Package 'pasadr'

October 14, 2022

Type Package

Title An Implementation of Process-Aware Stealthy Attack
Detection(PASAD)

Version 1.0

Date 2021-06-22

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Description

Anomaly detection method based on the paper ``Truth will out: Departure-based process-level de-
tection of stealthy attacks on control systems'' from Wissam Aoudi, Mikel Iturbe, and Mag-
nus Almgren (2018) <DOI:10.1145/3243734.3243781>. Also referred to the following imple-
mentation: <https://github.com/rahulrajpl/PyPASAD>.

License GPL-3

Encoding UTF-8

LazyData no

Repository CRAN

URL https://github.com/ainsuotain/pasadr

Depends R (>= 3.5.0), pracma, scales

NeedsCompilation no

Date/Publication 2021-06-30 10:40:02 UTC

R topics documented:

| pasad_test | *A test function of Process-Aware Stealthy Attack Detection(PASAD)* |

Description

Singular value decomposition of log covariance matrix (Trajectory matrix). This is a test phase of pasad

Usage

```
pasad_test(obj, test_idx, newdata, r = 3, calib = 1, thres = NULL, movn = 10, plot = TRUE)
```

Arguments

obj	A pasad model object result from `pasad_train`.
test_idx	A test index for pasad. For example, `test_idx = c(1:4801)`.
newdata	A test data for pasad.
r	A cardinal number of eigen value. Generally, r is same by the training phase.
calib	A threshold multiplier. since the threshold calculated during the training phase is a rather small, so the calib can be multiplied to the threshold. (default is 1, should be biggner than 0).
thres	If user already know the threshold, user can input the threshold.
movn	A moving average window value to see the trend of the score.
plot	Whether to draw a anomaly score or not. (default : TRUE).

Value

An object of class `pasad_test`.

total_scores	Anomaly score results from the pasad.
tr_score	A pasad score of the training index.
te_score	A pasad score of the test index.
extraced	A noise-reduced signal.
threshold	A (calculated) threshold.
outidx	An index of a anomaly score greater than the threshold.

Author(s)

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References

Wissam Aoudi, Mikel Iturbe, and Magnus Almgren (2018) <DOI:10.1145/3243734.3243781>. *In Proceedings of the 2018 ACM SIGSAC Conference on Computer and Communications Security*, pp. 817-831.
https://github.com/mikeliturbe/pasad https://github.com/rahulrajpl/PyPASAD

See Also

pasad_train

Examples

```
# data input
fpath = system.file("extdata", "sa.csv", package="pasadr")
sa = read.csv(fpath)

# check data
sig = sa$V5
plot(sig)

# training using pasad and check the scree plot
train_idx = c(1:500)
obj = pasad_train(x = sig,
                  train_idx = train_idx,
                  r = 1,
                  ws = length(train_idx)/2,
                  scree_plot = TRUE)

# test whole data and check the anomaly score of test data
pred = pasad_test(obj = obj,
                  test_idx = 1:4801,
                  newdata = sig,
                  r = 1,
                  calib = 1,
                  plot = TRUE)

# check the structure of test results
str(pred)
```

| pasad_train | *A training function of Process-Aware Stealthy Attack Detection(PASAD)* |

Description

Singular value decomposition of log covariance matrix (Trajectory matrix). This is a training phase of pasad

Usage

```
pasad_train(x, train_idx, r = 3, ws, scree_plot = FALSE)
```

Arguments

x	A signal data for inspectation.
train_idx	A training index fot pasad. For example, `train_idx = c(1:500)`.
r	A cardinal number of eigen value. Generally r is smaller than 3. (default : 3).
ws	A length of lag for creating covariance matrix. (default is a half of training length).
scree_plot	Whether to draw a scree_plot or not. (default : TRUE).

Value

An object of class `pasad_train`.

N	A length of signal data.
L	A length of lag for creating covariance matrix.
U	The r leading eigenvectors.
X	A trajectory matrix.
x	An original signal.
ws	A length of lag for creating covariance matrix.
train_idx	A training index fot pasad.
x_train	A data used for training.
singulars	A transpose of singular matrix

Author(s)

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References

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https://github.com/mikeliturbe/pasad https://github.com/rahulrajpl/PyPASAD

See Also

pasad_test

Examples

```
# data input
fpath = system.file("extdata", "sa.csv", package="pasadr")
sa = read.csv(fpath)

## NOT RUN:
## data(package = "pasadr")

# check data
sig = sa$V5
plot(sig)

# training using pasad and check the scree plot
train_idx = c(1:500)
obj = pasad_train(x = sig,
                  train_idx = train_idx,
                  r = 1,
                  ws = length(train_idx)/2,
                  scree_plot = TRUE)

# check the pasad model objects
str(obj)
```

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