Package ‘rpostgisLT’

September 6, 2016

Title Managing animal movement data with 'PostGIS' and R

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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 formats ('pgtraj' in PostGIS, 'ltraj' in R).

SystemRequirements PostgreSQL with PostGIS extension

Depends R (>= 3.3.0),
rpostgis,
adehabitatLT (>= 0.3.12)

License GPL (>= 3)

URL https://github.com/mablab/rpostgisLT

BugReports https://github.com/mablab/rpostgisLT/issues

Encoding UTF-8

LazyData true

RoxygenNote 5.0.1

Imports testthat

Suggests knitr,
rmarkdown

VignetteBuilder knitr

R topics documented:

as_pgtraj *Imports location data from a database table into a 'traj' schema.*

Description

as_pgtraj populates a traj schema from the data provided in relocations_table. If the provided schema doesn't exist, it will be created. On successful data input, as_pgtraj creates three database views for each pgtraj. These views are named <pgtraj_name>_parameters, <pgtraj_name>_step_geometry and <pgtraj_name>_summary and described more in detail in the package vignette.

The time zone of the pgtraj is set to the local time zone of the user.

Usage

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

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 schema and table that stores the relocations, e.g. c("schema","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. Relocations can be provided either as X,Y coordinates or PostGIS geometry. In both cases all relocations in the 'relocations_table' have to have the same projection.

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.

srid
: Integer. Optional SRID (spatial reference ID) of (x,y) coordinates provided for relocations. Ignored if relocations is a geometry type.

note
: String. Comment on the pgtraj. The comment is only used in the database and not transferred into an ltraj.

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.

Value

TRUE on success

Author(s)

Balázs Dukai <balazs.dukai@gmail.com>

References

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

See Also

Section on traj data model in the package vignette.

Examples

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

## End(Not run)

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

## End(Not run)
```

ltraj2pgtraj *Export ltraj object from R into database.*

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.

Usage

```
ltraj2pgtraj(conn, ltraj, schema = "traj", pgtraj = NULL, note = NULL,
  overwrite = FALSE)
```

Arguments

conn A connection object.

ltraj An object of class ltraj.

schema Character. Name of the schema that stores or will store the pgtraj data model.

pgtraj Character. Name of the new pgtraj. Defaults to the name of the provided ltraj.

note Character. A note that will be stored with the pgtraj in the database.

overwrite Logical. Use if a pgtraj with the same name as the provided ltraj already exists in the database: If TRUE, the existing pgtraj is deleted and the provided ltraj is inserted. If FALSE, the function exits. Note that overwrite requires an exact match among the pgtraj names otherwise it is ignored.

Value

TRUE on success.

Author(s)

Balázs Dukai <balazs.dukai@gmail.com>

See Also

as_pgtraj to create a pgtraj with data already stored in the database.

Examples

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

## End(Not run)
```

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)

Balázs Dukai <balazs.dukai@gmail.com>

Examples

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

pgTrajDB2TempT *Insert relocations from a source table into the table 'zgaqtsn_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, proj4string, note,
  time_zone)
```

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. c("schema","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 separated 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'.

proj4string String. The PROJ4 string to be inserted into `pgtraj` table.

note Sting. Comment on the pgtraj. The comment is only used in the database and not transferred into an ltraj.

time_zone String. Time zone to be inserted into `pgtraj` table.

Author(s)

Balázs Dukai

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

Description

`pgTrajDrop` deletes one or more pgtrajs from a traj schema.

Usage

```
pgTrajDrop(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

TRUE on success

Author(s)

Balázs Dukai <balazs.dukai@gmail.com>

Examples

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

## End(Not run)
```

`pgTrajSchema` *Check pgtraj schema.*

Description

Checks if the provided schema is a valid pgtraj schema, and creates one if it does not exist.

Usage

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

Arguments

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

Details

Creates a schema to store `pgtrajs` in the database by calling a SQL script from `./sql/traj_schema.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 all pgtraj tables are not present (e.g. because some were manually deleted). In this case, a new pgtraj schema needs to be created, or the existing schema needs to be deleted and recreated.

The function has it's standalone transaction control.

Value

`TRUE` if the schema exists (whether it was already available or was successfully created).

Author(s)

Balázs Dukai <`balazs.dukai@gmail.com`>

Examples

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

## End(Not run)
```

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

Author(s)

Balázs Dukai <balazs.dukai@gmail.com>

Examples

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

pgTrajVacuum *pgTrajVacuum VACUUM on a pgrtraj schema.*

Description

Performs a VACUUM (garbage-collect and optionally analyze) on all the tables of a traj schema.

Usage

```
pgTrajVacuum(conn, schema, full = FALSE, verbose = FALSE, analyze = TRUE)
```

Arguments

conn	Connection object created with RPostgreSQL
schema	String. Name of the schema that stores or will store the pgtraj data model.
full	Logical. Whether to perform a "full" vacuum, which can reclaim more space, but takes much longer and exclusively locks the table.
verbose	Logical. Whether to print a detailed vacuum activity report for each table.
analyze	Logical. Whether to update statistics used by the planner to determine the most efficient way to execute a query (default to TRUE).

Value

TRUE on success.

Author(s)

Balázs Dukai <balazs.dukai@gmail.com>

Examples

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

## End(Not run)
```

---

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_name>_parameters'.

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_name>_parameters'.

Usage

```
pgTrajViewParams(conn, schema, pgtraj, epsg, db = TRUE)
```

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.
db	Boolean. A switch that controlls the parameters view creation depending on source of data (R or PostgreSQL). If TRUE, raw data input from a database table is assumed. In this case all parameters will be computed. If FALSE, it is assumed that an ltraj was input from R with already computed parameters. In this case R2n and rel.angle will not be recomputed, but reused from the ltraj.

Value

TRUE on success, otherwise warning/error

Author(s)

Balázs Dukai

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.
`pgtraj`	String. Name of the pgtraj.

Value

TRUE on success, otherwise warning/error

Author(s)

Balázs Dukai

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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