

Package ‘mapsapi’

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Type Package

Title 'sf'-Compatible Interface to 'Google Maps' APIs

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Description Interface to the 'Google Maps' APIs: (1) routing directions based on the 'Directions' API, returned as 'sf' objects, either as single feature per alternative route, or a single feature per segment per alternative route; (2) travel distance or time matrices based on the 'Distance Matrix' API; (3) geocoded locations based on the 'Geocode' API, returned as 'sf' objects, either points or bounds; (4) map images using the 'Maps Static' API, returned as 'stars' objects.

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Suggests knitr, rmarkdown, leaflet, ggplot2, dplyr

VignetteBuilder knitr

URL <https://michaeldorman.github.io/mapsapi/>,
<https://github.com/michaeldorman/mapsapi/>

BugReports <https://github.com/michaeldorman/mapsapi/issues/>

NeedsCompilation no

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mp_directions

Get directions from the Google Maps Directions API

Description

Get directions from the Google Maps Directions API

Usage

```
mp_directions(
  origin,
  waypoints = NULL,
  destination,
  mode = c("driving", "transit", "walking", "bicycling"),
  arrival_time = NULL,
  departure_time = NULL,
  alternatives = FALSE,
  avoid = c(NA, "tolls", "highways", "ferries", "indoor"),
  region = NULL,
  traffic_model = c("best_guess", "pessimistic", "optimistic"),
  transit_mode = c("bus", "subway", "train", "tram"),
  transit_routing_preference = c(NA, "less_walking", "fewer_transfers"),
  language = NULL,
  key,
  quiet = FALSE
)
```

Arguments

origin	Origin, as <ul style="list-style-type: none"> • character vector of length one with address to be geocoded • numeric vector of length two (lon, lat) • matrix with one row and two columns (lon, lat) • sf or sfc point layer with one feature
waypoints	Waypoints, in one of the same formats as for origins but possibly with more than one location, i.e. <ul style="list-style-type: none"> • character vector with addresses to be geocoded • numeric vector of length two (lon, lat) • matrix with two columns (lon, lat) • sf or sfc point layer
destination	Destination, in one of the same formats as for origins
mode	Travel mode, one of: "driving" (default), "transit", "walking", "bicycling"
arrival_time	The desired time of arrival for transit directions, as POSIXct
departure_time	The desired time of departure, as POSIXct
alternatives	Whether to return more than one alternative (logical, default is FALSE)
avoid	NA (default, means avoid nothing) or one of: "tolls", "highways", "ferries" or "indoor"
region	The region code, specified as a ccTLD ("top-level domain") two-character value (e.g. "es" for Spain) (optional)
traffic_model	The traffic model, one of: "best_guess" (the default), "pessimistic", "optimistic". The traffic_model parameter is only taken into account when departure_time is specified!
transit_mode	Transit preferred mode, one or more of: "bus", "subway", "train" or "tram"
transit_routing_preference	Transit route preference. NA (default, means no preference) or one of: "less_walking" or "fewer_transfers"
language	The language in which to return directions. See https://developers.google.com/maps/faq#languagesupport for list of language codes.
key	Google APIs key
quiet	Logical; suppress printing URL for Google Maps API call (e.g. to hide API key)

Value

XML document with Google Maps Directions API response

Note

- Use function [mp_get_routes](#) to extract sf line layer where each feature is a **route**
- Use function [mp_get_segments](#) to extract sf line layer where each feature is a **route segment**

References

<https://developers.google.com/maps/documentation/directions/overview>

Examples

```
# Built-in reponse example
library(xml2)
doc = as_xml_document(response_directions_driving)
r = mp_get_routes(doc)
seg = mp_get_segments(doc)

## Not run:

# Text file with API key
key = readLines("~/key")

# Using 'numeric' input
doc = mp_directions(
  origin = c(34.81127, 31.89277),
  destination = c(34.781107, 32.085003),
  alternatives = TRUE,
  key = key
)

# Using 'character' and 'sf' input
library(sf)
doc = mp_directions(
  origin = "Beer-Sheva",
  destination = c(34.781107, 32.085003) |> st_point() |> st_sfc(crs = 4326),
  alternatives = TRUE,
  key = key
)

# Comparing traffic models
doc = mp_directions(
  origin = "Beer-Sheva",
  destination = "Tel Aviv",
  departure_time = Sys.time() + as.difftime(1, units = "hours"),
  traffic_model = "best_guess",
  key = key
)
mp_get_routes(doc)$duration_in_traffic_text
doc = mp_directions(
  origin = "Beer-Sheva",
  destination = "Tel Aviv",
  departure_time = Sys.time() + as.difftime(1, units = "hours"),
  traffic_model = "optimistic",
  key = key
)
mp_get_routes(doc)$duration_in_traffic_text
doc = mp_directions(
  origin = "Beer-Sheva",
```

```

    destination = "Tel Aviv",
    departure_time = Sys.time() + as.difftime(1, units = "hours"),
    traffic_model = "pessimistic",
    key = key
  )
  mp_get_routes(doc)$duration_in_traffic_text

## End(Not run)

```

mp_geocode

Get geocoded coordinates using the Google Maps Geocoding API

Description

Get geocoded coordinates using the Google Maps Geocoding API

Usage

```

mp_geocode(
  addresses,
  region = NULL,
  postcode = NULL,
  bounds = NULL,
  key,
  quiet = FALSE,
  timeout = 10
)

```

Arguments

addresses	Addresses to geocode, as character vector
region	The region code, specified as a ccTLD ("top-level domain") two-character value (e.g. "es" for Spain). This can to be a character vector of length 1 (in which case it is replicated) or a character vector with the same length of addresses (optional)
postcode	Vector of postal codes to filter the address match by (optional); Note that this is a component filter, which means that for each address, Google will search only within the corresponding postal code if non-missing
bounds	A preferred bounding box, specified as a numeric vector with four values xmin/ymin/xmax/ymax (in latitude/longitude) representing the coordinates of the southwest and northeast corners, e.g. as returned by function 'sf::st_bbox'. This can be a single vector (in which case it is replicated) or a list of numeric vectors with the same length as addresses (optional)
key	Google APIs key (optional)
quiet	Logical; suppress printing geocode request statuses
timeout	numeric of length 1, number of seconds to timeout, passed to curl's connecttimeout option. Default is 10 seconds

Value

list of XML documents with Google Maps Geocoding API responses, one item per element in addresses

Note

- Use function `mp_get_points` to extract **locations** as sf point layer
- Use function `mp_get_bounds` to extract **location bounds** as sf polygonal layer

References

<https://developers.google.com/maps/documentation/geocoding/overview>

Examples

```
# Built-in reponse example
library(xml2)
doc = list("Tel-Aviv" = as_xml_document(response_geocode))
pnt = mp_get_points(doc)
bounds = mp_get_bounds(doc)

## Not run:

# Text file with API key
key = readLines("~/key")

# Basic use
addresses = c("Rehovot", "Beer-Sheva", "New-York")
doc = mp_geocode(addresses, key = key)
pnt = mp_get_points(doc)
pnt

# Using the 'region' parameter
doc = mp_geocode(addresses = "Toledo", key = key)
mp_get_points(doc)
doc = mp_geocode(addresses = "Toledo", region = "es", key = key)
mp_get_points(doc)

# Various addresses
addresses = c(
  "Baker Street 221b, London",
  "Brandenburger Tor, Berlin",
  "",
  "Platz der Deutschen Einheit 1, Hamburg",
  "Arc de Triomphe de l'Etoile, Paris",
  NA
)
doc = mp_geocode(addresses, key = key)
pnt = mp_get_points(doc)
pnt
```

```
# Specifying a bounding box
b = c(-118.604794, 34.172684, -118.500938, 34.236144) # Bounds as xmin/ymin/xmax/ymax
result = mp_geocode(addresses = "Winnetka", key = key)
mp_get_points(result)
result = mp_geocode(addresses = "Winnetka", bounds = b, key = key)
mp_get_points(result)
result = mp_geocode(addresses = rep("Winnetka", 3), bounds = list(b, NA, b), key = key)
mp_get_points(result)

## End(Not run)
```

mp_get_bounds	<i>Extract geocoded *bounds* from Google Maps Geocode API response</i>
---------------	--

Description

Extract geocoded *bounds* from Google Maps Geocode API response

Usage

```
mp_get_bounds(doc)
```

Arguments

doc XML document with Google Maps Geocode API response

Value

sf Polygonal layer representing bounds of geocoded locations. In cases when there is more than one response per address, only first response is considered.

Examples

```
# Built-in reponse example
library(xml2)
doc = list("Tel-Aviv" = as_xml_document(response_geocode))
b = mp_get_bounds(doc)

## Not run:

# Text file with API key
key = readLines("~/key")

# Get bounds
doc = mp_geocode(addresses = c("Tel-Aviv", "Rehovot", "Beer-Sheva"), region = "il", key = key)
b = mp_get_bounds(doc)

## End(Not run)
```

mp_get_matrix	<i>Extract distance or duration *matrix* from a Google Maps Distance Matrix API response</i>
---------------	--

Description

Extract distance or duration **matrix** from a Google Maps Distance Matrix API response

Usage

```
mp_get_matrix(
  doc,
  value = c("distance_m", "distance_text", "duration_s", "duration_text",
            "duration_in_traffic_s", "duration_in_traffic_text")
)
```

Arguments

doc	XML document with Google Maps Distance Matrix API response
value	Value to extract, one of: "distance_m" (the default), "distance_text", "duration_s", "duration_text", "duration_in_traffic_s", "duration_in_traffic_text"

Value

A matrix, where rows represent origins and columns represent destinations. Matrix values are according to selected value, or NA if the API returned zero results

Note

The "duration_in_traffic_s" and "duration_in_traffic_text" options are only applicable when the API response contains these fields, i.e., when using `mp_matrix` with `mode="driving"`, with `departure_time` specified, and API key `key` provided

Examples

```
library(xml2)
doc = as_xml_document(response_matrix)
mp_get_matrix(doc, value = "distance_m")
mp_get_matrix(doc, value = "distance_text")
mp_get_matrix(doc, value = "duration_s")
mp_get_matrix(doc, value = "duration_text")

## Not run:
# Text file with API key
key = readLines("~/key")

locations = c("Tel-Aviv", "Jerusalem", "Neve Shalom")
```

```

# Driving times
doc = mp_matrix(
  origins = locations,
  destinations = locations,
  mode = "driving",
  departure_time = Sys.time() + as.difftime(10, units = "mins"),
  key = key
)
mp_get_matrix(doc, value = "distance_m")
mp_get_matrix(doc, value = "distance_text")
mp_get_matrix(doc, value = "duration_s")
mp_get_matrix(doc, value = "duration_text")
mp_get_matrix(doc, value = "duration_in_traffic_s")
mp_get_matrix(doc, value = "duration_in_traffic_text")

# Public transport times
doc = mp_matrix(
  origins = locations,
  destinations = locations,
  mode = "transit",
  key = key
)
mp_get_matrix(doc, value = "distance_m")
mp_get_matrix(doc, value = "distance_text")
mp_get_matrix(doc, value = "duration_s")
mp_get_matrix(doc, value = "duration_text")

## End(Not run)

```

mp_get_points

Extract geocoded points from Google Maps Geocode API response

Description

Extract geocoded points from Google Maps Geocode API response

Usage

```
mp_get_points(doc, all_results = FALSE)
```

Arguments

doc	XML document with Google Maps Geocode API response
all_results	The geocoder may return several results when address queries are ambiguous. Should all results be returned (TRUE), or just the first one (FALSE, default)?

Value

sf Point layer representing geocoded locations

Examples

```
library(xml2)
doc = list("Tel-Aviv" = as_xml_document(response_geocode))
pnt = mp_get_points(doc)
## Not run:
key = readLines("~/key")
doc = mp_geocode(addresses = c("Rehovot", "Beer-Sheva", "New-York"), key = key)
pnt = mp_get_points(doc)

## End(Not run)
```

mp_get_routes

*Extract *routes* from Google Maps Directions API response*

Description

Extract *routes* from Google Maps Directions API response

Usage

```
mp_get_routes(doc)
```

Arguments

doc XML document with Google Maps Directions API response

Value

Line layer (class sf) representing routes.

When document contains no routes ("ZERO_RESULTS" status), the function returns an empty line layer with NA in all fields.

Examples

```
library(xml2)

doc = as_xml_document(response_directions_driving)
r = mp_get_routes(doc)
plot(r)

doc = as_xml_document(response_directions_transit)
r = mp_get_routes(doc)
plot(r)

## Not run:

# Text file with API key
key = readLines("~/key")
```

```
# Transit example
doc = mp_directions(
  origin = c(34.81127, 31.89277),
  destination = c(34.781107, 32.085003),
  mode = "transit",
  alternatives = TRUE,
  key = key
)
r = mp_get_routes(doc)
plot(r)

# Duration in traffic
doc = mp_directions(
  origin = c(34.81127, 31.89277),
  destination = c(34.781107, 32.085003),
  departure_time = Sys.time(),
  alternatives = TRUE,
  key = key
)
r = mp_get_routes(doc)
plot(r)

# Using waypoints
doc = mp_directions(
  origin = c(34.81127, 31.89277),
  waypoints = rbind(c(35.01582, 31.90020), c(34.84246, 31.85356)),
  destination = c(34.781107, 32.085003),
  key = key
)
r = mp_get_routes(doc)
plot(r)

## End(Not run)
```

mp_get_segments	<i>Extract *route segments* from a Google Maps Directions API response</i>
-----------------	--

Description

Extract *route segments* from a Google Maps Directions API response

Usage

```
mp_get_segments(doc)
```

Arguments

doc	XML document with Google Maps Directions API response
-----	---

Value

Line layer (class sf) representing route segments

Examples

```
library(xml2)

doc = as_xml_document(response_directions_driving)
seg = mp_get_segments(doc)
plot(seg)

doc = as_xml_document(response_directions_transit)
seg = mp_get_segments(doc)
plot(seg)

## Not run:

# Text file with API key
key = readLines("~/key")

# Transit example
doc = mp_directions(
  origin = c(34.81127, 31.89277),
  destination = c(34.781107, 32.085003),
  mode = "transit",
  alternatives = TRUE,
  key = key
)
seg = mp_get_segments(doc)
plot(seg)

# Using waypoints
doc = mp_directions(
  origin = c(34.81127, 31.89277),
  waypoints = rbind(c(35.01582, 31.90020), c(34.84246, 31.85356)),
  destination = c(34.781107, 32.085003),
  alternatives = TRUE,
  key = key
)
seg = mp_get_segments(doc)
plot(seg)

## End(Not run)
```

mp_map

Get static map from the Maps Static API

Description

Download a static map from the Maps Static API, given map center and zoom level.

Usage

```
mp_map(
  center,
  zoom = 10L,
  maptypes = c("roadmap", "satellite", "terrain", "hybrid"),
  size = c(640L, 640L),
  scale = 2L,
  style = NULL,
  key,
  quiet = FALSE
)
```

Arguments

center	Character of length 1 of the form "lat,lon" or a geometry of class sfg, sfc or sf. If center is a geometry, the center of the geometry bounding box is passed as map center. Missing Coordinate Reference System (CRS) is assumed WGS84.
zoom	Zoom level, a positive integer or zero. The appropriate range is 0 to 21. Defaults to '10'.
maptypes	Map type, one of: "roadmap", "satellite", "terrain", "hybrid".
size	Numeric of length 2, the width and height of the map in pixels. The default is the maximum size allowed (640x640). The final dimensions of the image are affected by 'scale'.
scale	Integer, factor to multiply 'size' and determine the final image size. Allowed values are 1 and 2, defaults to 2.
style	List of named character vector(s) specifying style directives. The full style reference is available at https://developers.google.com/maps/documentation/maps-static/style-reference , see examples below.
key	Google APIs key
quiet	Logical; suppress printing URL for Google Maps API call (e.g. to hide API key)

Value

A stars raster with the requested map, in Web Mercator CRS (EPSG:3857).

References

<https://developers.google.com/maps/documentation/maps-static/overview>

Examples

```
## Not run:

library(stars)
key = readLines("~/key")
```

```

# Using coordinates
r = mp_map("31.253205,34.791914", 14, key = key)
plot(r)

# Using 'sfc' point - WGS84
pnt = st_point(c(34.791914, 31.253205))
pnt = st_sfc(pnt, crs = 4326)
r = mp_map(pnt, 14, key = key)
plot(r)

# Using 'sfc' point - UTM
pnt = st_point(c(34.791914, 31.253205))
pnt = st_sfc(pnt, crs = 4326)
pnt = st_transform(pnt, 32636)
r = mp_map(pnt, 14, key = key)
plot(r)

# Using 'sfc' polygon
pnt = st_point(c(34.791914, 31.253205))
pnt = st_sfc(pnt, crs = 4326)
pol = st_buffer(pnt, 0.01)
r = mp_map(pol, 14, key = key)
plot(r)

# 'ggplot2'
library(ggplot2)
cols = attr(r[[1]], "colors")
ggplot() +
  geom_stars(data = r, aes(x = x, y = y, fill = color)) +
  scale_fill_manual(values = cols, guide = FALSE) +
  coord_sf()

# 'ggplot2' - map types
r1 = mp_map(pnt, 14, maptypes = "roadmap", key = key)
r2 = mp_map(pnt, 14, maptypes = "satellite", key = key)
r3 = mp_map(pnt, 14, maptypes = "terrain", key = key)
r4 = mp_map(pnt, 14, maptypes = "hybrid", key = key)
cols1 = attr(r1[[1]], "colors")
cols2 = attr(r2[[1]], "colors")
cols3 = attr(r3[[1]], "colors")
cols4 = attr(r4[[1]], "colors")
theme1 = theme(
  axis.text = element_blank(),
  axis.title = element_blank(),
  axis.ticks = element_blank()
)
g1 = ggplot() +
  geom_stars(data = r1, aes(x = x, y = y, fill = color)) +
  scale_fill_manual(values = cols1, guide = FALSE) +
  coord_sf() +
  ggtitle("roadmap") +
  theme1
g2 = ggplot() +

```

```

    geom_stars(data = r2, aes(x = x, y = y, fill = color)) +
    scale_fill_manual(values = cols2, guide = FALSE) +
    coord_sf() +
    ggtitle("satellite") +
    theme1
g3 = ggplot() +
    geom_stars(data = r3, aes(x = x, y = y, fill = color)) +
    scale_fill_manual(values = cols3, guide = FALSE) +
    coord_sf() +
    ggtitle("terrain") +
    theme1
g4 = ggplot() +
    geom_stars(data = r4, aes(x = x, y = y, fill = color)) +
    scale_fill_manual(values = cols4, guide = FALSE) +
    coord_sf() +
    ggtitle("hybrid") +
    theme1
g1 + g2 + g3 + g4

# styled maps
n1 = list(
  c(feature = 'all', element = 'labels', visibility = 'off')
)
nb = list(
  c(feature = 'poi.business', visibility = 'off'),
  c(feature = 'poi.medical', visibility = 'off')
)
r_n1 = mp_map(pnt, 14, key = key, style = n1)
plot(r_n1)
r_nb = mp_map(pnt, 14, key = key, style = nb)
plot(r_nb)

## End(Not run)

```

mp_matrix

Get distance matrix from the Google Maps Distance Matrix API

Description

Get distance matrix from the Google Maps Distance Matrix API

Usage

```

mp_matrix(
  origins,
  destinations,
  mode = c("driving", "transit", "walking", "bicycling"),
  arrival_time = NULL,
  departure_time = NULL,
  avoid = c(NA, "tolls", "highways", "ferries", "indoor"),

```

```

region = NULL,
traffic_model = c("best_guess", "pessimistic", "optimistic"),
transit_mode = c("bus", "subway", "train", "tram"),
key,
quiet = FALSE
)

```

Arguments

origins	Origins, as <ul style="list-style-type: none"> • character vector with addresses to be geocoded • numeric vector of length two (lon, lat) • matrix with two columns (lon, lat) • sf or sfc point layer
destinations	Destinations, in one of the same formats as for origins
mode	Travel mode, one of: "driving", "transit", "walking", "bicycling"
arrival_time	The desired time of arrival for transit directions, as POSIXct
departure_time	The desired time of departure, as POSIXct
avoid	NA (default) or one of: "tolls", "highways", "ferries" or "indoor"
region	The region code, specified as a ccTLD ("top-level domain") two-character value (e.g. "es" for Spain) (optional)
traffic_model	The traffic model, one of: "best_guess" (the default), "pessimistic", "optimistic". The traffic_model parameter is only taken into account when departure_time is specified!
transit_mode	Transit preferred mode, one or more of: "bus", "subway", "train" or "tram"
key	Google APIs key
quiet	Logical; suppress printing URL for Google Maps API call (e.g. to hide API key)

Value

XML document with Google Maps Distance Matrix API response

Note

Use function `mp_get_matrix` to extract **distance** and **duration** matrix objects

References

<https://developers.google.com/maps/documentation/distance-matrix/overview>

Examples

```
# Built-in reponse example
library(xml2)
doc = as_xml_document(response_matrix)

## Not run:

# Text file with API key
key = readLines("~/key")

# Using 'data.frame' input
doc = mp_matrix(
  origins = rbind(c(34.811, 31.892), c(35.212, 31.769)),
  destinations = c(34.781, 32.085),
  key = key
)

# Using 'character' input
locations = c("Tel-Aviv", "Jerusalem", "Beer-Sheva", "Eilat")
doc = mp_matrix(
  origins = locations,
  destinations = locations,
  key = key
)

# Setting transit modes
locations = c("Tel-Aviv", "Beer-Sheva", "Eilat")
doc = mp_matrix(
  origins = locations,
  destinations = locations,
  key = key,
  mode = "transit",
  transit_mode = "train"
)

## End(Not run)
```

plot.mapsapi_map

Plot static Google map

Description

Plot method for static maps using function [mp_map](#).

Usage

```
## S3 method for class 'mapsapi_map'
plot(x, ...)
```

Arguments

x Map object of class stars and mapsapi_map obtained from function [mp_map](#)
 ... Further arguments passed to plot.stars

response_directions_driving

Sample response from Google Maps Directions API

Description

XML documents with **driving** directions from Tel-Aviv to Haifa

Usage

response_directions_driving

Format

A list obtained using `as_list` on XML response

Note

See [response_directions_transit](#) for Directions API response with **transit** directions

Examples

```
library(xml2)
doc = as_xml_document(response_directions_driving)
```

response_directions_transit

Sample response from Google Maps Directions API

Description

XML documents with **transit** directions from New-York to Boston

Usage

response_directions_transit

Format

A list obtained using `as_list` on XML response

Note

See [response_directions_driving](#) for Directions API response with **driving** directions

Examples

```
library(xml2)
doc = as_xml_document(response_directions_transit)
```

response_geocode	<i>Sample response from Google Maps Geocode API</i>
------------------	---

Description

An XML document with a geocoded location for the address "Tel-Aviv"

Usage

```
response_geocode
```

Format

A list obtained using `as_list` on XML response

Examples

```
library(xml2)
doc = list("Tel-Aviv" = as_xml_document(response_geocode))
```

response_map	<i>Sample response from Maps Static API (as 'stars' raster)</i>
--------------	---

Description

A stars raster with a static image of Beer-Sheva from the Maps Static API

Usage

```
response_map
```

Format

A stars raster with two dimensions x and y and a color table

Examples

```
library(stars)
plot(response_map)
```

`response_matrix`*Sample response from Google Maps Distance Matrix API*

Description

An XML document with a distance matrix for driving between three locations: Tel-Aviv, Jerusalem and Beer-Sheva

Usage`response_matrix`**Format**

A list obtained using `as_list` on XML response

Examples

```
library(xml2)
doc = as_xml_document(response_matrix)
```

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