Package 'rpostgisLT'

August 16, 2016

Title Managing and visualizing animal movement data with PostGIS and R

Version 0.2.1

Description The `rpostgisLT` package develops the integration of R and PostGIS for managing movement trajectories. The focus is on streamlining the workflow for biologists to store and process animal trajectories in PostGIS and analyze them in R, thus utilizing the strengths of both software. The package relies on `ltraj` objects from the R package `adehabitatLT`, and provides the analogous `pgtraj` data structure in PostGIS, with all functions to create and manage `pgtraj` data, and convert from and to both format (`pgtraj` in PostGIS, `ltraj` in R). For a list of documented functions, use `library(help = ``rpostgisLT'')`

SystemRequirements PostgreSQL with PostGIS extension

Depends R (>= 3.3.0),
rpostgis,
adehabitatLT

License GPL (>= 3)

Encoding UTF-8

LazyData true

RoxygenNote 5.0.1

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Imports testthat

Suggests knitr,
rmarkdown

VignetteBuilder knitr

R topics documented:

`as_pgtraj` *Converts relocation data into the pgtraj data model.*

Description

This is the core function of the `rpostgisLT` package and it is also used by `ltraj2pgtraj` to import trajectory data into a pgtraj data model. `as_pgtraj` copies the trajectory data which is stored in a database to a traj schema. If the provided schema doesn't exist, it is created on demand. On successful data input, `as_pgtraj` creates a view for each pgtraj, with the views named as <pgtraj>_params. The view contains the same step parameters as an ltraj object (e.g. R2n, rel.angle, dt...). If the input geometries are projected, their projection is used to create the steps in the schema, otherwise either no projection is used or the fuction exits.

Usage

```
as_pgtraj(conn, schema = "traj", relocations_table = NULL,
  pgtrajs = "pgtraj", animals = "animal", bursts = NULL,
  relocations = NULL, timestamps = NULL, rids = "rid", srid = NULL,
  db = TRUE)
```

Arguments

`conn`	Connection object created with RPostgreSQL
`schema`	String. Name of the schema that stores or will store the pgtraj data model.
`relocations_table`	String. Name of the table that stores the relocations, e.g. "public.relocations"
`pgtrajs`	String. Name of the pgtraj or name of the field that stores the pgtraj names.
`animals`	String. Name of the animal or name of the field that stores the animal names.
`bursts`	String. Name of the burst or name of the field that stores the burst names.

relocations	String. Name of the field that contains the relocations in relocations_table.
timestamps	String. Name of the field in relocations_table that contains the timestamps. If NULL, Type I trajectory is assumed.
rids	String. Name of the field in relocations_table that contains the numeric IDs of relocations.
db	Boolean. If TRUE, the relocations are stored in a database table, if FALSE relocations are stored in an R object. It is meant to be used by other functions internally. If you want to import an ltraj from R, use ltraj2pgtraj().

Details

Opening and closing connections have to be done manually by the user. However, the function checks if the provided connection is still valid. Not tested with capital letters for PostgreSQL field names, but it probably won't work. Its a bad practice anyway to force uppercase in PostgreSQL so use lowercase.

Value

TRUE on success

Author(s)

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References

https://cran.r-project.org/web/packages/adehabitatLT/vignettes/adehabitatLT.pdf

See Also

Section on pgtraj data model in the package vignette.

Examples

```
## Not run:
as_pgtraj(conn,
        schema = "traj_t4",
        relocations_table = "example_data.relocations_plus",
        pgtrajs = "id",
        animals = "animal",
        bursts = "burst",
        relocations = "geom",
        timestamp = "time",
        rid = "gid")

## End(Not run)
```

dl_opt *Quick Conversion of Objects of Class ltraj from and to Dataframes*

Description

Faster versions of ld and dl.

Usage

```
dl_opt(x)
```

Details

In ld, strict = FALSE can be up to 10 times faster, but assumes that the ltraj is well structured (i.e. not modified by the user). In dl, strict = FALSE can be up to 20 times faster, but assumes that the trajectory parameters in the data frame (x/y increments, angles, etc.) are still valid (e.g. no locations have been removed).

Author(s)

Modified by Mathieu Basille, Bal<U+FFFD><U+FFFD>zs Dukai, <basille@ase-research.org>, <balazs.dukai@gmail.com>

See Also

See ld for further details on the function and all available arguments.

Examples

```
data(puechcirc)
puechcirc ## class ltraj

## ld
df1 <- adehabitatLT::ld(puechcirc)
df2 <- ld(puechcirc, strict = FALSE)
all.equal(df1, df2)
## Note a difference in row names:
attr(df1, "row.names")
attr(df2, "row.names")

## dl
all.equal(dl(df2), adehabitatLT::dl(df2))
dl(df2, strict = FALSE)
## Comparison regarding 'strict'
all.equal(dl(df2), dl(df2, strict = FALSE))
## Differences in row.names (numeric in regular 'dl', characters using
## 'strict = FALSE') + NAs in R2n (for a reason, 'puechcirc[[2]]'
## starts by a sequence of missing values, but has several 'R2n'
## values. As a result, 'strict = FALSE' keeps the 'R2n' values)
```

`ltraj2pgtraj` *Export an ltraj object from R into a traj database schema.*

Description

`ltraj2pgtraj` creates a new traj schema or uses an existing one and exports an ltraj to the database. The time zone and projection information stored in the ltraj is transferred to the database. Uses `as_pgtraj` to insert the values into the traj schema.

Usage

```
ltraj2pgtraj(conn, ltraj, schema = "traj", pgtraj = NULL, comment = NULL,
  create = FALSE, new.srid = NULL)
```

Arguments

`conn`	Connection object created with RPostgreSQL
`ltraj`	An ltraj object.
`schema`	String. Name of the schema that stores or will store the pgtraj data model.
`pgtraj`	String. Name of the new pgtraj. Defaults to the name of the variable that stores the ltraj.
`comment`	String. A comment that will be stored with the pgtraj in the database.
`create`	Logical. If no matching SRID is found, should a new SRID be created? User must have write access on spatial_ref_sys table.
`new.srid`	Integer. Optional SRID to give to a newly created SRID. If left NULL (default), the next open value of ‘srid‘ in ‘spatial_ref_sys‘ between 880000 and 890000 will be used.

Value

TRUE on success

Author(s)

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See Also

`as_pgtraj`

Examples

```
## Not run: ltraj2pgtraj(conn, ibex, "traj_t2")
```

pgtraj2ltraj *Import a pgtraj into an ltraj.*

Description

pgtraj2ltraj imports a single pgtraj from a database into an ltraj object.

Usage

```
pgtraj2ltraj(conn, schema = "traj", pgtraj)
```

Arguments

conn	Connection object created with RPostgreSQL
schema	String. Name of the schema that stores or will store the pgtraj data model.
pgtraj	String. Name of the pgtraj.

Value

an ltraj object

Author(s)

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Examples

```
## Not run: pgtraj2ltraj(conn, "traj_t2", "ibex")
```

pgTrajDB2TempT *Insert relocations from a source table into the table 'qqbqahfs-brpq_temp'.*

Description

If relocations are given as X,Y coordinates, they are converted into a POINT geometry in PostGIS.

Usage

```
pgTrajDB2TempT(conn, schema, relocations_table, pgtrajs, animals,
  bursts = NULL, relocations, timestamps, rids, srid)
```

Arguments

conn	Connection object created with RPostgreSQL
schema	String. Name of the schema that stores or will store the pgtraj data model.
relocations_table	String. Name of the table that stores the relocations, e.g. "public.relocations"
pgtrajs	String. Name of the pgtraj or name of the field that stores the pgtraj names.
animals	String. Name of the animal or name of the field that stores the animal names.
bursts	String. Name of the burst or name of the field that stores the burst names.
relocations	Vector of string(s). Name of the field(s) that contains the relocations in relocations_table. If relocations are stored as pairs of (X,Y) or (long, lat) coorindates, the coordinates should be separeted in two fields and referenced accordingly.
timestamps	String. Name of the field in relocations_table that contains the timestamps.
rids	String. Name of the field in relocations_table that contains the numeric IDs of relocations.
srid	Numeric. The PostGIS SRID of the CRS of 'relocations'.

Author(s)

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pgTrajDelete *Delete one or more pgtrajs from a traj schema.*

Description

pgTrajDelete deletes one or more pgtrajs from a traj schema.

Usage

```
pgTrajDelete(conn, schema = "traj", pgtraj)
```

Arguments

conn	Connection object created with RPostgreSQL
schema	String. Name of the schema that stores the traj data model.
pgtraj	String. A vector containing the names of the pgtrajs.

Value

nothing

Author(s)

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Examples

```
## Not run: pgTrajDelete(conn, "traj", "ibex")

## Not run: pgTrajDelete(conn, schema="traj", pgtraj=c("ibex", "puechcirc")
```

`pgTrajR2TempT` *Insert an ltraj data frame into the 'qqbqahfsbrpq_temp' table. Input is an ltraj converted into a data frame with ld_opt(). Ltraj row names are preserved. No transaction control.*

Description

Insert an ltraj data frame into the 'qqbqahfsbrpq_temp' table. Input is an ltraj converted into a data frame with ld_opt(). Ltraj row names are preserved. No transaction control.

Usage

```
pgTrajR2TempT(conn, schema, dframe, pgtraj, srid = 0)
```

Arguments

`conn`	Connection object created with RPostgreSQL
`schema`	String. Name of the schema that stores or will store the pgtraj data model.
`dframe`	Data frame created from an ltraj with the function ld_opt().
`pgtraj`	String. Name of the new pgtraj. Defaults to the name of the variable that stores the ltraj.
`srid`	Numeric. The PostGIS SRID of the Coordinate Reference System of the relocation coordinates in the ltraj. Defaults to 0.

Value

TRUE on success, otherwise warning/error

Note

ST_PointFromText() vs. ST_MakePoint() http://gis.stackexchange.com/a/122263/56083

pgTrajSchema *Check 'traj' schema.*

Description

Checks if the provided schema exists in the database, and creates if it doesn't.

Usage

```
pgTrajSchema(conn, name = "traj")
```

Arguments

conn	Connection object created with RPostgreSQL.
schema	Chaaracter string. Name of the schema that stores or will store the pgtraj data model.

Details

Creates a 'traj' schema in the database by calling a SQL script from (./inst/sql/). The schema name defaults to 'traj'. If a schema with the provided name already exists in the database, it checks if it contains all the required tables. The function does not attempt to repair the schema if not all traj tables are present (e.g. because some were manually deleted). In this case, a new traj schema needs to be created.

The function has it's standalone transaction control.

Value

TRUE on success

Author(s)

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Examples

```
## Not run: pgTrajSchema(conn, "traj_1")
```

pgTrajTempT *Creates a temporary table in the 'traj' schema.*

Description

Used by pgTrajDB2TempT and pgTrajR2TempT to create a temporary table which will be populated by these functions. The temporary table's name is a random string to avoid collation with user generated tables.

Usage

```
pgTrajTempT(conn, schema)
```

Arguments

conn	Connection object created with RPostgreSQL
schema	String. Name of the schema that stores or will store the pgtraj data model.

Value

TRUE on success, otherwise warning/error

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Examples

```
## Not run: pgTrajTempT(conn, "traj_1")
```

pgTrajViewParams *Computes the trajectory parameters (as in ltraj) for a pgtraj and creates a view for the pgtraj. The views are always named as '<pgtraj>_params'.*

Description

Computes the trajectory parameters (as in ltraj) for a pgtraj and creates a view for the pgtraj. The views are always named as '<pgtraj>_params'.

Usage

```
pgTrajViewParams(conn, schema, pgtraj, epsg)
```

Arguments

conn	Connection object created with RPostgreSQL
schema	String. Name of the schema that stores or will store the pgtraj data model.
pgtraj	String. Name of the pgtraj.
epsg	Numeric. EPSG code of the relocation geometry.

Value

TRUE on success, otherwise warning/error

Author(s)

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pgTrajViewStepGeom *Creates a view of the step geometries for visualization.*

Description

Creates a view of the step geometries for visualization.

Usage

```
pgTrajViewStepGeom(conn, schema, pgtraj)
```

Arguments

conn	Connection object created with RPostgreSQL
schema	String. Name of the schema that stores or will store the pgtraj data model.

Value

TRUE on success, otherwise warning/error

Author(s)

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rpostgisLT *Integration of ltraj (adehabitatLT) and pgtraj (PostGIS).*

Description

rpostgisLT

Details

The ‘rpostgisLT‘ package develops the integration of R and PostGIS for managing movement trajectories. The focus is on streamlining the workflow for biologists to store and process animal trajectories in PostGIS and analyze them in R, thus utilizing the strengths of both software. The package relies on ‘ltraj‘ objects from the R package ‘adehabitatLT‘, and provides the analogous ‘pgtraj‘ data structure in PostGIS, with all functions to create and manage ‘pgtraj‘ data, and convert from and to both format (‘pgtraj‘ in PostGIS, ‘ltraj‘ in R). For a list of documented functions, use `library(help = "rpostgisLT")`

Author(s)

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test_input *Test inputs for the functions DB2reloc_temp(), as_pgtraj()*

Description

Test inputs for the functions DB2reloc_temp(), as_pgtraj()

Usage

```
test_input(pgtrajs = NULL, animals = NULL, relocations = NULL,
  bursts = NULL, rids = NULL, epsg = NULL)
```

Arguments

pgtrajs	String. Name of the pgtraj or name of the field that stores the pgtraj names.
animals	String. Name of the animal or name of the field that stores the animal names.
relocations	String. Name of the field that contains the relocations in relocations_table.
bursts	String. Name of the burst or name of the field that stores the burst names.
rids	String. Name of the field in relocations_table that contains the numeric IDs of relocations.
epsg	Numeric. The EPSG code of the Coordinate Reference System of the relocation coordinates in the ltraj. Defaults to 0.

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