

Package ‘IncDTW’

July 3, 2017

Type Package

Title Incremental Calculation of Dynamic Time Warping

Version 0.1.0

Author Maximilian Leodolter

Maintainer Maximilian Leodolter <maximilian.leodolter@gmail.com>

Description

Implements incremental calculation of the DTW (Dynamic Time Warping) distance of two vectors, which is specifically useful for life data streams. Further the calculation of the global cost matrix is implemented in C++ to be faster. The Sakoe Chiba band is also implemented. The calculation of DTW is less functional then the one of dtw(), however much faster. For details about DTW see the original paper ``Dynamic programming algorithm optimization for spoken word recognition" by Sakoe and Chiba (1978) <DOI:10.1109/TASSP.1978.1163055>.

License GPL (>= 2)

Encoding UTF-8

LazyData true

Imports Rcpp (>= 0.12.8)

LinkingTo Rcpp

NeedsCompilation yes

Suggests testthat

RoxygenNote 6.0.1

Repository CRAN

Date/Publication 2017-07-03 11:00:20 UTC

R topics documented:

IncDTW-package	2
dtw	2
idtw	4

Index	6
--------------	----------

IncDTW-package

Incremental Dynamic Time Warping

Description

Implements incremental calculation of the DTW (Dynamic Time Warping) distance of two vectors, which is specifically useful for life data streams. Further the calculation of the global cost matrix is implemented in C++ to be faster. The Sakoe Chiba band is also implemented. The calculation of DTW is less functional then the one of dtw(), however much faster.

Details

...

Author(s)

Maximilian Leodolter

Maintainer: Maximilian Leodolter <maximilian.leodolter@gmail.com>

References

Dynamic programming algorithm optimization for spoken word recognition by Sakoe and Chiba published in 1978 (DOI:10.1109/TASSP.1978.1163055)

See Also

<https://github.com/maxar/IncDTW>

dtw

dtw

Description

wrapper function for the C++ calculations and the BACKTRACK_cpp that finds the cheapest warping path.

Usage

```
dtw(Q, C, ws = NULL, return_diffM = FALSE)
```

Arguments

Q	one dimensional numeriv vector
C	one dimensional numeriv vector
ws	integer, describes the window size for the sakoe chiba window. If NULL, then no window is applied. (default = NULL)
return_diffM	boolean, if TRUE then the Matrix of differences (not the absolute value) is returned. (default = FALSE)

Details

The dynamic time warping distance is the element in the last row and last column of the global cost matrix.

Value

gcm	global cost matrix
dm	direction matrix (3=up, 1=diagonal, 2=left)
wp	warping path
ii	indices of C of the optimal path
jj	indices of Q of the optimal path
diffM	Matrix of differences

Author(s)

Maximilian Leodolter

References

Sakoe, H.; Chiba, S., Dynamic programming algorithm optimization for spoken word recognition, Acoustics, Speech, and Signal Processing [see also IEEE Transactions on Signal Processing], IEEE Transactions on , vol.26, no.1, pp. 43-49, Feb 1978. http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=1163055

Examples

```
Q <- cumsum(rnorm(100))
C <- Q[11:100] + rnorm(90, 0, 0.5)
dtw(Q=Q, C=C, ws = 15, return_diffM = FALSE)
dtw(Q=Q, C=C, ws = 15, return_diffM = TRUE)
```

 idtw

idtw

Description

wrapper function for the C++ calculations and the BACKTRACK_cpp that finds the cheapest warping path.

Usage

```
idtw(Q, C, newO, gcm, dm, ws = NULL, return_diffM = FALSE)
```

Arguments

Q	one dimensional numeric vector
C	one dimensional numeric vector
newO	one dimensional numeric vector of new observations to be appended to C
gcm	global cost matrix, output from dtw(Q=Q, C=C, ws=ws)
dm	direction matrix, output from dtw(Q=Q, C=C, ws=ws)
ws	integer, describes the window size for the sakoe chiba window. If NULL, then no window is applied. (default = NULL)
return_diffM	boolean, if TRUE then the Matrix of differences (not the absolute value) is returned. (default = FALSE)

Details

The dynamic time warping distance is the element in the last row and last column of the global cost matrix.

Value

gcm	global cost matrix
dm	direction matrix (3=up, 1=diagonal, 2=left)
wp	warping path
ii	indices of C of the optimal path
jj	indices of Q of the optimal path
diffM	Matrix of differences

Author(s)

Maximilian Leodolter

References

Sakoe, H.; Chiba, S., Dynamic programming algorithm optimization for spoken word recognition, Acoustics, Speech, and Signal Processing [see also IEEE Transactions on Signal Processing], IEEE Transactions on , vol.26, no.1, pp. 43-49, Feb 1978. http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=1163055

Examples

```
Q <- cumsum(rnorm(100))
C <- Q[11:100] + rnorm(90, 0, 0.5)
tmp <- dtw(Q=Q, C=C, ws = 15, return_diffM = FALSE) # the ordinary calculation
# new Observation
newObs <- c(2,3)
# the incremental step
idtw(Q, C, newO = newObs, gcm=tmp$gcm, dm=tmp$dm, ws = 15, return_diffM = FALSE)
```

Index

*Topic **DTW**

IncDTW-package, [2](#)

*Topic **cluster**

dtw, [2](#)

idtw, [4](#)

*Topic **ts**

dtw, [2](#)

idtw, [4](#)

dtw, [2](#)

idtw, [4](#)

IncDTW-package, [2](#)