Package ‘rbenvo’

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Version 1.0.5
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rbenvo-package

The 'rbenvo' package.

Description

rbenvo is a package that holds S4 class objects and methods for built environment data to ease the use of working with these data and improve interoperability with other packages.

activate

Determine the context of subsequent manipulation

Description

A benvo is a essentially a small relational database with a specific one-to-many structure between the subject table and each BEF tables. In order to know which data frame is of interest for displaying/manipulating at any given time use the activate function (akin to activate) to do so.

Usage

activate(x, what)

active(x)
**add_BEF**

**Arguments**

- **x**  
  benvo object

- **what**  
  name of df to activate

**Value**

a benvo

---

**Description**

Add Built Environment Feature to Benvo

**Usage**

```r
add_BEF(x, bef_data, bef_id, d_function = sf::st_distance)
```

**Arguments**

- **x**  
  benvo or base benvo

- **bef_data**  
  'tidy' data frame containing date/spatial information for one unique bef

- **bef_id**  
  unique bef_id column name

- **d_function**  
  function for calculating distance. Default is `st_distance`

---

**aggrenvo**

**Aggregate Matrix to Subject or Subject - Measurement Level**

---

**Description**

Aggregate Matrix to Subject or Subject - Measurement Level

**Usage**

```r
aggrenvo(x, M, stap_term, component)
```

## S3 method for class 'benvo'

```r
aggrenvo(x, M, stap_term, component)
```
Arguments

- `x`: benvo object
- `M`: matrix to aggregate
- `stap_term`: relevant stap term
- `component`: one of c("Distance","Time","Distance-Time") indicating which column(s) of the bef dataset should be returned

Methods (by class)

- benvo: method

Description

When building a benvo iteratively the base benvo allows you to start with no bef data constructed a priori and build up from subject data that contains spatial and/or temporal raw data in the form of `sf` structures or `Date` columns.

Usage

```r
base_benvo(subject_data, by, ...)
```

Arguments

- `subject_data`: data.frame containing subject level covariates.
- `by`: optional key
- `...`: optional arguments for specifying date-time columns see `set_datetime_cols`

Value

A benvo with attribute `base = TRUE`
**benvo**

Create a benvo object

**Description**

Create a benvo object

**Usage**

```r
benvo(subject_data, sub_bef_data = NULL, by = NULL, ...)
```

**Arguments**

- `subject_data` data.frame containing subject level covariates.
- `sub_bef_data` named list of data frames that contain subject-bef relevant data. NULL by default which returns a "base benvo" Which can be built upon/added to.
- `by` optional key to link subject - sub_bef data. Will use the intersection of column names if not specified directly.
- `...` optional arguments for specifying date-time columns see `set_datetime_cols`

**Details**

benvo is a constructor function which creates benvo objects. In particular, note that the benvo function will explicitly check the data you provide, to ensure benvo methods can be performed without error.

**Value**

benvo object

**See Also**

Introductory and more Specialized vignettes.

---

**benvo-methods**

Benvo Methods
Usage

bef_names(x)

components(x)

component_lookup(x, term)

subject_has_sf(x)

bef_has_sf(x, term)

num_BEF(x)

## S3 method for class 'benvo'
head(x, ...)

## S3 method for class 'benvo'
tail(x, ...)

get_id(x)

has_subject_dt(x)

has_bef_dt(x, term)

is.benvo(x)

Arguments

x                  a benvo object
term               bef_name string
...                optional arguments

---

create_CA_benvo   Create California Benvo

Description

This function exists primarily to save the hassle of having an sf object stored as an R data object, as it introduces non-ascii characters into the package. With this function, the appropriate benvo is returned.

Usage

create_CA_benvo()
**drop_BEF**

**Value**

a benvo with the Los Angeles data converted to sf objects.

**See Also**

The building benvos vignette

---

**drop_BEF**

*Drop Built Environment Feature from Benvo*

**Description**

Remove the active BEF data table and corresponding sub-bef data from the benvo.

**Usage**

drop_BEF(x)

**Arguments**

- **x**
  
  benvo or base benvo

**Value**

benvo without the active bef data

---

**example_benvo**

*Small benvo for use in benvo examples and vignettes.*

**Description**

Small benvo for use in benvo examples and vignettes.

**Usage**

FFbenvo

**Format**

A benvo with 1000 subjects and nearby simulated FFRs

- **FFR_subjects** see FFR_subjects dataset
- **FFR_distances** see FFR_distances dataset
FFR_distances  
Small dataset for use in `benvo` examples and vignettes.

**Description**

Small dataset for use in `benvo` examples and vignettes.

**Usage**

`FFR_distances`

**Format**

A data frame with 9501 rows and 2 columns

- **id**  The subject unique identifier
- **Distance**  The simulated distance between a hypothetical subject and fast food restaurant.

FFR_subjects  
Small dataset for use in `benvo` examples and vignettes.

**Description**

Small dataset for use in `benvo` examples and vignettes.

**Usage**

`FFR_subjects`

**Format**

A data frame with 1000 rows and 3 columns

- **id**  The subject unique identifier
- **sex**  The measurement unique identifier
- **BMI**  The Built Environment Unique identifier
**HFS_distances_times**

Small dataset for use in `benvo` examples and vignettes.

**Description**

Small dataset for use in `benvo` examples and vignettes.

**Usage**

`HFS_distances_times`

**Format**

A data frame with 5709 rows and 3 columns

<table>
<thead>
<tr>
<th>id</th>
<th>The subject unique identifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>measurement</td>
<td>The subject repeat measurement id</td>
</tr>
<tr>
<td>Distance</td>
<td>The simulated distance between a hypothetical subject and fast food restaurant.</td>
</tr>
<tr>
<td>Time</td>
<td>The simulated time between a hypothetical subject and fast food restaurant.</td>
</tr>
</tbody>
</table>

**HFS_subjects**

Longitudinal Dataset for use in `benvo` examples and vignettes.

**Description**

Longitudinal Dataset for use in `benvo` examples and vignettes.

**Usage**

`HFS_subjects`

**Format**

A data frame with 596 rows and 4 columns

<table>
<thead>
<tr>
<th>id</th>
<th>The subject unique identifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>measurement</td>
<td>The subject repeat measurement id</td>
</tr>
<tr>
<td>sex</td>
<td>The measurement unique identifier</td>
</tr>
<tr>
<td>BMI</td>
<td>The Built Environment Unique identifier</td>
</tr>
<tr>
<td>subj_effect</td>
<td>subject specific intercept used in simulating BMI exposure</td>
</tr>
<tr>
<td>exposure</td>
<td>The hypothetical Healthy Food Store exposure effect</td>
</tr>
</tbody>
</table>
joinvo

Join BEF and subject data within a benvo

Description

Join BEF and subject data within a benvo

Usage

joinvo(x, term, component = "Distance", NA_to_zero = F)

## S3 method for class 'benvo'
joinvo(x, term, component = "Distance", NA_to_zero = F)

Arguments

x  benvo object
term  string of bef name to join on in sub_bef_data
component  one of c("Distance","Time","Distance-Time") indicating which column(s) of the bef dataset should be returned
NA_to_zero  replaces NA values with zeros - potentially useful when constructing design matrices

Details

Joins the subject dataframe within a benvo to the supplied BEF dataframe keeping the selected component

Methods (by class)

- benvo: method

LA_restaurants

Los Angeles Fast Food Restaurants

Description

Los Angeles Fast Food Restaurants

Usage

LA_FF
**LA_schools**

**Format**

A dataframe with 8101 rows and 4 columns

name  Restaurant Name
osm_id  openstreetmap unique id
Latitude  Self Explanatory
Longitude  Self Explanatory

**Details**

data downloaded from the openstreetmap overpass api classified as "amenity:fast_food".

---

**California Public Schools Fitnessgram Data**

**Description**

California Public Schools Fitnessgram Data

**Usage**

LA_schools

**Format**

A dataframe with 308 rows and 8 columns

Perc5c  Proportion of Obese 5th Graders
NoStud5  Number of 5th Graders in the class
Charter  Factor variable indicating whether or not school is a charter school or not
cdscode  School identifier
City  Self Explanatory
County  Self Explanatory
Latitude  Self Explanatory
Longitude  Self Explanatory

**Details**

data downloaded from the CA department of education website, subset to include just those schools in Los Angeles.
longitudinal_design

**Longitudinal design dataframe**

**Description**
For use with `glmer` type formulas/models

**Usage**

```r
longitudinal_design(x, formula, ...)
```

Arguments

- `x`: benvo object
- `formula`: similar to `glmer`
- `...`: other arguments passed to the model frame

**Functions**

- `longitudinal_design`: method

---

**longitudinal_HFS**

Small benvo for use in `benvo` longitudinal examples and vignettes.

**Description**
Small benvo for use in `benvo` longitudinal examples and vignettes.

**Usage**

```r
longitudinal_HFS
```

**Format**

A benvo with 1000 subjects and nearby simulated FFRs

- `HFS_subjects` see `HFS_subjects` dataset
- `HFS_subjects` see `HFS_distances` dataset

**Details**

A hypothetical example showing how exposure to Healthy Food Stores (HFS) over time may decrease BMI
### plot.benvo

**Benvo plots**

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variety of plotting functions for benvo objects</td>
</tr>
</tbody>
</table>

#### Usage

```r
# S3 method for class 'benvo'
plot(x, plotfun = "pointrange", ...)
```

#### Arguments

- **x**: benvo object
- **plotfun**: one of c("pointrange","map")
- **...**: extra arguments for plotfun

---

### plot_map

**Spatial Plot of benvo**

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides a plot of benvo subjects and (one) BEF's locations</td>
</tr>
</tbody>
</table>

#### Usage

```r
plot_map(x, term = NULL)
```

#### Arguments

- **x**: benvo object
- **term**: BEF term
**plot_pointrange**

*Plot Pointrange*

**Description**

Plot Pointrange

**Usage**

```r
plot_pointrange(x, term = NULL, component = NULL, p = 0.95)
```

**Arguments**

- `x`: benvo object
- `term`: name of BEF to plot. If NULL plots the first component listed in the Benvo.
- `component`: one of c("Distance","Time") indicating which measure to use. Defaults to Distance if both measures are available, otherwise uses the only option.
- `p`: The probability of distances/times that should be included in interval

---

**plot_timeline**

*Temporal Plot of benvo*

**Description**

Provides a plot of benvo subjects temporal exposure over time.

**Usage**

```r
plot_timeline(x, ...)
```

**Arguments**

- `x`: benvo object
- `...`: currently ignored
print.benvo

benvo Print Method

Description
benvo Print Method

Usage

```r
## S3 method for class 'benvo'
print(x, ...)
```

Arguments

- **x**: benvo object
- **...**: ignored

set_datetime_cols

Set DateTime Columns

Description
When exposure time and lag exposure time need to be calculated the measurement date, and start/stop date columns can be provided to the benvo and base_benvo functions as optional arguments. Note that these columns will be converted to `date` objects if they’re not already.

Usage

```r
set_datetime_cols(
  measurement_date = NULL,
  start_date_col = NULL,
  stop_date_col = NULL
)
```

Arguments

- **measurement_date**: column string for the date at which a subject was measured
- **start_date_col**: column string for the date at which a subject/bef moved to their corresponding location
- **stop_date_col**: column string for the date at which a subject/bef stopped having exposure at the corresponding location.
Description

benvo BEF Summary Generic

Usage

```r
## S3 method for class 'benvo'
summary(object, ...)
```

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>object</td>
<td>a benvo object</td>
</tr>
<tr>
<td>...</td>
<td>ignored</td>
</tr>
</tbody>
</table>
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