data with distances and outlier flags.

Examples

```
df_mtcars <- mtcars[, c("mpg", "hp", "wt" )]
head(df_mtcars)

## Mahalanobis Distance
result_mahal <- detect_multivariate_outliers(df_mtcars, method = "mahalanobis", alpha = 0.975)

## Minimum Covariance Determinant (MCD)
result_mcd <- detect_multivariate_outliers(df_mtcars, method = "mcd", alpha = 0.975)

## Principal Component Analysis (PCA)
result_pca <- detect_multivariate_outliers(df_mtcars, method = "pca", alpha = 0.975)
```

plot_outliers	<i>Plot Pairwise Outliers</i>
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Description

Generates 2D scatterplots for each pair of variables in the dataset, with outliers identified using Mahalanobis or MCD distances computed across all variables, without including each observation in its own distance calculation.

Usage

```
plot_outliers(data, method = c("mahalanobis", "mcd"), alpha = 0.975)
```

Arguments

data	A numeric data frame or matrix.
method	Outlier detection method: "mahalanobis" or "mcd".
alpha	The quantile cutoff for identifying outliers (default 0.975).

Examples

```
df_mtcars <- mtcars[, c("mpg", "hp", "wt" )]  
head(df_mtcars)  
  
## Pairwise Plots: Mahalanobis  
plot_outliers(df_mtcars, method = "mahalanobis", alpha = 0.975)  
  
## Pairwise Plots: MCD  
plot_outliers(df_mtcars, method = "mcd", alpha = 0.975)
```

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