Package 'rmapzen'

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```
Title Client for 'Mapzen' and Related Map APIs
Version 0.5.1
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Description Provides an interface to 'Mapzen'-based APIs (including
      geocode.earth, Nextzen, and NYC GeoSearch) for geographic search
      and geocoding, isochrone calculation, and vector data to draw map tiles.
      See <a href="https://www.mapzen.com/documentation/">https://www.mapzen.com/documentation/</a> for more information. The original
      Mapzen has gone out of business, but 'rmapzen' can be set up to work with
      any provider who implements the Mapzen API.
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LazyData TRUE
Depends R (>= 2.10)
Imports tibble, httr, jsonlite, ISOcodes, dplyr, assertthat,
      geojsonio, tidyr, purrr, digest, sf (>= 1.0.0), utils
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```

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Type Package

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Description

The rmapzen package provides interfaces to the Search https://github.com/pelias/documentation/, Isochrone https://valhalla.readthedocs.io/en/latest/, and Vector Tile https://tilezen.readthedocs.io/en/latest/ services from 'Mapzen', via the following functions:

Search

All functionality described in https://github.com/pelias/documentation/ are supported:

- mz_search
- mz_reverse_geocode
- mz_autocomplete
- mz_place
- mz_structured_search

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Additionally, mz_geocode is useful for a common application of search, that of just obtaining latitude and longitude for a given address or place.

Isochrone

Isochrones are the areas reachable from a given location within a specified period of time. Mapzen's Isochrone service can calculate isochrones for driving, walking, cycling, or multimodal forms of transport:

- mz_isochrone
- mz_costing: for constructing "costing models" that describe method of transport along with speed and other options relevant to the calculation of the isochrone
- mz_costing_options: for selecting specific options when constructing a costing model

Vector Tiles

- mz_vector_tiles: Request one or more adjacent tiles. Multiple map tiles will be stitched together before being returned as a single object.
- mz_tile_coordinates: When using mz_vector_tiles, you must specify the geographic area for which you want tile data. One way to do so is using the x, y, z tile naming system (see https://wiki.openstreetmap.org/wiki/Slippy_map_tilenames).
- mz_rect: Alternatively, you can specify the lower left and top-right points of a bounding box, which will automatically be converted to tile-coordinates when you use mz_vector_tiles
- mz_bbox: This is a generic function which will return the bounding box of any Mapzen object.
 In this way, you can request vector tiles for a region defined as the bounding box of an existing object.

Data types and conversion

Objects returned by rmapzen can be converted to simple features (sf) via the generic function as_sf. Search and Isochrone objects can additionally be converted to ordinary data.frames via as.data.frame.

Author(s)

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Other contributors:

• Daniel Possenriede [contributor]

See Also

- https://tarakc02.github.io/rmapzen/> contains detailed examples
- 'Mapzen' documentation

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as_sf

Coerce a Mapzen response to a simple features object

Description

Coerces responses to class sf. See vignette("sf1", package = "sf") for more information about Simple Features for R.

Usage

```
as_sf(geo, ...)
## S3 method for class 'geo_list'
as_sf(geo, ...)
## S3 method for class 'mapzen_vector_layer'
as_sf(geo, ...)
```

Arguments

geo The object to be converted ... not currently used

ca_tiles

Vector tiles the contain California

Description

Vector tiles the contain California

Usage

```
ca_tiles
```

Format

An object of class $mapzen_vector_tiles$ (inherits from list) of length 9.

Source

Mapzen, OpenStreetMap contributors, Who's On First, Natural Earth, and openstreetmapdata.com

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costing_models

Costing model constructors and helpers

Description

Mapzen's Isochrone service (mz_isochrone) as well as other mobility services (currently not implemented in this package, read more at https://valhalla.readthedocs.io/en/latest/) require users to specify a "costing model." See https://valhalla.readthedocs.io/en/latest/ for details. These can be difficult to construct correctly, so the objects mz_costing and mz_costing_options exist to make that process less error-prone and more convenient.

Usage

```
mz_costing
mz_costing_options
```

Format

An object of class list of length 4. An object of class list of length 4.

See Also

mz_isochrone

Examples

```
## creates a pedestrian costing model with walking speed of 2 km/hr
## that also avoids alleys.
## non-multimodal costing models will accept 0 or more options from the
## appropriate list.
mz_costing$pedestrian(
   mz_costing_options$pedestrian$walking_speed(2.0),
   mz_costing_options$pedestrian$alley_factor(0)
)
## creates a multimodal costing model that favors buses over rails, and
## has a slower than default walking speed
## (note multimodal has named arguments requiring list inputs)
mz_costing$multimodal(
   transit = list(
       mz_costing_options$transit$use_bus(1.0),
       mz_costing_options$transit$use_rail(5)
   pedestrian = list(
       mz_costing_options$pedestrian$walking_speed(4.1)
   )
)
```

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mapzen_references

Reference lists

Description

Lists of sources, layers, and countries, as they are expected to appear in the mz_search functions. These data objects are provided as a convenience, to be able to quickly and easily look up acceptable values for the optional arguments of search functions. Object names match the argument names for which they are appropriate. So mz_sources provide acceptable arguments for the source argument in mz_search, mz_layers for the layer argument, and mz_countries for the boundary.country argument. Mapzen's documentation (https://github.com/pelias/documentation/) explains more about each of these arguments.

Usage

```
mz_sources
mz_layers
mz_countries
```

Format

```
An object of class list of length 8.

An object of class list of length 13.

An object of class list of length 747.
```

Examples

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marina_walks

Pedestrian isochrones from the Berkeley Marina for 10 and 15 minutes

Description

Isochrone results from Mapzen as of January 8, 2017. The location for the isochrones is the Berkeley Marina, lat 37.86613, lon -122.3151

Usage

marina_walks

Format

An object of class mapzen_isochrone_list (inherits from geo_list) of length 3.

Source

Mapzen, OpenStreetMap, British Oceanographic Data Centre, NASA, USGS, and Transitland.

marina_walks_polygons Pedestrian isochrones from the Berkeley Marina for 10 and 15 minutes, as polygons

Description

Polygon Isochrone results (using polygons = TRUE) from Mapzen as of January 10, 2017. The location for the isochrones is the Berkeley Marina, lat 37.86613, lon -122.3151, and the contours are 10 and 15 minutes for a pedestrian costing model.

Usage

marina_walks_polygons

Format

An object of class mapzen_isochrone_list (inherits from geo_list) of length 3.

Source

Mapzen, OpenStreetMap, British Oceanographic Data Centre, NASA, USGS, and Transitland.

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mz_autocomplete

Mapzen search API

Description

Functions to access the various endpoints from the Mapzen Search API. For more details, see https://github.com/pelias/documentation/. If your data is already split up by street, city, state, zip, etc., then you might find mz_structured_search to be more precise. All arguments besides text (point in the case of mz_reverse_geocode) are optional. If you have parsed addresses (e.g. for geocoding), use mz_structured_search

Usage

```
mz_autocomplete(
  text,
  boundary.country = NULL,
  boundary.rect = NULL,
  focus.point = NULL,
  sources = NULL,
  layers = NULL,
  api_key = NULL
)
mz_reverse_geocode(
  point,
  size = NULL,
  layers = NULL,
  sources = NULL,
  boundary.country = NULL,
  api_key = NULL
)
mz_search(
  text,
  size = 10,
  boundary.country = NULL,
  boundary.rect = NULL,
  boundary.circle = NULL,
  focus.point = NULL,
  sources = NULL,
  layers = NULL,
  api_key = NULL
)
```

Arguments

text

Search string

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boundary.country

ISO-3166 country code to narrow the search. See mz_countries

boundary.rect 4 corners that define a box to narrow the search. Can be the result of mz_bbox.

Should have named elements with names "min_lon", "min_lat", "max_lon",

"max_lat" - can be created using mz_rect.

focus.point A point to "focus" the search. Can be created with mz_location or mz_geocode,

otherwise should have names "lat" and "lon"

sources The originating source of the data (to filter/narrow search results). See mz_sources

layers Which layers (types of places) to search. See https://github.com/pelias/

documentation/ for definitions, and use mz_layers for convenience

api_key Your Mapzen API key. The default is to look for the key within the provider

information that was set up with 'mz_set_host'.

point For reverse geocoding, the location to reverse geocode. Can be created with

mz_location or mz_geocode, otherwise should have names "lat" and "lon"

size Number of search results requested

boundary.circle

A circle to narrow the search. Should have named elements with names "lon",

"lat", and "radius"

See Also

```
mz_place, mz_structured_search, mz_countries, mz_sources, mz_layers
```

Examples

mz_bbox

Get the bounding box

Description

Returns the bottom left and top right corners of the box that contains a mapzen object (mz_geo_list, mz_isochrone_list, or mapzen_vector_tiles). In the case of mz_rect, creates such a box from the specified coordinates. The returned value can be used directly as the boundary.rect parameter for search functions, as well as converted to x, y, zoom coordinates to use with mz_vector_tiles.

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Usage

```
mz_bbox(geo)
## S3 method for class 'mapzen_geo_list'
mz_bbox(geo)
## S3 method for class 'mapzen_isochrone_list'
mz_bbox(geo)
mz_rect(min_lon, min_lat, max_lon, max_lat)
```

Arguments

```
geo A mapzen geo list or isochrone list min_lon, min_lat, max_lon, max_lat
```

The bottom left and top right corners, expressed as latitude and longitude, of a rectangle.

Value

A single-row tibble with columns min_lon, min_lat, max_lon, max_lat.

Examples

```
mz_rect(min_lon = -122.2856, min_lat = 37.73742, max_lon = -122.1749, max_lat = 37.84632)
mz_bbox(oakland_public)
```

mz_check_usage

Check usage statistics

Description

Prints out remaining queries for various time periods. rmapzen manages rate limiting for the persecond limits, but does not keep track of the daily limits.

Usage

```
mz_check_usage()
```

Details

This function is populated from the headers of responses to various API requests. If no queries have been made, or if the only queries so far have hit cache servers, then no information will be available.

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mz_contours

Create an mz_contours object

Description

Contours are given as inputs to mz_isochrone. This function makes it convenient to construct them.

Usage

```
mz_contours(times, colors = NULL)
```

Arguments

times Times in minutes for the contour. Up to a maximum of 4 numbers.

colors Colors for the contours. By default, a palette will be constructed from the Col-

orbrewer 4-class oranges palette.

mz_coordinates

Extract a data frame of coordinates from a mapzen_geo_list

Description

Extract a data frame of coordinates from a mapzen_geo_list

Usage

```
mz_coordinates(geo)
## S3 method for class 'mapzen_geo_list'
mz_coordinates(geo)
```

Arguments

geo

A mapzen geo list

Value

A tibble, with columns lon and lat.

Examples

```
mz_coordinates(oakland_public)
```

mz_geocode

mz_date_time

Create mz_date_time objects

Description

Mobility services (such as mz_isochrone) take, optionally, a date_time argument that specifies the date and time along with type (departure/arrival). This function constructs the appropriate objects to use as date_time arguments.

Usage

```
mz_date_time(date_time, type = "departure")
```

Arguments

date_time A POSIXt date-time object
type "departure" or "arrival"

mz_geocode

Geocode an address or other location

Description

This is a convenience function that calls mz_search to retrieve latitude and longitude.

Usage

```
mz_geocode(location, ...)
```

Arguments

location An address or other suitably specific search string
... Additional arguments passed on to mz_search

Value

A tibble, with the parsed address used to retrieve the geocode, lat/lon, and the confidence (between 0 and 1)

See Also

```
mz_search, mz_reverse_geocode
```

mz_geocode_structured

Examples

```
## Not run:
mz_geocode("1600 Pennsylvania Ave., Washington DC")
# can also be a landmark
mz_geocode("Statue of Liberty, New York")
## End(Not run)
```

mz_geocode_structured Geocode a structured address

Description

mz_geocode allows you to search using an unstructured string of text, but if your address data has more structure (eg separate columns for address, city, state, zip), then using the structured search service may provide more precision. For more information, see https://github.com/pelias/documentation/. Note that all of the arguments are optional, but at least one of them must be non-NULL. Furthermore, postalcode can not be used by itself.

Usage

```
mz_geocode_structured(
  address = NULL,
  neighbourhood = NULL,
  borough = NULL,
  locality = NULL,
  county = NULL,
  region = NULL,
  postalcode = NULL,
  country = NULL,
  ...
)
```

Arguments

address Can be a numbered street address or just the name of the street

neighbourhood Neighborhood name (eg "Notting Hill" in London)

borough eg "Manhattan"

locality The city (eg "Oakland")

county The county

region States in the case of US/Canada, or state-like administrative division in other

countries

postalcode AKA the zip code. Can not be used alone, must have at least one other argument country The country - Can be the full name or the abbreviation from mz_countries

... Arguments passed on to mz_structured_search

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Value

A tibble, with the parsed address used to retrieve the geocode, lat/lon, and the confidence (between 0 and 1)

See Also

```
mz_geocode, mz_structured_search
```

mz_isochrone

Retrieve isochrones

Description

From https://valhalla.readthedocs.io/en/latest/: "An isochrone is a line that connects points of equal travel time about a given location, from the Greek roots of 'iso' for equal and 'chrone' for time. The Mapzen Isochrone service computes areas that are reachable within specified time intervals from a location, and returns the reachable regions as contours of polygons or lines that you can display on a map."

Usage

```
mz_isochrone(
  locations,
  costing_model,
  contours,
  date_time = NULL,
  polygons = NULL,
  denoise = NULL,
  generalize = NULL,
  id = "my-iso",
  api_key = NULL
)
```

Arguments

locations An mz_location, or something that can be coerced to an mz_location, as the

departure point for the isochrone. This can be the result of mz_geocode. Despite the argument name, the isochrone service currently can only accept a single

location

costing_model The costing model, see mz_costing contours

Up to 4 contours, see mz_contours

date_time The local date and time at the location, and whether it is the departure or arrival

time. See mz_date_time

polygons Whether to return polygons (TRUE) or linestrings (FALSE, default)

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A value between 0 and 1 (default 1) to remove smaller contours. A value of 1 will only return the largest contour for a given time value. A value of 0.5 drops any contours that are less than half the area of the largest contour.

Tolerance in meters for the Douglas-Peucker generalization.

A descriptive identifier, the response will contain the id as an element.

Your Mapzen API key. The default is to look for the key within the provider information that was set up with 'mz_set_host'.

Value

A mapzen_isochrone_list, which can be converted to sf using as_sf.

See Also

```
mz_costing
```

Examples

```
## Not run:
mz_isochrone(
    mz_location(lat = 37.87416, lon = -122.2544),
    costing_model = mz_costing$auto(),
    contours = mz_contours(c(10, 20, 30))
)

# departure point can be specified as a geocode result
mz_isochrone(
    mz_geocode("UC Berkeley"),
    costing_model = mz_costing$pedestrian(),
    contours = mz_contours(c(10, 20, 30))
)

## End(Not run)
```

 $mz_location$

Create/extract lat/lon location information

Description

mz_location constructs a new mz_location object, which can be used with functions such as mz_isochrone or mz_reverse_geocode. as.mz_location coerces eligible objects to mz_locations.

mz_place

Usage

```
mz_location(lat, lon)
as.mz_location(x, ...)
## Default S3 method:
as.mz_location(x, ...)
## S3 method for class 'mz_geocode_result'
as.mz_location(x, ...)
```

Arguments

lat	Latitude
lon	Longitude
x	An object that has location information
	Not currently used

See Also

 $mz_isochrone$ For using the Mapzen isochrone service $mz_contours$, $mz_costing$, and $mz_costing_options$ for other argument constructors

mz_place

Get details on a place

Description

Search functions (e.g. mz_search) return identification numbers, or gids. Use mz_place to retrieve more details about the place. See https://github.com/pelias/documentation/ for details. This function is generic, and can take a character vector of IDs, or a mapzen_geo_list as returned by mz_search and friends.

```
mz_place(ids, ..., api_key = NULL)
## S3 method for class 'character'
mz_place(ids, ..., api_key = NULL)
## S3 method for class 'mapzen_geo_list'
mz_place(ids, ..., gid = "gid", api_key = NULL)
```

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Arguments

ids	A character vector of gids (see details), or a mapzen_geo_list
	Arguments passed on to methods
api_key	Your Mapzen API key. The default is to look for the key within the provider information that was set up with 'mz_set_host'.
gid	The name of the gid field to use. Search results may include, in addition to the gid for the search result itself (the default), the gids for the country, region, county, locality and neighborhood.

mz_provider Configure provider information

Description

rmapzen works with most implementations of PELIAS. This function defines the base URL for a particular API provider, and can be used to provider the provider argument to mz_set_host.

Usage

```
mz_provider(hostname, path = NULL, key = NULL, scheme = "https")
```

Arguments

hostname The hostname in the API URL, for instance www.example.com
path Specific path that all API requests must include, e.g. "v1"

key API key for this provider, if required

scheme The scheme for the URL, should always be "https"

See Also

mz_set_host

mz_set_host Set up a host provider for a PELIAS service

Description

rmapzen works with most implementations of PELIAS. Use this function to set up the basic information required to connect to a particular provider. Provider-specific setup functions include information to set up known providers.

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Usage

```
mz_set_host(which, provider)
mz_get_host(which)
mz_set_search_host_geocode.earth(key = Sys.getenv("GEOCODE.EARTH_KEY"))
mz_set_search_host_nyc_geosearch()
mz_set_tile_host_nextzen(key = Sys.getenv("NEXTZEN_KEY"))
```

Arguments

which One of "search", "matrix", or "tile"

provider A provider, created using mz_provider

key API key

See Also

mz_provider

mz_structured_search Structured search

Description

mz_search allows you to search using an unstructured string of text, but if your address data has more structure (eg separate columns for address, city, state, zip), then using the structured search service may provide more precision. For more information, see https://github.com/pelias/documentation. Note that all of the arguments are optional, but at least one of them must be non-NULL. Furthermore, postalcode can not be used by itself.

```
mz_structured_search(
  address = NULL,
  neighbourhood = NULL,
  borough = NULL,
  locality = NULL,
  county = NULL,
  region = NULL,
  postalcode = NULL,
  country = NULL,
  country = NULL,
  api_key = NULL,
  ...
)
```

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Arguments

address Can be a numbered street address or just the name of the street

neighbourhood Neighborhood name (eg "Notting Hill" in London)

borough eg "Manhattan"

locality The city (eg "Oakland")

county The county

region States in the case of US/Canada, or state-like administrative division in other

countries

postalcode AKA the zip code. Can not be used alone, must have at least one other argument

country The country - Can be the full name or the abbreviation from mz_countries

api_key Your Mapzen API key. The default is to look for the key within the provider

information that was set up with 'mz_set_host'.

.. Any of the parameters, other than "text", that appear in mz_search, can appear

here, for example size, boundary.country, etc.

See Also

mz_search

mz_tile_coordinates
Specify tile coordinates

Description

mz_vector_tiles requires tile coordinates or some other specification of the region that is to be drawn. mz_vector_tiles will automatically convert its inputs to vector tiles, so you generally won't need to use this function directly.

```
mz_tile_coordinates(x, y, z)
as.mz_tile_coordinates(obj, ...)
## S3 method for class 'mz_tile_coordinates'
as.mz_tile_coordinates(obj, ...)
## S3 method for class 'mz_bbox'
as.mz_tile_coordinates(obj, ..., z = NULL, height = NULL, width = NULL)
## S3 method for class 'mz_location'
as.mz_tile_coordinates(obj, ..., z = 15L)
## S3 method for class 'mz_geocode_result'
as.mz_tile_coordinates(obj, ..., z = 15L)
```

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Arguments

X	integer vector of x-coordinates
У	integer vector of y-coordinates
z	integer between 0 and 19 specifying the zoom level $$
obj	An object that can be converted to tile coordinates
	Other arguments passed on to methods
height	Height in pixels
width	Width in pixels

See Also

```
mz_vector_tiles, mz_bbox
```

Examples

mz_vector_tiles

Request vector tile data

Description

From https://tilezen.readthedocs.io/en/latest/: "Vector tiles are square-shaped collections of geographic data that contain the map feature geometry, such as lines and points."

```
mz_vector_tiles(tile_coordinates, ..., Origin = NULL)
```

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Arguments

```
an mz_tile_coordinates object, or something that can be coerced to one (including the output of mz_bbox)

Arguments passed on to as.mz_tile_coordinates.

Origin optional, specify Origin URL in request header
```

Details

Multiple tiles are stitched together and returned as one object. Individual layers can be converted to sf or sp, making it possible to draw each layer with custom styles.

Value

A list of tile layers (such as "water", "buildings", "roads", etc.). Each layer is an object of class mapzen_vector_layer, which can be converted to sf using as_sf

See Also

```
mz_tile_coordinates
```

Examples

```
## Not run:
# vector tile at x = 19293, y = 24641, and zoom level 16
mz_vector_tiles(mz_tile_coordinates(19293, 24641, 16))
# multiple contiguous tiles will be stitched together
# this returns the result of stitching together 4 tiles
mz_vector_tiles(mz_tile_coordinates(19293:19294, 24641:24642, 16))
# can also use a bounding box:
mz_vector_tiles(mz_rect(min_lon = -122.2856,
                        min_lat = 37.73742,
                        \max_{l} = -122.1749,
                        max_lat = 37.84632))
# mz_bbox returns a bounding box for any Mapzen object
mz_vector_tiles(mz_bbox(oakland_public))
# bounding boxes are automatically converted to tile coordinates,
# with the zoom level based on the desired size in pixels of the final map
mz_vector_tiles(mz_bbox(oakland_public), height = 750, width = 1000)
## End(Not run)
```

22 oakland_public

oakland_public

25 search results for "Oakland Public library branch"

Description

Contains the search results from Mapzen's search service for the query "Oakland public library branch" as of January 8, 2017.

Usage

oakland_public

Format

A mapzen_geo_list with 25 locations

Source

Mapzen, OpenStreetMap, OpenAddresses, GeoNames, WhosOnFirst, see https://www.mapzen.com/rights/

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