

# Package ‘SpatialAcc’

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**Type** Package

**Title** Spatial Accessibility Measures

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**Description** Provides a set of spatial accessibility measures from a set of locations (demand) to another set of locations (supply). It aims, among others, to support research on spatial accessibility to health care facilities. Includes the locations and some characteristics of major public hospitals in Greece.

**License** GPL (>= 2)

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SpatialAcc-package      *Spatial Accessibility Measures*

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### Description

Provides a set of spatial accessibility measures from a set of locations (demand) to another set of locations (supply). It aims, among others, to support research on spatial accessibility to health care facilities. Includes the locations and some characteristics of major public hospitals in Greece.

### Details

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### Author(s)

Stamatis Kalogirou  
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### References

Kalogirou, S., and Foley, R. (2006). Health, place and Hanly: Modelling accessibility to hospitals in Ireland. *Irish Geography*, 39(1), 52-68.

Kalogirou, S. (2017). Spatial inequality in the accessibility to hospitals in Greece, *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XLII-4/W2, 91-94, <https://doi.org/10.5194/isprs-archives-XLII-4-W2-91-2017>.

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ac      *Spatial Accessibility measures*

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### Description

This function measures the accessibility certain geographical areas have to certain amenities. The former usually refer to the population residence and the latter to services such as health care, education, and culture. Several functions may define the accessibility measure. See family for further details.

### Usage

```
ac(p, n, D, d0, power=2, family="SAM")
```

### Arguments

p	is a vector that quantifies the demand for services in each location, usually the population at risk. For example, it may be the number of older people interested in geriatric services at hospitals.
n	is a vector that quantifies the supply of services in each location, usually a characteristic of the service. For example, it may be the number of beds at hospitals.
D	a matrix of a quantity separating the demand from the supply. This is usually a distance matrix, preferably using a road network distance or travel time through the road network.
d0	is the threshold distance or time that defines the catchment area (spatial kernel)
power	the power of the separation variable. This is usually 2 from the theory of the gravity model in geography.
family	a character value to define the accessibility measure function. "SAM", "2SFCA", "KD2SFCA", "Hansen". Default is "SAM".  SAM are the initials of Spatial Accessibility Measure referring to the function $A_i = \sum_j (n_j / (p_i * D_{ij}^2))$ discussed in Kalogirou and Foley (2006).

### Details

SAM refers to the Spatial Accessibility Measure proposed by Kalogirou and Foley (2006).

### Value

a vector with accessibility measures for all locations (defined by the length of p).

### Author(s)

Stamatis Kalogirou <stamatis@lctools.science>

### References

Kalogirou, S., and Foley, R. (2006). Health, place and Hanly: Modelling accessibility to hospitals in Ireland. *Irish Geography*, 39(1), 52-68.

Kalogirou, S. (2017). Spatial inequality in the accessibility to hospitals in Greece, *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XLII-4/W2, 91-94, <https://doi.org/10.5194/isprs-archives-XLII-4-W2-91-2017>.

### Examples

```
n<-1:4
p<-20:25
D<-matrix(1:24, ncol=4, nrow=6)
Acc.p <- ac(p, n, D)
```

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distance

*Distance Matrix Computation*

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### Description

Computes Euclidean or Manhattan distances for all pairs of points between two sets of points.

### Usage

```
distance(m1, m2, type = "euclidean")
```

### Arguments

m1	a vector referring to a set of origin point coordinates
m2	a vector referring to a set of destination point coordinates
type	the type of distance to be computed. Two types are currently supported "euclidean" and "manhattan".

### Details

When m1 and m2 are identical, the function is equivalent to the [dist](#) function of base R.

### Value

A distances matrix in which rows refer to origins and columns refer to destinations.

### Author(s)

Stamatis Kalogirou <stamatis@lctools.science>

### See Also

[dist](#) in stats.

### Examples

```
m1<-cbind(c(1:10),c(1:10))
m2<-cbind(sample(20:80,4),sample(20:80,4))
d<-distance(m1,m2)
```

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GR.Hospitals	<i>Greek Hospitals</i>
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**Description**

Locations of General and Specialised Hospitals in Greece.

**Usage**

```
data("GR.Hospitals")
```

**Format**

A data frame with 132 observations on the following 15 variables.

Address character vector of hospitals' addresses

Name a character vector of hospitals' names

ID a integer vector of hospitals' IDs

X a numeric vector of x coordinates (GGRS87 - Greek Grid)

Y a numeric vector of y coordinates (GGRS87 - Greek Grid)

Postcode a numeric vector of the hospitals' postcodes

URL a character vector of hospitals' websites

DYPE a integer vector of hospitals' Healthcare Regions

KallCode a character vector of municipality codes to link with data from the Hellenic Statistical Authority (EL.STAT.)

Dimos a character vector of municipality names (Greek with latin characters)

Lat a numeric vector of hospitals' latitudes (WGS84)

Lon a numeric vector of hospitals' longitudes (WGS84)

Beds15 a integer vector of hospitals' beds in 2015

Patien15 a integer vector of hospitals' admitted patients (hospital discharges) in 2015

Nights15 a numeric vector of in-patients' nights in 2015

**Details**

The X,Y coordinates (as well as the Lat/Lon coordinates) refer to the exact locations of operating hospitals in the summer 2016. Their identification is the results of registry data, formal hospital addresses, OpenStreetMap (<https://www.openstreetmap.org>) and Google Maps (<https://maps.google.com>) including Street View. They have been manually digitised by the author of this package.

**Source**

The source of the hospital beds, hospital discharges and in-patient nights statistics is the Ministry of Health (<http://www.moh.gov.gr/articles/bihealth/stoixeia-noshleytikhs-kinshs/3865-stoixeia-noshleythentwn-sta-nosokomeia-toy-esy-etoys-2015?dl=1>).

## References

Kalogirou, S. (2017). Spatial inequality in the accessibility to hospitals in Greece, The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, XLII-4/W2, 91-94, <https://doi.org/10.5194/isprs-archives-XLII-4-W2-91-2017>.

## Examples

```
data(GR.Hospitals)
hist(GR.Hospitals$Beds15)
```

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PWC.Municipalities      *Population weighted centroids of the Municipalities in Greece.*

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## Description

Population weighted centroids of Municipalities in Greece (Programme Kallikratis).

## Usage

```
data("PWC.Municipalities")
```

## Format

A data frame with 326 observations on the following 6 variables.

**KallCode** a character vector of municipality codes to link with data from the Hellenic Statistical Authority (EL.STAT.)

**pwX** a numeric vector of population weighted x coordinates (GGRS87 / Greek Grid)

**pwY** a numeric vector of population weighted y coordinates (GGRS87 / Greek Grid)

**Pop** a numeric vector of population according to the 2011 Census for Population in Greece

**Lat** a numeric vector of municipalities' latitudes (WGS84)

**Lon** a numeric vector of municipalities' longitudes (WGS84)

## Details

The population weighted centroids for the 325 Municipalities and the Holy Mountain (Agion Oros) in Greece were computed based on the 13,548 settlements' x and y coordinates and their total population in 2011.

## References

Kalogirou, S. (2017). Spatial inequality in the accessibility to hospitals in Greece, The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, XLII-4/W2, 91-94, <https://doi.org/10.5194/isprs-archives-XLII-4-W2-91-2017>.

**Examples**

```
data(PWC.Municipalities)
plot(PWC.Municipalities$pwX,PWC.Municipalities$pwY)
summary(PWC.Municipalities$Pop)
```

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