

Package ‘cancensus’

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Type Package

Title Access, Retrieve, and Work with Canadian Census Data and Geography

Version 0.4.2

Description Integrated, convenient, and uniform access to Canadian Census data and geography retrieved using the 'CensusMapper' API. This package produces analysis-ready tidy data frames and spatial data in multiple formats, as well as convenience functions for working with Census variables, variable hierarchies, and region selection. API keys are freely available with free registration at <<https://censusmapper.ca/api>>. Census data and boundary geometries are reproduced and distributed on an "as is" basis with the permission of Statistics Canada (Statistics Canada 2001; 2006; 2011; 2016).

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<https://mountainmath.github.io/cancensus/>,
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as_census_region_list *Convert a (suitably filtered) data frame from [list_census_regions](#) to a list suitable for passing to [get_census](#).*

Description

Convert a (suitably filtered) data frame from [list_census_regions](#) to a list suitable for passing to [get_census](#).

Usage

```
as_census_region_list(tbl)
```

Arguments

`tbl` A data frame, suitably filtered, as returned by `list_census_regions`.

Examples

```
## Not run:
library(dplyr, warn.conflicts = FALSE)

# Query the CensusMapper API for the total occupied dwellings
# of 20 random Census Subdivisions, in Census 2016.
regions <- list_census_regions("CA16") %>%
  filter(level == "CSD") %>%
  sample_n(20) %>%
  as_census_region_list()

occupied <- get_census("CA16", regions = regions,
                      vectors = c("v_CA16_408"),
                      level = "Regions")

## End(Not run)
```

<code>census_vectors</code>	<i>Return Census variable names and labels as a tidy data frame (Deprecated)</i>
-----------------------------	--

Description

Return Census variable names and labels as a tidy data frame (Deprecated)

Usage

```
census_vectors(x)
```

Arguments

`x` A data frame, `sp` or `sf` object returned from `get_census` or similar.

Value

A data frame with a column variable containing the truncated variable name, and a column label describing it.

Examples

```
## Not run:
# Query census data with truncated labels:
census_data <- get_census(dataset='CA16', regions=list(CMA="59933"),
                          vectors=c("v_CA16_408", "v_CA16_409", "v_CA16_410"),
                          level='CSD', geo_format = "sf", labels="short")
```

```
# Get details for truncated vectors:
census_vectors(census_data)

## End(Not run)
```

`child_census_vectors` *List all child variables from vector hierarchies given either a list of Census variables returned by `list_census_vectors`, `search_census_vectors`, `find_census_vectors`, or a direct string reference to the vector code.*

Description

List all child variables from vector hierarchies given either a list of Census variables returned by `list_census_vectors`, `search_census_vectors`, `find_census_vectors`, or a direct string reference to the vector code.

Usage

```
child_census_vectors(
  vector_list,
  leaves_only = FALSE,
  max_level = NA,
  keep_parent = FALSE
)
```

Arguments

<code>vector_list</code>	the list of vectors to be used, either a character vector or a filtered tibble as returned from <code>list_census_vectors</code> .
<code>leaves_only</code>	boolean flag to indicate if only final leaf vectors should be returned, i.e. terminal vectors that themselves do not have children.
<code>max_level</code>	optional, maximum depth to look for child vectors. Default is NA and will return all child census vectors.
<code>keep_parent</code>	optional, also return parent vector in list of results. Default is set to FALSE.

Examples

```
# Query parent vectors directly using vector identifier
child_census_vectors("v_CA16_2510")

## Not run:

# Example using multiple vectors coerced into a list
child_census_vectors(c("v_CA16_2510", "v_CA16_2511", "v_CA16_2512"))
```

```

# or, equivalently
selected_vectors <- c("v_CA16_2510", "v_CA16_2511", "v_CA16_2512")
child_census_vectors(selected_vectors)

# Example using dplyr and piped arguments
library(dplyr, warn.conflicts = FALSE)

list_census_vectors("CA16") %>%
  filter(vector == "v_CA16_2510") %>%
  child_census_vectors(TRUE)

# this will return the equivalent of c("v_CA16_2510", child_census_vectors("v_CA16_2510"))
list_census_vectors("CA16") %>%
  filter(vector == "v_CA16_2510") %>%
  child_census_vectors(TRUE, keep_parent = TRUE)

## End(Not run)

```

CODES_TABLE

A dataset with code table summaries for census data

Description

A dataset with code table summaries for census data

Author(s)

derived from StatCan definitions

References

<https://www12.statcan.gc.ca/census-recensement/2016/ref/dict/geo012-eng.cfm>

COV_SKYTRAIN_STATIONS

A dataset City of Vancouver skytrain station locations

Description

A dataset City of Vancouver skytrain station locations

Author(s)

City of Vancouver Open Data

References

<https://opendata.vancouver.ca/explore/dataset/rapid-transit-stations/information/>

dataset_attribution *Get attribution for datasets*

Description

Get attribution for datasets

Usage

```
dataset_attribution(datasets)
```

Arguments

datasets Vector of dataset identifiers

Value

Returns a string to be used as attribution for the given datasets.

Examples

```
# Attribution string for the 2006 and 2016 census datasets
dataset_attribution(c('CA06', 'CA16'))
```

explore_census_regions
Interactively browse Census variables and regions on Censusmapper.ca in a new browser window

Description

Finding the right Census variables or regions can be complicated. `explore_census_vectors(dataset)` and `explore_census_regions(dataset)` will open a new browser page or tab to an interactive Census variable and region exploration and selection tool on the [Censusmapper.ca website](http://Censusmapper.ca). Interactive tools available for the CA16, CA11, CA06, and CA01 Census datasets and geographies.

Usage

```
explore_census_regions(dataset = "CA16")
```

Arguments

dataset The dataset to query for available vectors, e.g. 'CA16'. Interactive tools available for the CA16, CA11, CA06, and CA01 Census datasets and geographies.

Examples

```
## Not run:  
  
explore_census_vectors(dataset = "CA16")  
  
explore_census_regions(dataset = "CA11")  
  
## End(Not run)
```

explore_census_vectors

Interactively browse Census variables and regions on Censusmapper.ca in a new browser window

Description

Finding the right Census variables or regions can be complicated. `explore_census_vectors(dataset)` and `explore_census_regions(dataset)` will open a new browser page or tab to an interactive Census variable and region exploration and selection tool on the [Censusmapper.ca website](https://censusmapper.ca). Interactive tools available for the CA16, CA11, CA06, and CA01 Census datasets and geographies.

Usage

```
explore_census_vectors(dataset = "CA16")
```

Arguments

dataset	The dataset to query for available vectors, e.g. 'CA16'. Interactive tools available for the CA16, CA11, CA06, and CA01 Census datasets and geographies.
---------	--

Examples

```
## Not run:  
  
explore_census_vectors(dataset = "CA16")  
  
explore_census_regions(dataset = "CA11")  
  
## End(Not run)
```

find_census_vectors *Query the CensusMapper API for vectors using exact, semantic, or keyword search*

Description

Query the available list of Census vectors based on their label and return details including vector code. Default search behaviour expects an exact match, but keyword or semantic searches can be used instead by setting `query_type='keyword'` or `query_type = 'semantic'` instead. Keyword search is useful when looking to explore Census vectors based on broad themes like "income" or "language". Keyword search separates the query into unigrams and returns Census vectors with matching words, ranked by incidence of matches. Semantic search is designed for more precise searches while allowing room for error for spelling or phrasing, as well as for finding closely related vector matches. Semantic search separates the query into n-grams and relies on string distance measurement using a generalized Levenshtein distance approach.

Some census vectors return population counts segmented by Female and Male populations, in addition to a total aggregate. By default, query matches will return matches for the Total aggregation, but can optionally return only the Female or Male aggregations by adding `type = 'female'` or `type = 'male'` as a parameter.

Usage

```
find_census_vectors(query, dataset, type = "all", query_type = "exact", ...)
```

Arguments

query	The term or phrase to search for e.g. 'Oji-cree'. Search queries are case insensitive.
dataset	The dataset to query for available vectors, e.g. 'CA16'. To see a list of available datasets: <code>list_census_datasets()</code>
type	One of 'all', 'total', 'male' or 'female'. If specified, only return aggregations of specified 'type'. By default, only the 'total' aggregation will be returned.
query_type	One of exact, 'semantic' or 'keyword'. By default, assumes exact string matching, but the alternatives may be better options in some cases. See description section for more details on query types.
...	Other arguments passed to internal functions.

Examples

```
find_census_vectors('Oji-cree', dataset = 'CA16', type = 'total', query_type = 'exact')
```

```
find_census_vectors('commuting duration', dataset = 'CA11', type = 'female', query_type = 'keyword')
```

```
find_census_vectors('after tax income', dataset = 'CA16', type = 'total', query_type = 'semantic')
```



```

## Not run:
# This incorrect spelling will return a warning that no match was found,
# but will suggest trying semantic or keyword search.
find_census_vectors('Ojibwey', dataset = 'CA16', type = 'total')

# This will find near matches as well
find_census_vectors('Ojibwey', dataset = 'CA16', type = 'total', query_type = "semantic")

find_census_vectors('commute duration', dataset = 'CA16', type = 'female', query_type = 'keyword')

find_census_vectors('commute duration', dataset = 'CA11', type = 'all', query_type = 'keyword')

find_census_vectors('ukrainian origin', dataset = 'CA16', type = 'total', query_type = 'keyword')

## End(Not run)

```

get_census

Access to Canadian census data through the CensusMapper API

Description

This function allows convenient access to Canadian census data and boundary files through the CensusMapper API. An API key is required to retrieve data.

Usage

```

get_census(
  dataset,
  regions,
  level = NA,
  vectors = c(),
  geo_format = NA,
  labels = "detailed",
  use_cache = TRUE,
  quiet = FALSE,
  api_key = Sys.getenv("CM_API_KEY")
)

```

Arguments

dataset	A CensusMapper dataset identifier.
regions	A named list of census regions to retrieve. Names must be valid census aggregation levels.
level	The census aggregation level to retrieve, defaults to "Regions". One of "Regions", "PR", "CMA", "CD", "CSD", "CT", "DA", "EA" (for 1996), or "DB" (for 2001-2016).

vectors	An R vector containing the CensusMapper variable names of the census variables to download. If no vectors are specified only geographic data will get downloaded.
geo_format	By default is set to NA and appends no geographic information. To include geographic information with census data, specify one of either "sf" to return an <code>sf</code> object (requires the <code>sf</code> package) or "sp" to return a <code>SpatialPolygonsDataFrame-class</code> object (requires the <code>rgdal</code> package).
labels	Set to "detailed" by default, but truncated Census variable names can be selected by setting labels = "short". Use <code>label_vectors(...)</code> to return variable label information in detail.
use_cache	If set to TRUE (the default) data will be read from the local cache if available.
quiet	When TRUE, suppress messages and warnings.
api_key	An API key for the CensusMapper API. Defaults to <code>options()</code> and then the <code>CM_API_KEY</code> environment variable.

Details

For help selecting regions and vectors, see [list_census_regions](#) and [list_census_vectors](#), or check out the interactive selection tool at <https://censumapper.ca/api> by calling `explore_census_vectors()`

Source

Census data and boundary geographies are reproduced and distributed on an "as is" basis with the permission of Statistics Canada (Statistics Canada 1996; 2001; 2006; 2011; 2016).

Examples

```
# Query the API for data on dwellings in Vancouver, at the census subdivision
# level:
## Not run:
census_data <- get_census(dataset='CA16', regions=list(CMA="59933"),
                        vectors=c("v_CA16_408", "v_CA16_409", "v_CA16_410"),
                        level='CSD')

# Query the API for data on dwellings in Vancouver, at the census subdivision
# level, and return the associated geography files in \code{sf} format:
census_data <- get_census(dataset='CA16', regions=list(CMA="59933"),
                        vectors=c("v_CA16_408", "v_CA16_409", "v_CA16_410"),
                        level='CSD', geo_format = "sf")

# Make the same query, but this time drop descriptive vector names:
census_data <- get_census(dataset='CA16', regions=list(CMA="59933"),
                        vectors=c("v_CA16_408", "v_CA16_409", "v_CA16_410"),
                        level='CSD', geo_format = "sf", labels="short")

# Get details for truncated vectors:
label_vectors(census_data)

## End(Not run)
```

```
get_intersecting_geometries
```

Get identifiers for census regions intersecting a geometry

Description

This function returns a list of regions that intersect a given geometry input. This list of regions can be used directly to query census when one is interested in census data for a particular geographic region that does not coincide with defined census geometries. The returned value can be used as the regions parameter in [get_census](#) to get corresponding census geographies and variables that cover the give geometry. Input spatial objects can be any sf or sfc class objects such as POINT, MULTIPOINT or POLYGON.

This function comes with CensusMapper API limits

Usage

```
get_intersecting_geometries(
  dataset,
  level,
  geometry,
  simplified = FALSE,
  use_cache = TRUE,
  quiet = FALSE,
  api_key = Sys.getenv("CM_API_KEY")
)
```

Arguments

dataset	A CensusMapper dataset identifier.
level	The census aggregation level to retrieve. One of "Regions", "PR", "CMA", "CD", "CSD", "CT", "DA", "EA" (for 1996 census), or "DB" (for 2001-2016 censuses)..
geometry	A valid sf or sfc class object. As long as the geometry is valid, any projection is accepted. Objects will be reprojected as server-side intersections use lat/lon projection.
simplified	If TRUE will return a region list compatible with get_census , otherwise will return a character vector of matching region ids.
use_cache	If set to TRUE (the default) data will be read from the local cache if available.
quiet	When TRUE, suppress messages and warnings.
api_key	An API key for the CensusMapper API. Defaults to options() and then the CM_API_KEY environment variable.

Source

Census data and boundary geographies are reproduced and distributed on an "as is" basis with the permission of Statistics Canada (Statistics Canada 1996; 2001; 2006; 2011; 2016).

Examples

```
## Not run:
# Example using a POINT-class object from a pair of lat/lon coordinates
point_geo <- sf::st_sfc(sf::st_point(c(-123.25149, 49.27026)), crs=4326)
regions <- get_intersecting_geometries(dataset = 'CA16', level = 'CT', geometry = point_geo)
census_data <- get_census(dataset='CA16', regions=regions,
                          vectors=c("v_CA16_408", "v_CA16_409", "v_CA16_410"),
                          level='CT')

# Example using a POLYGON-class object from a bounding box with four coordinates
poly_geo <- sf::st_as_sfc(sf::st_bbox(c(ymin = 49.25, ymax = 49.30,
                                      xmin = -123.25, xmax = -123.30)), crs = 4326)
regions <- get_intersecting_geometries(dataset = 'CA16', level = 'CT', geometry = poly_geo)
census_data <- get_census(dataset='CA16', regions=regions,
                          vectors=c("v_CA16_408", "v_CA16_409", "v_CA16_410"), level='CT')

## End(Not run)
```

label_vectors

Return Census variable names and labels as a tidy data frame

Description

Return Census variable names and labels as a tidy data frame

Usage

```
label_vectors(x)
```

Arguments

x A data frame, sp or sf object returned from get_census or similar.

Value

A data frame with a column variable containing the truncated variable name, and a column label describing it.

Examples

```
## Not run:
# Query census data with truncated labels:
label_data <- get_census(dataset='CA16', regions=list(CMA="59933"),
                        vectors=c("v_CA16_408", "v_CA16_409", "v_CA16_410"),
                        level='CSD', geo_format = "sf", labels="short")

# Get details for truncated vectors:
```

```
label_vectors(label_data)

## End(Not run)
```

list_census_datasets *Query the CensusMapper API for available datasets.*

Description

Query the CensusMapper API for available datasets.

Usage

```
list_census_datasets(use_cache = TRUE, quiet = FALSE)
```

Arguments

use_cache	If set to TRUE (the default), data will be read from a temporary local cache for the duration of the R session, if available. If set to FALSE, query the API for the data, and refresh the temporary cache with the result.
quiet	When TRUE, suppress messages and warnings.

Value

Returns a data frame with a column `dataset` containing the code for the dataset, a column `description` describing it, a `geo_dataset` column identifying the geography dataset the data is based on, a `attribution` column with an attribution string, a `reference` column with a reference identifier, and a `reference_url` column with a link to reference materials.

Examples

```
# List available datasets in CensusMapper
list_census_datasets()
```

list_census_regions *Query the CensusMapper API for available regions in a given dataset.*

Description

Query the CensusMapper API for available regions in a given dataset.

Usage

```
list_census_regions(dataset, use_cache = TRUE, quiet = FALSE)
```

Arguments

dataset	The dataset to query for available regions, e.g. "CA16".
use_cache	If set to TRUE (the default), data will be read from a local cache that is maintained for the duration of the R session, if available. If set to FALSE, query the API for the data, and refresh the local cache with the result.
quiet	When TRUE, suppress messages and warnings.

Value

Returns a data frame with the following columns:

region	The region identifier.
name	The name of that region.
level	The census aggregation level of that region.
pop	The population of that region.
municipal_status	Additional identifiers to distinguish the municipal status of census subdivisions.
CMA_UID	The identifier for the Census Metropolitan Area the region is in (if any).
CD_UID	The identifier for the Census District the region is in (if any).
PR_UID	The identifier for the Province the region is in (if unique).

Examples

```
list_census_regions('CA16')
```

list_census_vectors	<i>Query the CensusMapper API for available vectors for a given dataset.</i>
---------------------	--

Description

Query the CensusMapper API for available vectors for a given dataset.

Usage

```
list_census_vectors(dataset, use_cache = TRUE, quiet = TRUE)
```

Arguments

dataset	The dataset to query for available vectors, e.g. "CA16".
use_cache	If set to TRUE (the default), data will be read from a local cache that is maintained for the duration of the R session, if available. If set to FALSE, query the API for the data, and refresh the local cache with the result.
quiet	When FALSE, shows messages and warnings. Set to TRUE by default.

Value

Returns a data frame detailing the available Census vectors (i.e. variables) for a given Census dataset. This data frame has columns `vector` containing the short code for the variable, `type` describing whether it's a female, male, or total aggregate, `label` indicating the name of the variable, `units` indicating whether the value represents a numeric integer, percentage, dollar figure, or ratio, `parent_vector` to show hierarchical relationship, `aggregation` indicating whether the value is additive or a transformation, and a column `details` with a detailed description of the variable generated by traversing all labels within its hierarchical structure.

Examples

```
# List all vectors for a given Census dataset in CensusMapper
list_census_vectors('CA16')
```

`parent_census_vectors` *List all parent variables from vector hierarchies given either a list of Census variables returned by `list_census_vectors`, `search_census_vectors`, `find_census_vectors`, or a direct string reference to the vector code.*

Description

List all parent variables from vector hierarchies given either a list of Census variables returned by `list_census_vectors`, `search_census_vectors`, `find_census_vectors`, or a direct string reference to the vector code.

Usage

```
parent_census_vectors(vector_list)
```

Arguments

`vector_list` The list of vectors to be used, either a character vector or a filtered tibble as returned from `list_census_vectors`.

Examples

```
# Query parent vectors directly using vector identifier
parent_census_vectors("v_CA16_2519")
## Not run:
# Example using multiple vectors coerced into a list
parent_census_vectors(c("v_CA16_2519", "v_CA16_2520", "v_CA16_2521"))

# or, equivalently
selected_vectors <- c("v_CA16_2519", "v_CA16_2520", "v_CA16_2521")
parent_census_vectors(selected_vectors)
```

```
# Example using dplyr and piped arguments
library(dplyr, warn.conflicts = FALSE)

list_census_vectors("CA16") %>%
  filter(vector == "v_CA16_2519") %>%
  parent_census_vectors()

## End(Not run)
```

search_census_regions *Query the CensusMapper API for regions with names matching a searchterm.*

Description

Runs a query against the CensusMapper API to retrieve region data with names matching specific queries. Users can optionally specify the target geography level (e.g. level = 'CMA', level = 'CSD', etc.). Alternatively, calling explore_census_vectors() will launch the interactive region selection tool on the Censusmapper site in a new web page or tab.

Usage

```
search_census_regions(searchterm, dataset, level = NA, ...)
```

Arguments

searchterm	The term to search for e.g. "Victoria". Search terms are case insensitive. If unable to find a given search term, this function will suggest the correct spelling to use when possible.
dataset	The dataset to query for available regions, e.g. "CA16".
level	One of NA, 'C', 'PR', 'CMA', 'CD', or 'CSD'. If specified, only return variables of specified 'level'.
...	Further arguments passed on to list_census_regions .

Examples

```
search_census_regions('Victoria', 'CA16')

## Not run:
# This will return a warning that no match was found, but will suggest similar named regions.
search_census_regions('Victorea', 'CA16')

# This will limit region results to only include CMA level regions
search_census_regions('Victoria', 'CA16', level = "CMA")

## End(Not run)
```

search_census_vectors *Query the CensusMapper API for vectors with descriptions matching a search term or phrase (deprecated)*

Description

Query the CensusMapper API for vectors with descriptions matching a search term or phrase (deprecated)

Usage

```
search_census_vectors(searchterm, dataset, type = NA, ...)
```

Arguments

searchterm	The term or phrase to search for e.g. "Ojibway". Search terms are case insensitive. If unable to find a given string, this function will suggest similarly named objects.
dataset	The dataset to query for available vectors, e.g. "CA16".
type	One of NA, 'Total', 'Male' or 'Female'. If specified, only return variables of specified 'type'.
...	Further arguments passed on to list_census_vectors .

Examples

```
search_census_vectors('Ojibway', 'CA16')
## Not run:
# This will return a warning that no match was found, but will suggest similar terms.
search_census_vectors('Ojibwe', 'CA16', 'Total')

## End(Not run)
```

set_api_key *Set Censusmapper API key*

Description

Cancensus requires a free Censusmapper API key to retrieve data. This function helps set the key for either the duration of the session (default) or permanently for use across sessions.

Usage

```
set_api_key(key, overwrite = FALSE, install = FALSE)
```

Arguments

key	a Censusmapper API key. For more information on keys see the API key section
overwrite	Option to overwrite any existing Censusmapper keys already stored locally.
install	Option to install permanently for use across sessions.

Examples

```
## Not run:
set_api_key("YOUR_CM_API_KEY")

# This will set the key permanently until overwritten again
set_api_key("YOUR_CM_API_KEY", install = TRUE)

## End(Not run)
```

set_cache_path	<i>Set persistent cancensus cache location</i>
----------------	--

Description

Cancensus provides session caching for retrieved data to increase speeds and reduce API usage. This function will create a persistent cache across sessions.

Usage

```
set_cache_path(cache_path, overwrite = FALSE, install = FALSE)
```

Arguments

cache_path	a local directory to use for saving cached data
overwrite	Option to overwrite any existing Censusmapper keys already stored locally.
install	Option to install permanently for use across sessions.

Examples

```
## Not run:
set_cache_path("~/cancensus_cache")

# This will set the cache path permanently until overwritten again
set_cache_path("~/cancensus_cache", install = TRUE)

## End(Not run)
```

show_api_key	<i>View saved Censusmapper API key</i>
--------------	--

Description

View saved API key#'

Usage

show_api_key()

show_cache_path	<i>View saved cache directory path</i>
-----------------	--

Description

View saved API key#'

Usage

show_cache_path()

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