Package ‘hereR’

January 29, 2020

Type Package
Title 'sf'-Based Interface to the 'HERE' REST APIs
Version 0.3.1
Maintainer Merlin Unterfinger <info@munterfinger.ch>
URL https://munterfinger.github.io/hereR/,
https://github.com/munterfinger/hereR/
BugReports https://github.com/munterfinger/hereR/issues/
Description Interface to the 'HERE' REST APIs:<https://developer.here.com/develop/rest-apis>:
(1) geocode and autocomplete addresses or reverse geocode POIs using the 'Geocoder' API;
(2) route directions, travel distance or time matrices and isolines using the 'Routing' API;
(3) request real-time traffic flow and incident information from the 'Traffic' API;
(4) find request public transport connections and nearby stations from the 'Public Transit' API;
(5) get weather forecasts, reports on current weather conditions, astronomical information and alerts at a specific location from the 'Destination Weather' API.
Locations, routes and isolines are returned as 'sf' objects.
Depends R (>= 3.3.0)
Imports curl (>= 4.2), data.table (>= 1.12.6), jsonlite (>= 1.6),
lwgeom (>= 0.1-7), sf (>= 0.8-0), stringr (>= 1.4.0)
Suggests ggplot2 (>= 3.2.1), leaflet (>= 0.0.1), mapview (>= 2.7.0),
testthat (>= 2.2.1), knitr (>= 1.25), rmarkdown (>= 1.16), covr
(>= 3.3.2)
License GPL-3
Encoding UTF-8
LazyData true
RoxygenNote 7.0.2
VignetteBuilder knitr
NeedsCompilation no
Author Merlin Unterfinger [aut, cre]
Repository CRAN
Date/Publication 2020-01-29 16:40:02 UTC
Description

The hereR package provides an interface to the 'HERE' REST APIs:

- Geocode and autocomplete addresses or reverse geocode POIs using the 'Geocoder' API;
- Route directions, travel distance or time matrices and isolines using the 'Routing' API;
- Request real-time traffic flow and incident information from the 'Traffic' API;
- Find request public transport connections and nearby stations from the 'Public Transit' API;
- Get weather forecasts, reports on current weather conditions, astronomical information and alerts at a specific location from the 'Destination Weather' API.

Locations, routes and isolines are returned as sf objects.

Application credentials

This package requires an API key for a HERE project. The key is set for the current R session and is used to authenticate in the requests to the APIs. A free login and project can be created on https://developer.here.com/. In order to obtain the API key navigate to a project of your choice in the developer portal, select 'REST: Generate APP' and then 'Create API Key'. To set the API key, please use: set_key("<YOUR API KEY>")
Functions to access the APIs

- **autocomplete** - Get suggestions for address strings.
- **geocode** - Get coordinates from addresses.
- **reverse_geocode** - Get addresses or landmarks from locations.
- **route** - Find the fastest routes between places.
- **route_matrix** - Request a matrix of route summaries between places.
- **isoline** - Create isochrone, isodistance or isoconsumption lines around places.
- **traffic** - Get information about traffic jam and incidents in areas.
- **connection** - Request public transport connections between places.
- **station** - Find stations nearby places.
- **weather** - Get weather observations, forecasts and alerts at places.

Author(s)

Merlin Unterfinger - <info@munterfinger.ch>

See Also

- [https://github.com/munterfinger/hereR/](https://github.com/munterfinger/hereR/)
- [https://munterfinger.github.io/hereR/](https://munterfinger.github.io/hereR/)

---

**Example Areas of Interest**

**Description**

Some example Areas of Interest (AOIs): The boundary polygons of Switzerland and Liechtenstein.

**Usage**

data(aoi)

**Format**

An object of class "sf", "data.frame".

**Source**

Made with Natural Earth. Free vector and raster map data @naturalearthdata.com

**Examples**

data(aoi)
**HERE Geocoder API: Autocomplete**

**Description**
 Completes addresses using the HERE 'Geocoder Autocomplete' API.

**Usage**

```r
autocomplete(addresses, results = 5, url_only = FALSE)
```

**Arguments**

- `addresses`: character, addresses to autocomplete.
- `results`: numeric, maximum number of suggestions (Valid range: 1 and 20).
- `url_only`: boolean, only return the generated URLs (default = FALSE)?

**Value**

A `data.table` object, containing the autocomplete suggestions for the addresses.

**References**

HERE Geocoder API: Autocomplete

**Examples**

```r
# Provide an API Key for a HERE project
set_key("<YOUR API KEY>")

suggestions <- autocomplete(addresses = poi$city, url_only = TRUE)
```

---

**HERE Public Transit API: Transit Route**

**Description**

Route public transport connections with geometries (LINESTRING) between pairs of points using the HERE 'Public Transit' API. Two modes are provided:

- `summary = FALSE`: The public transport connections are returned as multiple sections with the same vehicle and transport mode. Each section has a detailed route geometry.
- `summary = TRUE`: A summary of the connections is retrieved, where each connection is represented as one row with a unified and simplified geometry.
**connection**

Usage

```r
connection(
  origin,
  destination,
  datetime = Sys.time(),
  arrival = FALSE,
  results = 3,
  transfers = -1,
  summary = FALSE,
  url_only = FALSE
)
```

Arguments

- **origin**: sf object, the origin locations of geometry type POINT.
- **destination**: sf object, the destination locations of geometry type POINT.
- **datetime**: POSIXct object, datetime for the departure (or arrival if `arrival = TRUE`).
- **arrival**: boolean, calculate connections for arrival at the defined time (default = FALSE)?
- **results**: numeric, maximum number of suggested public transport routes (Valid range: 1 and 6).
- **transfers**: numeric, maximum number of transfers allowed per route (Valid range: -1 and 6, default = -1).
- **summary**: boolean, return a summary of the public transport connections instead of the sections of the routes (default = FALSE)?
- **url_only**: boolean, only return the generated URLs (default = FALSE)?

Value

An sf object containing the requested routes.

Note

As it is not possible to match the "maneuvers" to the "connections-sections" in the API response using the section id (sec_id), the returned geometries of walking sections are straight lines between the station (or origin and destination) points instead of routed lines on the pedestrian network. The walking segments can be routed in hindsight using the `route` function with mode set to "pedestrian".

References

HERE Public Transit API: Transit Route

Examples

```r
# Provide an API Key for a HERE project
set_key("<YOUR API KEY>")
```
# Connection sections
sections <- connection(
  origin = poi[3:4, ], destination = poi[5:6, ],
  summary = FALSE, url_only = TRUE
)

# Connection summary
summary <- connection(
  origin = poi[3:4, ], destination = poi[5:6, ],
  summary = TRUE, url_only = TRUE
)

---

**flow**

**HERE Traffic API: Flow**

### Description
Real-time traffic flow from the HERE 'Traffic' API in areas of interest (AOIs). The traffic flow data contains speed ("SP") and congestion (jam factor: "JF") information, which corresponds to the status of the traffic at the time of the query.

### Usage
`flow(aoi, min_jam_factor = 0, url_only = FALSE)`

#### Arguments
- **aoi**: sf object, Areas of Interest (POIs) of geometry type POLYGON.
- **min_jam_factor**: numeric, only retrieve flow information with a jam factor greater than the value provided (default = 0).
- **url_only**: boolean, only return the generated URLs (default = FALSE)?

### Value
An sf object containing the requested traffic flow information.

### Note
The maximum width and height of the bounding box of the input AOIs is 10 degrees. This means that each polygon (= one row) in the AOI sf object should fit in a 10 x 10 degree bbox.

Explanation of the traffic flow variables:
- "PC": Point TMC location code.
- "DE": Text description of the road.
- "QD": Queuing direction. '+' or '-'. Note this is the opposite of the travel direction in the fully qualified ID, For example for location 107+03021 the QD would be '-'.
- "LE": Length of the stretch of road.
• "TY": Type information for the given Location Referencing container. This may be a freely defined string.
• "SP": Speed (based on UNITS) capped by speed limit.
• "FF": The free flow speed on this stretch of the road.
• "JF": The number between 0.0 and 10.0 indicating the expected quality of travel. When there is a road closure, the Jam Factor will be 10. As the number approaches 10.0 the quality of travel is getting worse. -1.0 indicates that a Jam Factor could not be calculated.
• "CN": Confidence, an indication of how the speed was determined. -1.0 road closed. 1.0=100%.

References

• HERE Traffic API: Flow
• Flow explanation, stackoverflow

Examples

# Provide an API Key for a HERE project
set_key("<YOUR API KEY>")

# Real-time traffic flow
flow <- flow(
  aoi = aoi[aoi$code == "LI", ],
  url_only = TRUE
)

---

geocode

**HERE Geocoder API: Geocode**

Description

Geocodes addresses using the HERE 'Geocoder' API.

Usage

geocode(addresses, autocomplete = FALSE, url_only = FALSE)

Arguments

addresses character, addresses to geocode.
autocomplete boolean, use the 'Geocoder Autocomplete' API to autocomplete addresses?
  Note: This options doubles the amount of requests (default = FALSE).
url_only boolean, only return the generated URLs (default = FALSE)?

Value

An sf object, containing the coordinates of the geocoded addresses.
References

HERE Geocoder API: Geocode

Examples

# Provide an API Key for a HERE project
set_key("<YOUR API KEY>"

locs <- geocode(addresses = poi$city, url_only = TRUE)

incident

HERE Traffic API: Incidents

Description

Traffic incident information from the HERE 'Traffic' API in areas of interest (AOIs). The incidents contain information about location, duration, severity, type, description and further details.

Usage

incident(aoi, from = Sys.time() - 60 * 60 * 24 * 7, url_only = FALSE)

Arguments

aoi sf object, Areas of Interest (POIs) of geometry type POLYGON.
from POSIXct object, datetime of the earliest traffic incidents (default = FALSE).
url_only boolean, only return the generated URLs (default = FALSE)?

Value

An sf object containing the traffic incidents.

Note

The maximum width and height of the bounding box of the input AOIs is 10 degrees. This means that each polygon (= one row) in the AOI sf object should fit in a 10 x 10 degree bbox.

References

HERE Traffic API: Incidents
### Examples

```r
# Provide an API Key for a HERE project
set_key("<YOUR API KEY>")

# All traffic incidents from the beginning of 2018
incidents <- incident(
  aoi = aoi,
  from = as.POSIXct("2018-01-01 00:00:00"),
  url_only = TRUE
)
```

### isoline

**HERE Routing API: Calculate Isoline**

#### Description

Calculates isolines (POLYGON or MULTIPOLYGON) using the HERE 'Routing' API that connect the end points of all routes leaving from defined centers (POIs) with either a specified length, a specified travel time or consumption.

#### Usage

```r
isoline(
  poi,  # sf object, Points of Interest (POIs) of geometry type POINT.
  datetime = Sys.time(),  # POSIXct object, datetime for the departure (or arrival if arrival = TRUE).
  arrival = FALSE,  # boolean, are the provided Points of Interest (POIs) the origin or destination locations (default = FALSE)?
  range = seq(5, 30, 5) * 60,  # numeric, a vector of type integer containing the breaks for the generation of the isolines: (1) time in seconds; (2) distance in meters; (3) consumption in costfactor.
  range_type = "time",  # character, unit of the isolines: "distance", "time" or "consumption".
  type = "fastest",  # character, set the routing type: "fastest" or "shortest".
  mode = "car",  # numeric, a vector of type integer containing the breaks for the generation of the isolines: (1) time in seconds; (2) distance in meters; (3) consumption in costfactor.
  traffic = FALSE,  # boolean, are the provided Points of Interest (POIs) the origin or destination locations (default = FALSE)?
  aggregate = TRUE,  # boolean, are the provided Points of Interest (POIs) the origin or destination locations (default = FALSE)?
  url_only = FALSE  # boolean, are the provided Points of Interest (POIs) the origin or destination locations (default = FALSE)?
)
```

#### Arguments

- **poi**: sf object, Points of Interest (POIs) of geometry type POINT.
- **datetime**: POSIXct object, datetime for the departure (or arrival if arrival = TRUE).
- **arrival**: boolean, are the provided Points of Interest (POIs) the origin or destination locations (default = FALSE)?
- **range**: numeric, a vector of type integer containing the breaks for the generation of the isolines: (1) time in seconds; (2) distance in meters; (3) consumption in costfactor.
- **range_type**: character, unit of the isolines: "distance", "time" or "consumption".
- **type**: character, set the routing type: "fastest" or "shortest".
mode character, set the transport mode: "car", "pedestrian" or "truck".
traffic boolean, use real-time traffic or prediction in routing (default = FALSE)? If no datetime is set, the current timestamp at the moment of the request is used for datetime.
aggregate boolean, aggregate (with function min) and intersect the isolines from geometry type POLYGON to geometry type MULTIPOLYGON (default = TRUE)?
url_only boolean, only return the generated URLs (default = FALSE)?

Value

An sf object containing the requested isolines.

References

HERE Routing API: Calculate Isoline

Examples

# Provide an API Key for a HERE project
set_key("<YOUR API KEY>")

# Isochrone for 5, 10, 15, 20, 25 and 30 minutes driving time
isolines <- isoline(
  poi = poi,
  range = seq(5, 30, 5) * 60,
  url_only = TRUE
)

Example Points of Interest

Description

Some example Points of Interest (POIs): Cities in Switzerland and Liechtenstein with more than 100'000 inhabitants.

Usage

data(poi)

Format

An object of class "sf", "data.frame".

Source

Made with Natural Earth. Free vector and raster map data @naturalearthdata.com
reverse_geocode

Examples

```r
data(poi)
```

---

**reverse_geocode**

**HERE Geocoder API: Reverse Geocode**

**Description**

Get addresses or landmarks from locations using the HERE 'Geocoder' API. The return value is an `sf` object, containing point geometries with suggestions for addresses or landmarks near the provided POIs.

**Usage**

```r
reverse_geocode(poi, results = 1, landmarks = FALSE, url_only = FALSE)
```

**Arguments**

- `poi` (`sf` object, Points of Interest (POIs) of geometry type `POINT`).
- `results` (`numeric`, maximum number of results (Valid range: 1 and 20)).
- `landmarks` (`boolean`, retrieve landmarks instead of addresses (default = FALSE)).
- `url_only` (`boolean`, only return the generated URLs (default = FALSE)).

**Value**

An `sf` object, containing the suggested addresses or landmark names of the reverse geocoded POIs.

**Note**

If no addresses or landmarks are found near a POI, NULL for this POI is returned. In this case the rows corresponding to this particular POI are missing and merging the POIs by row is not possible. However, in the returned `sf` object, the column "id" matches the rows of the input POIs. The "id" column can be used to join the original POIs.

**References**

**HERE Geocoder API: Geocode**

**Examples**

```r
# Provide an API Key for a HERE project
set_key("<YOUR API KEY>")

# Get addresses
addresses <- reverse_geocode(poi = poi, results = 3, landmarks = FALSE, url_only = TRUE)

# Get landmarks
landmarks <- reverse_geocode(poi = poi, results = 3, landmarks = TRUE, url_only = TRUE)
```
route

**Description**

Calculates route geometries (LINESTRING) between given pairs of points using the HERE 'Routing' API. Routes can be created for various transport modes, as for example 'car' or 'public transport', incorporating current traffic information, if available. For routes using the transport mode "car" a vehicle type can be specified, to obtain an estimate of the consumption.

**Usage**

```r
describe(route(
  origin, 
  destination, 
  datetime = Sys.time(), 
  arrival = FALSE, 
  type = "fastest", 
  mode = "car", 
  traffic = FALSE, 
  vehicle_type = "diesel,5.5", 
  url_only = FALSE
))
```

**Arguments**

- `origin` sf object, the origin locations of geometry type POINT.
- `destination` sf object, the destination locations of geometry type POINT.
- `datetime` POSIXct object, datetime for the departure (or arrival if `arrival = TRUE`).
- `arrival` boolean, calculate routes for arrival at the defined time (default = FALSE)?
- `type` character, set the routing type: "fastest", "shortest" or "balanced".
- `mode` character, set the transport mode: "car", "pedestrian", "carHOV", "publicTransport", "truck" or "bicycle".
- `traffic` boolean, use real-time traffic or prediction in routing (default = FALSE)? If no `datetime` is set, the current timestamp at the moment of the request is used for `datetime`.
- `vehicle_type` character, specify the motor type of the vehicle: "diesel", "gasoline" or "electric". And set the consumption per 100km in liters (default = "diesel,5.5").
- `url_only` boolean, only return the generated URLs (default = FALSE)?

**Value**

An sf object containing the requested routes.
Note

The public transport routes (mode = "publicTransport") provided by route are not considering the time tables of the public transport providers. Use connection for public transport routes that consider time tables.

References

HERE Routing API: Calculate Route

Examples

```
# Provide an API Key for a HERE project
set_key("<YOUR API KEY>")

to <- poi[rep(seq_len(nrow(poi)), nrow(poi)), ]
from <- poi[rep(seq_len(nrow(poi)), each = nrow(poi)),]
idx <- apply(to != from, any, MARGIN = 1)
to <- to[idx, ]
from <- from[idx, ]

# Routing
routes <- route(
  origin = from, destination = to,
  mode = "car", type = "fastest", traffic = TRUE,
  vehicle_type = "diesel,5.5",
  url_only = TRUE
)
```

route_matrix  

**HERE Routing API: Calculate Matrix**

Description

Calculates a matrix of M:N, M:1 or 1:N route summaries between given points of interest (POIs) using the HERE 'Routing' API. Various transport modes and traffic information at a provided timestamp are supported. The requested matrix is split into (sub-)matrices of dimension 15x100 to use the maximum matrix size per request and thereby minimize the number of overall needed requests. The result is one route summary matrix, that fits the order of the provided POIs: origIndex, destIndex.

Usage

```
route_matrix(
  origin,
  destination = origin, 
  datetime = Sys.time(),
  type = "fastest", 
  mode = "car",
)```
```r
route_matrix

  traffic = FALSE,
  search_range = 99999999,
  attribute = c("distance", "traveltime"),
  url_only = FALSE
)

Arguments

origin       sf object, the origin locations (M) of geometry type POINT.
destination  sf object, the destination locations (N) of geometry type POINT.
datetime     POSIXct object, datetime for the departure.
type         character, set the routing type: "fastest", "shortest" or "balanced".
mode         character, set the transport mode: "car", "pedestrian", "carHOV" or "truck".
traffic      boolean, use real-time traffic or prediction in routing (default = FALSE)? If no
datetime is set, the current timestamp at the moment of the request is used for
datetime.
search_range numeric, value in meters to limit the search radius in the route generation (default
                     = 99999999).
attribute    character, attributes to be calculated on the routes: "distance" or "traveltime"
                     (default = c("distance","traveltime").
url_only     boolean, only return the generated URLs (default = FALSE)?

Value

A data.frame, which is an edge list containing the requested M:N route combinations.

References

HERE Routing API: Calculate Matrix

Examples

# Provide an API Key for a HERE project
set_key("<YOUR API KEY>")

# Create routes summaries between all POIs
mat <- route_matrix(
  origin = poi,
  traffic = TRUE,
  url_only = TRUE
)
```
set_key

**Set HERE Application Credentials**

**Description**

Provide an API Key for a HERE project of type 'REST'. The key is set for the current R session and is used to authenticate in the requests to the APIs.

**Usage**

set_key(api_key)

**Arguments**

- **api_key** character, the API key from a HERE project.

**Details**

No login yet? Get a free login and key here: klick

**Value**

None.

**Examples**

set_key("<YOUR API KEY>")

---

set_proxy

**Proxy Configuration**

**Description**

If a proxy is needed, for example because the computer is behind a corporate proxy, it can be set as follows: proxy = "http://your-proxy.net:port/" or "https://your-proxy.net:port/" and "proxyuserpwd" = "user:pwd".

**Usage**

set_proxy(proxy, proxyuserpwd)

**Arguments**

- **proxy** character, the URL of the proxy ("https://your-proxy.net:port/").
- **proxyuserpwd** character, user and password for the authentication ("user:pwd").
**Value**

None.

**Examples**

```r
set_proxy(
  proxy = "https://your-proxy.net:port/",
  proxyuserpwd = "user:pwd"
)
```

---

**station**  
**HERE Public Transit API: Find Stations Nearby**

**Description**

Retrieve stations with the corresponding line information around given locations using the HERE 'Public Transit' API.

**Usage**

```r
station(poi, radius = 500, results = 5, url_only = FALSE)
```

**Arguments**

- `poi` sf object, Points of Interest (POIs) of geometry type POINT.
- `radius` numeric, the search radius in meters (default = 500).
- `results` numeric, maximum number of suggested public transport stations (Valid range: 1 and 50, default = 5).
- `url_only` boolean, only return the generated URLs (default = FALSE)?

**Value**

An sf object containing the requested stations with the corresponding line information.

**References**

HERE Public Transit API: Find Stations Nearby

**Examples**

```r
# Provide an API Key for a HERE project
set_key("<YOUR API KEY>")

# Stations
stations <- station(poi = poi, url_only = TRUE)
```
**unset_key**

Remove HERE Application Credentials

**Description**

Remove previously set HERE API key from the current R session.

**Usage**

```r
unset_key()
```

**Value**

None.

**Examples**

```r
unset_key()
```

**unset_proxy**

Remove Proxy Configuration

**Description**

Remove a previously set proxy configuration from the current R session.

**Usage**

```r
unset_proxy()
```

**Value**

None.

**Examples**

```r
unset_proxy()
```
weather

**HERE Destination Weather API: Observations, Forecasts, Astronomy and Alerts**

**Description**

Weather forecasts, reports on current weather conditions, astronomical information and alerts at a specific location (coordinates or location name) based on the HERE 'Destination Weather' API. The information comes from the nearest available weather station and is not interpolated.

**Usage**

```r
weather(poi, product = "observation", url_only = FALSE)
```

**Arguments**

- `poi` sf object or character, Points of Interest (POIs) of geometry type POINT or location names (e.g. cities or regions).
- `product` character, weather product of the 'Destination Weather API'. Supported products: "observation", "forecast_hourly", "forecast_astronomy" and "alerts".
- `url_only` boolean, only return the generated URLs (default = FALSE)?

**Value**

An sf object containing the requested weather information at the nearest weather station. The point geometry in the sf object is the location of the weather station.

**References**

HERE Destination Weather API: Observation

**Examples**

```r
# Provide an API Key for a HERE project
set_key("<YOUR API KEY>")

# Observation
observation <- weather(poi = poi, product = "observation", url_only = TRUE)

# Forecast
forecast <- weather(poi = poi, product = "forecast_hourly", url_only = TRUE)

# Astronomy
astronomy <- weather(poi = poi, product = "forecast_astronomy", url_only = TRUE)

# Alerts
alerts <- weather(poi = poi, product = "alerts", url_only = TRUE)
```
Index

*Topic **datasets**
  aoi, 3
  poi, 10

*Topic **package**
  hereR-package, 2

aoi, 3
autocomplete, 3, 4
connection, 3, 4, 13
flow, 6
gecode, 3, 7
hereR-package, 2
incident, 8
isoline, 3, 9

poi, 10
reverse_geocode, 3, 11
route, 3, 5, 12, 13
route_matrix, 3, 13

set_key, 2, 15
set_proxy, 15
sf, 2
station, 3, 16

traffic, 3

unset_key, 17
unset_proxy, 17

weather, 3, 18