Package ‘pts2polys’

February 20, 2020

Type Package

Title Construct Polygons Summarising the Location and Variability of Point Sets

Version 0.1.3

Date 2020-02-20

Description Various applications in invasive species biology, conservation biology, epidemiology and elsewhere involve sampling of sets of 2D points from a posterior distribution. The number of such point sets may be large, say 1000 or 10000. This package facilitates visualisation of such output by constructing seven nested polygons representing the location and variability of the point sets. This can be used, for example, to visualise the range boundary of a species, and uncertainty in the location of that boundary.

License GPL (>= 2)

Imports Rcpp (>= 1.0.1)

LinkingTo Rcpp

NeedsCompilation yes

Author Jonathan Keith [aut, cre], Ken Clarkson [aut], Eric Hufschmid [ctb], AT&T [cph]

Maintainer Jonathan Keith <jonathan.keith@monash.edu>

Repository CRAN

Date/Publication 2020-02-20 17:40:02 UTC

R topics documented:

pts2polys-package ......................................................... 2

Index 4
Description

Various applications in invasive species biology, conservation biology, epidemiology and elsewhere involve sampling of sets of 2D points from a posterior distribution. The number of such point sets may be large, say 1000 or 10000. This package facilitates visualisation of such output by constructing seven nested polygons representing the location and variability of the point sets. This can be used, for example, to visualise the range boundary of a species, and uncertainty in the location of that boundary.

The function pts2polys takes multiple sets of points as input and in Stage 1 constructs a chi-shape enclosing each point set. In Stage 2, it outputs chi-shapes enclosing grid points that are interior to a specified proportion of the chi-shapes from Stage 1.

The method implemented in this package is described in a manuscript entitled "Delimiting a species' geographic range using posterior sampling and computational geometry". The manuscript is currently under review.

The package depends on code for constructing a Delaunay triangulation originally written by Ken Clarkson, modified by Eric Hufschmid and further modified by Jonathan Keith. Ken Clarkson's original code included the following notice:

"Ken Clarkson wrote this. Copyright (c) 1995 by AT&T. Permission to use, copy, modify, and distribute this software for any purpose without fee is hereby granted, provided that this entire notice is included in all copies of any software which is or includes a copy or modification of this software and in all copies of the supporting documentation for such software."

Usage

pts2polys(in_string,SAMPLESIZE,MINLEN,GRIDSIZE,MINX,MAXX,MINY,MAXY)

Arguments

in_string name of input file containing point sets. This is a text file in which each point set begins with a line starting with 'P' followed by one line per point, with each line containing an x and y coordinate
SAMPLESIZE number of point sets
MINLEN minimum length of external edges to be removed
GRIDSIZE spacing between points in a square tiling
MINX minimum x co-ordinate
MAXX maximum x co-ordinate
MINY minimum y co-ordinate
MAXY maximum y co-ordinate
Value

A list comprised of two elements: boundarylen and boundary. ‘boundarylen’ is an integer vector with 7 elements, representing the number of points in each of 7 polygons. ‘boundary’ is a list comprised of 7 numeric vectors, corresponding to alpha = 0.999, 0.990, 0.975, 0.750, 0.500, 0.250 and 0.025. Each vector is comprised of alternating x and y co-ordinates.

Author(s)

Author and Maintainer: Jonathan Keith <<jonathan.keith@monash.edu>>
Author: Ken Clarkson
Contributor: Eric Hufschmid
Copyright holder: AT&T

Examples

```r
pol <- pts2polys(system.file("extdata", "test.pt.sets", package = "pts2polys", mustWork = TRUE),
                  20,10000,100,293706,564106,6803848,7076948)

plot(pol$boundary[[1]][c((1:pol$boundarylen[1])*2-1,1)],
     pol$boundary[[1]][c((1:pol$boundarylen[1])*2,2)],type="l",
     xlab="Easting",ylab="Northing")
lines(pol$boundary[[2]][c((1:pol$boundarylen[2])*2-1,1)],
     pol$boundary[[2]][c((1:pol$boundarylen[2])*2,2)],col=2)
lines(pol$boundary[[3]][c((1:pol$boundarylen[3])*2-1,1)],
     pol$boundary[[3]][c((1:pol$boundarylen[3])*2,2)],col=3)
lines(pol$boundary[[4]][c((1:pol$boundarylen[4])*2-1,1)],
     pol$boundary[[4]][c((1:pol$boundarylen[4])*2,2)],col=4)
lines(pol$boundary[[5]][c((1:pol$boundarylen[5])*2-1,1)],
     pol$boundary[[5]][c((1:pol$boundarylen[5])*2,2)],col=5)
lines(pol$boundary[[6]][c((1:pol$boundarylen[6])*2-1,1)],
     pol$boundary[[6]][c((1:pol$boundarylen[6])*2,2)],col=6)
lines(pol$boundary[[7]][c((1:pol$boundarylen[7])*2-1,1)],
     pol$boundary[[7]][c((1:pol$boundarylen[7])*2,2)],col=7)
```
Index

*Topic package
  pts2polys-package, 2

pts2polys (pts2polys-package), 2
pts2polys-package, 2