

cophenet

Cophenetic correlation coefficient

Syntax

```
c = cophenet(Z,Y)
```

Description

`c = cophenet(Z,Y)` computes the cophenetic correlation coefficient which compares the distance information in `Z`, generated by [linkage](#), and the distance information in `Y`, generated by [pdist](#). `Z` is a matrix of size $(m-1)$ -by-3, with distance information in the third column. `Y` is a vector of size $m \cdot (m - 1)/2$.

For example, given a group of objects $\{1, 2, \dots, m\}$ with distances `Y`, the function `linkage` produces a hierarchical cluster tree. The `cophenet` function measures the distortion of this classification, indicating how readily the data fits into the structure suggested by the classification.

The output value, `c`, is the cophenetic correlation coefficient. The magnitude of this value should be very close to 1 for a high-quality solution. This measure can be used to compare alternative cluster solutions obtained using different algorithms.

The cophenetic correlation between `Z(:,3)` and `Y` is defined as

$$c = \frac{\sum_{i < j} (Y_{ij} - y)(Z_{ij} - z)}{\sqrt{\sum_{i < j} (Y_{ij} - y)^2 \sum_{i < j} (Z_{ij} - z)^2}}$$

where:

- Y_{ij} is the distance between objects i and j in `Y`.
- Z_{ij} is the distance between objects i and j in `Z(:,3)`.
- y and z are the average of `Y` and `Z(:,3)`, respectively.


Example

```
rand('seed',12);  
X = [rand(10,3);rand(10,3)+1;rand(10,3)+2];  
Y = pdist(X);  
Z = linkage(Y,'centroid');  
c = cophenet(Z,Y)
```

c =
0.6985

See Also

[cluster](#), [dendrogram](#), [inconsistent](#), [linkage](#), [pdist](#), [squareform](#)

 [combnk](#)

[cordexch](#) 