

Package ‘eechidna’

February 25, 2021

Version 1.4.1

Title Exploring Election and Census Highly Informative Data Nationally for Australia

Description Data from the seven Australian Federal Elections (House of Representatives) between 2001 and 2019, and from the four Australian Censuses over the same period. Includes tools for visualizing and analysing the data, as well as imputing Census data for years in which a Census does not occur. This package incorporates data that is copyright Commonwealth of Australia (Australian Electoral Commission and Australian Bureau of Statistics) 2019.

Depends R (>= 3.5.0)

Imports dplyr, shiny, ggplot2, ggthemes, magrittr, rgeos, plotly (>= 4.5.6), sp, tidyr, graphics, stats, purrr, colourpicker, rgdal, methods, stringi, tibble, tidyselect

Suggests testthat, knitr, rmarkdown, maptools, purrrlyr, GGally, corrrplot, broom, scales, readr, gridExtra, tidyverse, spelling, ggmap

Encoding UTF-8

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LazyData true

ByteCompile TRUE

License GPL (>= 2)

URL <https://github.com/jforbes14/eechidna/>,
<https://jforbes14.github.io/eechidna/>

VignetteBuilder knitr

RoxygenNote 7.1.1

BugReports <https://github.com/jforbes14/eechidna/issues/>

Language en-US

NeedsCompilation no

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Repository CRAN

Date/Publication 2021-02-25 12:20:02 UTC

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abs2001

*Australian Census data on all electorates***Description**

A dataset containing demographic and other information about each electorate from the Australian Census of Population and Housing.

The data were obtained from the Australian Bureau of Statistics, and downloaded from <https://www.censusdata.abs.gov.au/datapacks/>. Electorate boundaries match those in place at the time of the relevant data.

Census data for non-census years has been imputed. For more details on this process, see the help vignette: `vignette("imputing-census-data", package = "eechidna")`

Data for 2004, 2007, 2013 and 2010 was updated in October 2019. The older versions can be found [in the GitHub repository](#).

Usage

abs2001

abs2004

abs2006

abs2007

abs2010

abs2011

abs2013

abs2016

abs2019

Format

Data frames with the following variables, variables with an asterisk are only available in the 2001, 2006, 2011 and 2016 data sets.

- UniqueID: Numeric identifier that links the electoral division with Census and other election datasets.
- DivisionNm: Name of electorate
- State: State containing electorate
- Population: Total population of electorate

- Area*: Area of electorate division in square kilometres
- Age00_04: Percentage of people aged 0-4.
- Age05_14: Percentage of people aged 5-9.
- Age15_19: Percentage of people aged 15-19.
- Age20_24: Percentage of people aged 20-24.
- Age25_34: Percentage of people aged 25-34.
- Age35_44: Percentage of people aged 35-44.
- Age45_54: Percentage of people aged 45-54.
- Age55_64: Percentage of people aged 55-64.
- Age65_74: Percentage of people aged 65-74.
- Age75_84: Percentage of people aged 75-84.
- Age85plus: Percentage of people aged 85 or higher.
- Anglican: Percentage of people affiliated with the Anglican denomination
- AusCitizen: Percentage of people who are Australian Citizens
- AverageHouseholdSize: Average number of people in a household
- BachelorAbv: Percentage of people who have completed a Bachelor degree or above
- Born_Asia: Percentage of people born in Asia
- Born_MidEast: Percentage of people born in the Middle East
- Born_SE_Europe: Percentage of people born in South Eastern Europe
- Born_UK: Percentage of people born in the United Kingdom
- BornElsewhere: Percentage of people who were born overseas, outside of Asia, Middle East, South Eastern Europe and the UK
- BornOverseas_NS*: Percentage of people who did not answer the question relating to birth-place
- Buddhism: Percentage of people affiliated with the Buddhist religion
- Catholic: Percentage of people affiliated with the Catholic denomination
- Christianity: Percentage of people affiliated with the Christian religion (of all denominations)
- Couple_NoChild_House: Percentage of households made up of a couple with no children
- Couple_WChild_House: Percentage of households made up of a couple with children
- CurrentlyStudying: Percentage of people who are currently studying
- DeFacto: Percentage of people who are in a de facto marriage
- DiffAddress: Percentage of people who live at a different address to what they did 5 years ago
- DipCert: Percentage of people who have completed a diploma or certificate
- Distributive: Percentage of employed persons who work in wholesale trade, retail trade, transport, post or warehousing related industries
- EmuneratedElsewhere: Percentage of people who receive emuneration outside of Australia, out of the total population plus overseas visitors
- EnglishOnly: Percentage of people who speak only English

- Extractive: Percentage of employed persons who work in extractive industries (includes mining, gas, water, agriculture, waste, electricity)
- FamilyIncome_NS*: Percentage of people who did not answer the question relating to family income
- FamilyRatio: Average number of people per family
- Finance: Percentage of employed persons who work in finance or insurance related industries
- HighSchool: Percentage of people who have completed high school
- HighSchool_NS*: Rate of nonresponse for questions relating to high school completion
- HouseholdIncome_NS*: Percentage of people who did not answer the question relating to household income
- Indigenous: Percentage of people who are Indigenous
- InternetAccess: Percentage of people with access to the internet
- InternetAccess_NS*: Rate of nonresponse for questions relating to internet access
- InternetUse: Percentage of people who used internet in the last week (2001 only)
- InternetUse_NS*: Rate of nonresponse for questions relating to internet use (2001 only)
- Islam: Percentage of people affiliated with the Islamic religion
- Judaism: Percentage of people affiliated with the Jewish religion
- Laborer: Percentage of employed persons who work as a laborer
- Language_NS*: Rate of nonresponse for questions relating to language spoken at home
- LFParticipation: Labor force participation rate
- ManagerAdminClericalSales: Percentage of employed persons who work in management, administration, clerical duties and sales
- Married: Percentage of people who are married
- MedianAge: Median age
- MedianFamilyIncome: Median weekly family income (in \$)
- MedianHouseholdIncome: Median weekly household income (in \$)
- MedianLoanPay: Median mortgage loan repayment amount (of mortgage payments, in \$)
- MedianPersonalIncome: Median weekly personal income (in \$)
- MedianRent: Median weekly rental payment amount (of those who rent, in \$)
- Mortgage: Percentage of dwellings that are on a mortgage
- NoReligion: Percentage of people with no religion
- OneParent_House: Percentage of households made up of one parent with children
- Other_NonChrist: Percentage of people affiliated with a religion other than Christianity, Buddhism, Islam and Judaism
- OtherChrist: Percentage of people affiliated with a denomination of the Christian religion other than Anglican or Catholic
- OtherLanguageHome: Percentage of people who speak a language other than English at home
- Owned: Percentage of dwellings that are owned outright
- PersonalIncome_NS*: Rate of nonresponse for questions relating to personal income

- Professional: Percentage of employed persons who work as a professional
- PublicHousing: Percentage of dwellings that are owned by the government, and rented out to tenants
- Religion_NS*: Rate of nonresponse for questions relating to religion
- Rent_NS*: Rate of nonresponse for questions relating to rental costs
- Renting: Percentage of dwellings that are being rented
- SocialServ: Percentage of employed persons who work in education and training, healthcare, social work, community, arts and recreation
- SP_House: Percentage of households occupied by a single person
- Tenure_NS*: Rate of nonresponse for questions relating to tenure
- Tradesperson: Percentage of employed persons who specialise in a trade
- Transformative: Percentage of employed persons who work in construction or manufacturing related industries
- Unemployed: Unemployment rate
- University_NS*: Rate of nonresponse for questions relating to University
- Volunteer: Percentage of people who work as a volunteer
- Volunteer_NS*: Rate of nonresponse for questions relating to working as a volunteer

An object of class `data.frame` with 150 rows and 70 columns.

Examples

```
library(eechidna)
library(dplyr)
data(abs2001)
abs2001 %>% select(DivisionNm, MedianAge, Unemployed, NoReligion, MedianPersonalIncome) %>% head()

# Join with two-party preferred voting data
library(ggplot2)
data(tpp01)
election2001 <- left_join(abs2001, tpp01, by = "UniqueID")
# See relationship between personal income and Liberal/National support
ggplot(election2001, aes(x = MedianPersonalIncome, y = LNP_Percent)) +
  geom_jitter() +
  geom_smooth(method='lm')
```

aec_add_carto_f *aec_add_carto_f - computes and binds the cartogram coordinates to original data*

Description

Add the cartogram locations as new variables to original data and make any of these that were not made equal to the original centroids. This is simply all of the Australian electoral cartogram steps in one hit.

Usage

```
aec_add_carto_f(nat_data)
```

Arguments

nat_data subset of data with centroids of electoral divisions

Examples

```
library(eechidna)
library(dplyr)
library(ggplot2)

nat_map16 <- nat_map_download(2016)
nat_data16 <- nat_data_download(2016)

nat_data16 <- nat_data16 %>% select(-c(x,y)) # remove existing cartogram coordinates
nat_data_cart <- aec_add_carto_f(nat_data16)
# Map theme
library(ggthemes)

ggplot(data=nat_data_cart, aes(map_id=id)) +
  geom_map(map = nat_map16, fill="grey90", colour="white") +
  geom_point(aes(x=x, y=y), size=2, alpha=0.4,
             colour="#572d2c", inherit.aes=FALSE) +
  expand_limits(x=nat_map16$long, y=nat_map16$lat) +
  theme_map() + coord_equal()
```

aec_carto_f *aec_carto_f - run dorling on data centers*

Description

The dorling algorithm creates a non-contiguous cartogram by shifting circles to alleviate overlap, while roughly maintaining geographic proximity.

Usage

```

aec_carto_f(
  aec_data_sub,
  polygon.vertex = 6,
  name.text = TRUE,
  dist.ratio = dist.ratio,
  iteration = 100,
  xlab = "",
  ylab = "",
  ...
)

```

Arguments

<code>aec_data_sub</code>	subset of data with centroids of electoral divisions
<code>polygon.vertex</code>	The number of vertice of the circle. Default to be 100. If <code>polygon.vertex=4</code> then diamonds applies. If <code>polygon.vertex=6</code> , then hexagon applies.
<code>name.text</code>	whether to print the region names on the circles or polygons.
<code>dist.ratio</code>	The threshold to determine whether an attract force is added. It is applied to the ratio of the distance between two centroids and the sum of the two radii.
<code>iteration</code>	The limit of the number of iterations. Default to be 9999.
<code>xlab</code>	Label for dorling x axis, intermediate drawing
<code>ylab</code>	Label for dorling y axis, intermediate drawing
<code>...</code>	arguments to dorling function

Examples

```

library(dplyr)
library(ggplot2)
nat_map16 <- nat_map_download(2016)
nat_data16 <- nat_data_download(2016)
nat_data16 <- nat_data16 %>% select(-c(x,y)) # remove existing cartogram coordinates
adelaide <- aec_extract_f(nat_data16, ctr=c(138.6, -34.9), expand=c(2,3))
adelaide_carto <- aec_carto_f(adelaide) %>% rename(id=region)
ggplot(data=nat_map16) +
  geom_path(aes(x=long, y=lat, group=group, order=order),
            colour="grey50") +
  geom_point(data=adelaide_carto, aes(x=x, y=y), size=4, alpha=0.4,
             colour="#f0027f") +
  xlim(c(136, 140)) + ylim(-36, -33) +
  coord_equal()
adelaide_all <- merge(adelaide, adelaide_carto, by="id")
ggplot(data=nat_map16) +
  geom_path(aes(x=long, y=lat, group=group, order=order),
            colour="grey50") +
  geom_point(data=adelaide_all, aes(x=long_c, y=lat_c), size=2, alpha=0.4,
             colour="#f0027f") +
  geom_point(data=adelaide_all, aes(x=x, y=y), size=2, alpha=0.4,

```

```

                                colour="#f0027f") +
  geom_segment(data=adelaide_all,
              aes(x=long_c, xend=x, y=lat_c, yend=y), colour="#f0027f") +
  xlim(c(136, 140)) + ylim(-37, -33) +
  coord_equal()

```

aec_carto_join_f

aec_carto_join_f - bind the cartogram coordinates to original data

Description

Add the cartogram locations as new variables to original data and make any of these that were not made equal to the original centroids

Usage

```
aec_carto_join_f(aec_data, aec_carto)
```

Arguments

aec_data	subset of data with centroids of electoral divisions
aec_carto	centers

Examples

```

library(dplyr)
library(ggplot2)
nat_map16 <- nat_map_download(2016)
nat_data16 <- nat_data_download(2016)
nat_data16 <- nat_data16 %>% select(-c(x,y)) # remove existing cartogram coordinates
cities <- list(c(151.2, -33.8), # Sydney
              c(153.0, -27.5), # Brisbane
              c(145.0, -37.8), # Melbourne
              c(138.6, -34.9), # Adelaide,
              c(115.9, -32.0)) # Perth
expand <- list(c(2,3.8), c(2,3), c(2.6,4.1), c(4,3), c(12,6))
nat_carto <- purrr::map2(.x=cities, .y=expand,
                       .f=aec_extract_f, aec_data=nat_data16) %>%
  purrr::map_df(aec_carto_f) %>%
  mutate(region=as.integer(as.character(region))) %>%
  rename(id=region)
nat_data_cart <- aec_carto_join_f(nat_data16, nat_carto)
library(ggthemes)

ggplot(data=nat_data16, aes(map_id=id)) +
  geom_map(map = nat_map16, fill="grey90", colour="white") +
  geom_point(data=nat_data_cart, aes(x=x, y=y), size=2, alpha=0.4,

```

```

    colour="#572d2c", inherit.aes=FALSE) +
  expand_limits(x=nat_map16$long, y=nat_map16$lat) +
  theme_map() + coord_equal()

```

 aec_extract_f

aec_extract_f - extract subsets geographically

Description

The dorling algorithm doesn't work on the entire country, because it is very clustered at the cities. To get a reasonable cartogram we need to extract out the cities, expand these with dorling independently. This function does the extraction.

Usage

```
aec_extract_f(aec_data, ctr = c(151.2, -33.8), expand = c(3, 4.5), ...)
```

Arguments

aec_data	data with centroids of electoral divisions
ctr	centroids of subset
expand	how large a chunk to cut out
...	other arguments

Examples

```

library(dplyr)
library(ggplot2)
nat_map16 <- nat_map_download(2016)
nat_data16 <- nat_data_download(2016)
nat_data16 <- nat_data16 %>% select(-c(x,y)) # remove existing cartogram coordinates
adelaide <- aec_extract_f(nat_data16, ctr=c(138.6, -34.9), expand=c(2,3))
ggplot(data=nat_map16) +
  geom_polygon(aes(x=long, y=lat, group=group, order=order),
    fill="grey90", colour="white") +
  geom_point(data=adelaide, aes(x=long_c, y=lat_c), size=2, alpha=0.4,
    colour="#f0027f") +
  xlim(c(136, 142)) + ylim(-36, -33) +
  coord_equal()

```

allocate_electorate	<i>Determine which electoral division contains the centroid from each of the Census polygons.</i>
---------------------	---

Description

Using the electoral boundaries at the time of an election and the centroids from the SA1 polygons from a neighbouring Census, allocate each SA1 to the electoral division that contains its centroid.

Usage

```
allocate_electorate(  
  centroids_ls,  
  electorates_sf,  
  census_year = NA,  
  election_year = NA  
)
```

Arguments

centroids_ls	list containing centroids as SpatialPoints and a dataframe with basic data on each polygon (e.g. name)
electorates_sf	shapefile with electoral boundaries
census_year	census year
election_year	election year

Value

data frame detailing which electoral division each Census polygon is allocated to

Examples

```
## Not run:  
# Mapping each SA1 from the 2011 Census to the 2013 electoral boundaries  
mapping_c11_e13 <- allocate_electorate(centroids_ls = centroids_sa1_2011, electorates_sf = sF_13,  
  census_year = "2011", election_year = "2013")  
  
## End(Not run)
```

`circle`*Draw a circle*

Description

##' From <https://github.com/chxy/cartogram/blob/master/R/dorling.R> Not exported here, but needed for `aec_carto_f`

Usage

```
circle(  
  xvec,  
  yvec,  
  rvec,  
  vertex = 100,  
  border = 1,  
  col = NULL,  
  add = TRUE,  
  square = FALSE,  
  ...  
)
```

Arguments

<code>xvec</code>	X-coordinates
<code>yvec</code>	Y-coordinates
<code>rvec</code>	Radii
<code>vertex</code>	The number of vertices of the circle
<code>border</code>	Color of border
<code>col</code>	Color to render in circle
<code>add</code>	Whether the circles are added to another plot.
<code>square</code>	A logical value to determine whether to draw squares.
<code>...</code>	other things

Details

This function is used to compute the locations of the circle border and draw multiple circles. It borrows the code from `plotrix::draw.circle`

Examples

```
## Not run:  
x=y=1:5  
r=5:1/5  
circle(x,y,r,add=FALSE,asp=1)
```

```
circle(x,y,r,vertex=6,add=TRUE) # hexagon
circle(x,y,r,vertex=4,add=TRUE) # diamond
circle(x,y,r,square=TRUE,add=TRUE) # square

## End(Not run)
```

complete_color	<i>Auto complete (or cut) a vector to a fixed length</i>
----------------	--

Description

From <https://github.com/chxy/cartogram/blob/master/R/dorling.R> Not exported here, but needed for aec_carto_f

Usage

```
complete_color(cl, targetlen)
```

Arguments

cl	a vector of colors
targetlen	the target length

Value

a vector of completed cl with length n

Examples

```
## Not run:
complete_color('red',5)
complete_color(c('red','blue'),5)
complete_color(c('red','blue','green','yellow','pink','grey'),5)

## End(Not run)
```

 dorling

Produce a Pseudo-Dorling Cartogram.

Description

From <https://github.com/chxy/cartogram/blob/master/R/dorling.R> Not exported here, but needed for `aec_carto_f`

Usage

```
dorling(
  name,
  centroidx,
  centroidy,
  density,
  nbr = NULL,
  shared.border = NULL,
  color = NULL,
  tolerance = 0.1,
  dist.ratio = 1.2,
  iteration = 9999,
  polygon.vertex = 100,
  animation = FALSE,
  sleep.time = 0.3,
  nbredge = ifelse(is.null(nbr), FALSE, TRUE),
  name.text = TRUE,
  ggplot2 = FALSE,
  ...
)
```

Arguments

<code>name</code>	A vector of region names.
<code>centroidx</code>	A vector of x-coordinates of the regions.
<code>centroidy</code>	A vector of y-coordinates of the regions.
<code>density</code>	A vector of the variable of interest. It will be used as the radii of the circles.
<code>nbr</code>	A list of the neighbors of every region. Each element is a vector of all the neighbor names of a region. If <code>nbr=NULL</code> , then it is assumed that no region has any neighbors. If <code>nbr</code> is not <code>NULL</code> , then names should be given to all the elements of the list, for matching the neighbors with the host region name, otherwise the parameter "name" (a character vector) will be used as the element names of <code>nbr</code> . Besides, any values in <code>nbr</code> that are not in "name" will be removed. The length of <code>nbr</code> could be different from the length of "name", but any element in <code>nbr</code> whose name is not in "name" will be removed too.
<code>shared.border</code>	A matrix of the counts of shared borders, typically generated from the function <code>border_summary_length()</code> . It is used to scale the attract force.

color	a vector of color to fill in the circles or polygons. Auto-completed if the length does not match with name.
tolerance	Tolerant value for the sum of overlapped radii.
dist.ratio	The threshold to determine whether an attract force is added. It is applied to the ratio of the distance between two centroids and the sum of the two radii.
iteration	The limit of the number of iterations. Default to be 9999.
polygon.vertex	The number of vertice of the circle. Default to be 100. If polygon.vertex=4 then diamonds applies. If polygon.vertex=6, then hexagon applies.
animation	Whether to show the movements of centroids.
sleep.time	Only works when animation=TRUE.
nbredge	whether to draw the lines between neighbor regions.
name.text	whether to print the region names on the circles or polygons.
ggplot2	whether to use ggplot2 to draw the cartogram.
...	other things

extract_centroids *Extract centroids from the polygons within a shapefile.*

Description

Extract centroids from the polygons within a shapefile.

Usage

```
extract_centroids(shapefile)
```

Arguments

shapefile SpatialPolygonsDataFrame containing polygons

Value

list containing centroids as SpatialPoints and a dataframe with basic data on each polygon (e.g. name)

Examples

```
## Not run:
sF_download(year = 2016)
electorate_centroids_2016 <- extract_centroids(sF_16)

## End(Not run)
```

firstpref_pollingbooth_download

Download first preference voting data from each polling booth, from the six Australian Federal elections between 2001 and 2016.

Description

Download first preference voting data from each polling booth, from the six Australian Federal elections between 2001 and 2016.

Usage

```
firstpref_pollingbooth_download(...)
```

Arguments

... Additional arguments passed to 'download.file'
Downloads and returns first preference votes for candidates in the House of Representatives, for each polling booth, in the seven Australian Federal elections between 2001 and 2016.

Format

A data frame with the following variables:

- StateAb: Abbreviation for state name
- DivisionID: Electoral division ID
- DivisionNm: Electoral division name
- PollingPlaceID: Polling place ID
- PollingPlace: Polling place name
- CandidateID: Candidate ID
- Surname: Candidate surname
- GivenNm: Candidate given name
- BallotPosition: Candidate's position on the ballot
- Elected: Whether the candidate was elected (Y/N)
- HistoricElected: Whether the candidate is the incumbent member
- PartyAb: Abbreviation for political party name
- PartyNm: Political party name
- OrdinaryVotes: Number of ordinary votes cast at the polling place for the candidate
- Swing: Percentage point change in ordinary votes for the party from the previous election
- PremisesPostCode: Post code of polling booth
- Latitude: Coordinates
- Longitude: Coordinates
- year: Election year

Value

A data frame containing first preference votes

A dataset containing first preference vote counts, candidate names, polling place locations, and other results for the House of Representatives from the 2001, 2004, 2007, 2010, 2013 and 2016 Australian federal elections. This data set is obtained using the 'firstpref_pollingbooth_download' function. The data were obtained from the Australian Electoral Commission.

Examples

```
## Not run:
fp_pp <- firstpref_pollingbooth_download()
library(dplyr)
fp_pp %>% filter(year == 2016) %>% arrange(-OrdinaryVotes) %>% head

## End(Not run)
```

fp01	<i>First preference votes for candidates (House of Representatives) in each electorate.</i>
------	---

Description

A dataset containing first preference vote counts, candidate names, and other results for the House of Representatives from Australian federal elections from 2001 to 2019.

Usage

```
fp01
fp04
fp07
fp10
fp13
fp16
fp19
```

Format

A data frame with the following variables:

For the 2001 election only:

- UniqueID: Numeric identifier that links the electoral division with Census and other election datasets.
- StateAb: Abbreviation for state name
- DivisionNm: Electoral division name
- Surname: Candidate surname
- GivenNm: Candidate given name
- PartyAb: Abbreviation for political party name
- PartyNm: Political party name
- Elected: Whether the candidate was elected (Y/N)
- Percent: Percentage of ordinary votes for the candidate

For the 2004 election onwards:

- StateAb: Abbreviation for state name
- UniqueID: Numeric identifier that links the electoral division with Census and other election datasets.
- DivisionNm: Electoral division name
- BallotPosition: Candidate's position on the ballot
- CandidateID: Candidate ID
- Surname: Candidate surname
- GivenNm: Candidate given name
- PartyAb: Abbreviation for political party name
- PartyNm: Political party name
- Elected: Whether the candidate was elected (Y/N)
- OrdinaryVotes: Number of ordinary votes cast at the electorate for the candidate
- Percent: Percentage of ordinary votes for the candidate

Source

https://www.aec.gov.au/About_AEC/Publications/statistics/files/aec-2001-election-statistics.zip

<https://results.aec.gov.au/12246/results/HouseDownloadsMenu-12246-csv.htm>

https://www.aec.gov.au/elections/federal_elections/2004/downloads.htm

<https://results.aec.gov.au/13745/Website/HouseDownloadsMenu-13745-csv.htm>

https://www.aec.gov.au/elections/federal_elections/2007/downloads.htm

<https://results.aec.gov.au/15508/Website/HouseDownloadsMenu-15508-csv.htm>

https://www.aec.gov.au/elections/federal_elections/2010/downloads.htm

<https://results.aec.gov.au/17496/Website/HouseDownloadsMenu-17496-csv.htm>

https://www.aec.gov.au/elections/federal_elections/2013/downloads.htm

<https://results.aec.gov.au/20499/Website/HouseDownloadsMenu-20499-csv.htm>

https://www.aec.gov.au/elections/federal_elections/2016/downloads.htm

<https://results.aec.gov.au/24310/Website/HouseDownloadsMenu-24310-Csv.htm>

get_electorate_shapes *Extract shapefiles (of Australian electorates) from raw file into fortified map and data components.*

Description

Extract polygon information and demographics for each of Australia's electorates. The map and data corresponding to the shapefiles of the 2013 Australian electorates (available at https://www.aec.gov.au/Electorates/gis/gis_datadownload.htm) are part of this package as nat_map.rda and nat_data.rda in the data folder. The function will take several minutes to complete.

Usage

```
get_electorate_shapes(  
  path_to_shapeFile = NULL,  
  sF = NULL,  
  mapinfo = TRUE,  
  layer = NULL,  
  tolerance = 0.005  
)
```

Arguments

path_to_shapeFile	path to object in local machine (only if shapefile has not already loaded)
sF	Shapefile object loaded to environment using load_shapefile
mapinfo	Is the data mapInfo format, rather than ESRI? default=TRUE
layer	If the format is mapInfo, the layer name also needs to be provided, default is NULL
tolerance	Numerical tolerance value to be used by the Douglas-Peucker algorithm (only if shapefile has not already loaded)

Value

list with two data frames: map and data; 'map' is a data set with geographic latitude and longitude, and a grouping variable to define each entity. The 'data' data set consists of demographic or geographic information for each electorate, such as size in square kilometers or corresponding state. Additionally, geographic latitude and longitude of the electorate's centroid are added.

Examples

```
## Not run:  
# Get electorate shapes in data.frame format  
  
# Path to your shapefile  
fl <- "local/path/to/shapefile.shp"
```

```
map_and_data16 <- get_electorate_shapes(path_to_shapefile = fl)

## End(Not run)
```

launch_app

Shiny app for exploring census and electorate data

Description

Shiny app for exploring census and electorate data

Usage

```
launch_app(
  election_year = 2016,
  age = c("Age00_04", "Age05_14", "Age15_19", "Age20_24", "Age25_34", "Age35_44",
    "Age45_54", "Age55_64", "Age65_74", "Age75_84", "Age85plus"),
  religion = c("Christianity", "Catholic", "Buddhism", "Islam", "Judaism",
    "NoReligion"),
  other = c("AusCitizen", "MedianPersonalIncome", "Unemployed", "BachelorAbv",
    "Indigenous", "EnglishOnly", "OtherLanguageHome", "Married", "DeFacto",
    "FamilyRatio", "Owned"),
  palette = c("#1B9E77", "#F0027F", "#E6AB02", "#66A61E", "#7570B3", "#D95F02",
    "#3690C0")
)
```

Arguments

election_year	Year of Federal election to be explored (2001, 2004, 2007, 2010, 2013 or 2016)
age	Age variables to show. Variable(s) should match column names from abs2016 . By default, all variables are shown.
religion	Religion variables to show. Variable(s) should match column names from abs2016 . By default, all variables are shown.
other	Other census variables to show. Variable(s) should match column names from abs2016 . By default, all variables are shown.
palette	a named character vector of selection colors. The vector names are used as the display in the drop-down control.

Author(s)

Carson Sievert

Examples

```

## Not run:
library(shiny)
library(plotly)
library(tidyverse)
# for comparing labor/liberal
launch_app(
  election_year = 2016,
  age = c("Age20_24", "Age25_34", "Age55_64"),
  religion = c("Christianity", "Catholic", "NoReligion"),
  other = c("AusCitizen", "MedianPersonalIncome", "Unemployed")
)

# for inspecting highly contested areas
launch_app(
  election_year = 2016,
  age = c("Age25_34", "Age35_44", "Age55_64"),
  religion = c("Christianity", "Catholic", "NoReligion"),
  other = c("Owned", "Indigenous", "AusCitizen")
)

launch_app()

## End(Not run)

```

load_shapefile

Load shapefile of Australia into R

Description

Load shapefile into R as a SpatialDataFrame, extract polygon information, thin polygon, fix any problematic polygons, and format variable names. "nat_map" and "nat_data" objects for every Australian federal election between 2001-2016 can be readily loaded from the package for analysis.

Usage

```
load_shapefile(path_to_shapeFile, tolerance = 0.005)
```

Arguments

```

path_to_shapeFile
    path to object in local machine

tolerance
    numerical tolerance value to be used by the Douglas-Peucker algorithm

```

Details

The function will take several minutes to complete.

Value

object of class SpatialPolygonsDataFrame

Examples

```
## Not run:  
# Load electorate shapefile into R  
  
# Path to your shapefile  
fl <- "local/path/to/shapefile.shp"  
  
# Load  
my_sF <- load_shapefile(fl)  
  
## End(Not run)
```

mapping_fn	<i>Compute areas of intersection between each election boundary and those in the Census of interest. This is a less refined method than using SAI centroids.</i>
------------	--

Description

At the time of an election, compute how much each electoral division intersects with the divisions in place at the time of the Census. This is to be used in interpolating Census information for electoral divisions in a year that a Census did not occur.

Usage

```
mapping_fn(aec_sF, abs_sF, area_thres = 0.995)
```

Arguments

aec_sF	shapefile with boundaries at election time
abs_sF	shapefile with boundaries at census time
area_thres	threshold for which mapping is sufficient (default is 99.5%)

Value

data frame detailing how much Census divisions intersect with each electoral division at the time of the election.

Examples

```
## Not run:
# Each 2013 electorate boundary's composition in terms of the
# boundaries in place for the 2016 Census
aec_sF_2013 <- loadShapeFile(path_to_aec_shapefile)
abs_sF_2016 <- loadShapeFile(path_to_abs_shapefile)

mapping_df <- mapping_fn(aec_sF = aec_sF_2013, abs_sF = abs_sF_2016, area_thres = 0.995)

## End(Not run)
```

nat_data_download	<i>Download a data frame containing electorate centroids</i>
-------------------	--

Description

Downloads and returns a data frame containing the points that make up the centroids for each of the Australian electorates in the desired federal election.

Usage

```
nat_data_download(year, ...)
```

Arguments

year	Desired year, must be one of 2001, 2004, 2007, 2010, 2011, 2013, 2016, 2019
...	Additional arguments passed to 'download.file'

Value

A data frame with data associated with each of the Australian federal electorates

- id: Numeric identifier for the polygon
- elect_div: Electorate division name
- state: abbreviation of the state name
- numccds: AEC variable that might be filled with meaning or a description down the road
- area_sqkm: combined square kilometers of each electorate
- long_c: longitude coordinate of electorate (polygon) centroid
- lat_c: latitude coordinate of electorate (polygon) centroid
- x: longitude coordinate for plotting a cartogram
- y: latitude coordinate for plotting a cartogram
- radius: variable used in the construction of cartogram points

Examples

```
library(eechidna)
library(dplyr)
library(ggmap)

nat_data19 <- nat_data_download(2019)

nat_data19 %>%
  qmplot(long_c, lat_c, data=.)
```

nat_map_download	<i>Download a data frame containing the polygons of Australian federal electorates</i>
------------------	--

Description

Downloads and returns a DataFrame containing the points that outline the polygons for each of the Australian electorates in the desired federal election. The data were obtained from the Australian Electoral Commission and the Australian Bureau of Statistics.

Usage

```
nat_map_download(year, ...)
```

Arguments

year	Desired year, must be one of 2001, 2004, 2007, 2010, 2011, 2013, 2016, 2019
...	Additional arguments passed to ‘download.file’

Value

A data frame consisting of points with the following variables:

- id: Numeric identifier for the polygon
- long: longitude coordinate of point in polygon
- lat: latitude coordinate of point in polygon
- order: order for polygon points
- hole: whether polygon has a hole
- piece: piece for polygon
- group: group for polygon
- elect_div: Electoral division name
- state: Abbreviation for state name

Examples

```

library(eechidna)
library(dplyr)
library(ggmap)

nat_map16 <- nat_map_download(2016)

nat_map16 %>%
  filter(elect_div=='MELBOURNE') %>%
  qmplot(long, lat, data=., color='red', size=5,
         xlab=NA,ylab=NA) +
  theme(legend.position = 'none')

```

sF_download	<i>Download SpatialPolygonsDataFrame containing polygons of Australian federal electorates</i>
-------------	--

Description

Download SpatialPolygonsDataFrame containing polygons of Australian federal electorates

Usage

```
sF_download(year, ...)
```

Arguments

year	Desired year, must be one of 2001, 2004, 2007, 2010, 2011, 2013, 2016, 2019
...	Additional arguments passed to 'download.file'

Downloads and returns a large SpatialPolygonsDataFrame containing the polygons and associated data for each of the Australian electorates in the desired federal election. This object is obtained using the 'sF_download' function. The data were obtained from the Australian Electoral Commission and the Australian Bureau of Statistics.

Value

A SpatialPolygonsDataFrame containing polygons of the Australian federal electorates

Examples

```

## Not run:
sF_16 <- sF_download(year = 2016)
# Plot a map of the electorates
library(sp)
plot(sF_16)

## End(Not run)

```

tcp01	<i>Two candidate preferred votes for candidates (House of Representatives) in each electorate.</i>
-------	--

Description

A dataset containing two candidate preferred vote counts, and other results for the House of Representatives from the 2001 to 2019 Australian federal elections. Includes the count of votes for the leading two candidates in the electorate after distribution of preferences.

Usage

tcp01

tcp04

tcp07

tcp10

tcp13

tcp16

tcp19

Format

A data frame with the following variables:

For the 2001 election:

UniqueID Numeric identifier that links the electoral division with Census and other election datasets

StateAb Abbreviation for state name

DivisionNm Electoral division name

Surname Candidate surname

GivenNm Candidate given name

Elected Whether the candidate was elected (Y/N)

Percent Percentage of ordinary votes cast for the candidate

PartyAb Abbreviation for political party name

PartyNm Political party name

Swing Percentage point change in ordinary votes for the party from the previous election

For the 2004 election:

StateAb Abbreviation for state name

UniqueID Numeric identifier that links the electoral division with Census and other election datasets.
DivisionNm Electoral division name
BallotPosition Candidate's position on the ballot
CandidateID Candidate ID
Surname Candidate surname
GivenNm Candidate given name
PartyAb Abbreviation for political party name
PartyNm Political party name
Elected Whether the candidate was elected (Y/N)
OrdinaryVotes Number of ordinary votes cast for the candidate
Percent Percentage of ordinary votes cast for the candidate

For the 2007 election onwards:

StateAb Abbreviation for state name
UniqueID Numeric identifier that links the electoral division with Census and other election datasets.
DivisionNm Electoral division name
BallotPosition Candidate's position on the ballot
CandidateID Candidate ID
Surname Candidate surname
GivenNm Candidate given name
PartyAb Abbreviation for political party name
PartyNm Political party name
Elected Whether the candidate was elected (Y/N)
HistoricElected Whether the candidate is the incumbent member
OrdinaryVotes Number of ordinary votes cast for the candidate
Percent Percentage of ordinary votes cast for the candidate

Source

https://www.aec.gov.au/About_AEC/Publications/statistics/files/aec-2001-election-statistics.zip
<https://results.aec.gov.au/12246/results/HouseDownloadsMenu-12246-csv.htm>
https://www.aec.gov.au/elections/federal_elections/2004/downloads.htm
<https://results.aec.gov.au/13745/Website/HouseDownloadsMenu-13745-csv.htm>
https://www.aec.gov.au/elections/federal_elections/2007/downloads.htm
<https://results.aec.gov.au/15508/Website/HouseDownloadsMenu-15508-csv.htm>
https://www.aec.gov.au/elections/federal_elections/2010/downloads.htm
<https://results.aec.gov.au/17496/Website/HouseDownloadsMenu-17496-csv.htm>
https://www.aec.gov.au/elections/federal_elections/2013/downloads.htm
<https://results.aec.gov.au/20499/Website/HouseDownloadsMenu-20499-csv.htm>
https://www.aec.gov.au/elections/federal_elections/2016/downloads.htm
<https://results.aec.gov.au/24310/Website/HouseDownloadsMenu-24310-Csv.htm>

tpp01	<i>Two party preferred votes for candidates in each electorate where Labor and Liberal parties were the two most popular parties.</i>
-------	---

Description

A dataset containing two party preferred vote counts, winning candidate names, and other results for the House of Representatives from the 2001 to 2019 Australian federal elections. Includes the count of votes for the Australian Labor Party and the count of votes for the Liberal-National Coalition for each electorate.

Usage

tpp01

tpp04

tpp10

tpp07

tpp13

tpp16

tpp19

Format

A data frame with the following variables:

UniqueID Numeric identifier that links the electoral division with Census and other election datasets.

DivisionNm Electoral division name

StateAb Abbreviation for state name

LNP_Vote Count of two party preferred vote in favour of the Liberal National coalition

LNP_Percent Percentage of two party preferred vote in favour of the Liberal National coalition

ALP_Votes Count of two party preferred vote in favour of the Labor party

ALP_Percent Percentage of two party preferred vote in favour of the Labor party

TotalVotes Total number of votes cast

Swing Percentage point change in two party preferred vote from the previous election

Source

https://www.aec.gov.au/About_AEC/Publications/statistics/files/aec-2001-election-statistics.zip
<https://results.aec.gov.au/12246/results/HouseDownloadsMenu-12246-csv.htm>
https://www.aec.gov.au/elections/federal_elections/2004/downloads.htm
<https://results.aec.gov.au/15508/Website/HouseDownloadsMenu-15508-csv.htm>
https://www.aec.gov.au/elections/federal_elections/2010/downloads.htm
<https://results.aec.gov.au/13745/Website/HouseDownloadsMenu-13745-csv.htm>
https://www.aec.gov.au/elections/federal_elections/2007/downloads.htm
<https://results.aec.gov.au/17496/Website/HouseDownloadsMenu-17496-csv.htm>
https://www.aec.gov.au/elections/federal_elections/2013/downloads.htm
<https://results.aec.gov.au/20499/Website/HouseDownloadsMenu-20499-csv.htm>
https://www.aec.gov.au/elections/federal_elections/2016/downloads.htm
<https://results.aec.gov.au/24310/Website/HouseDownloadsMenu-24310-Csv.htm>

twocand_pollingbooth_download

Download two candidate preference voting data from each polling booth, from the five Australian Federal elections between 2004 and 2016.

Description

Download two candidate preference voting data from each polling booth, from the five Australian Federal elections between 2004 and 2016.

Usage

```
twocand_pollingbooth_download(...)
```

Arguments

... Additional arguments passed to ‘download.file’
Downloads and returns the two candidate preferred votes for candidates in the House of Representatives, for each polling booth, in the five Australian Federal elections between 2004 and 2016.

Format

A data frame with the following variables:

- StateAb: Abbreviation for state name
- DivisionID: Electoral division ID
- DivisionNm: Electoral division name
- PollingPlaceID: Polling place ID
- PollingPlace: Polling place name
- CandidateID: Candidate ID
- Surname: Candidate surname
- GivenNm: Candidate given name
- BallotPosition: Candidate's position on the ballot
- Elected: Whether the candidate was elected (Y/N)
- HistoricElected: Whether the candidate is the incumbent member
- PartyAb: Abbreviation for political party name
- PartyNm: Political party name
- OrdinaryVotes: Number of ordinary votes cast at the polling place for the candidate
- Swing: Percentage point change in ordinary votes for the party from the previous election
- PremisesPostCode: Post code of polling booth
- Latitude: Coordinates
- Longitude: Coordinates
- year: Election year

Value

A data frame containing two candidate preference votes

A dataset containing two candidate preferred vote counts, polling place locations, and other results for the House of Representatives from each of the 2004, 2007, 2010, 2013 and 2016 Australian federal elections. Includes the count of votes for the leading two candidates in the electorate after distribution of preferences for each polling place. Note that 2001 two candidate preferred vote is not available in this package. This data set is obtained using the 'twocand_pollingbooth_download' function. The data were obtained from the Australian Electoral Commission,

Examples

```
## Not run:  
tcp_pp <- twocand_pollingbooth_download()  
library(dplyr)  
tcp_pp %>% filter(year == 2016) %>% arrange(-OrdinaryVotes) %>% head  
  
## End(Not run)
```

twoparty_pollingbooth_download

Download two party preference voting data from each polling booth, from the seven Australian Federal elections between 2001 and 2016.

Description

Download two party preference voting data from each polling booth, from the seven Australian Federal elections between 2001 and 2016.

Usage

```
twoparty_pollingbooth_download(...)
```

Arguments

... Additional arguments passed to ‘download.file’
Downloads and returns the two party preferred votes for candidates in the House of Representatives, for each polling booth, in the six Australian Federal elections between 2001 and 2016.

Format

A data frame with the following variables:

- StateAb: Abbreviation for state name
- DivisionID: Electoral division ID
- DivisionNm: Electoral division name
- PollingPlaceID: Polling place ID
- PollingPlace: Polling place name
- LNP_Votes: Count of two party preferred vote in favour of the Liberal National coalition
- LNP_Percent: Percentage of two party preferred vote in favour of the Liberal National coalition
- ALP_Votes: Count of two party preferred vote in favour of the Labor party
- ALP_Percent: Percentage of two party preferred vote in favour of the Labor party
- TotalVotes: Total number of votes cast
- Swing: Percentage point change in two party preferred vote from the previous election
- PremisesPostCode: Post code of polling booth
- Latitude: Coordinates
- Longitude: Coordinates
- year: Election year

Value

A data frame containing two party preference votes

A dataset containing two party preferred vote counts, winning candidate names, polling place locations, and other results for the House of Representatives from each of the 2001, 2004, 2007, 2010, 2013 and 2016 Australian federal elections. Includes the count of votes for the Australian Labor Party and the count of votes for the Liberal-National Coalition for each polling place. This data set is obtained using the ‘twoparty_pollingbooth_download’ function. The data were obtained from the Australian Electoral Commission.

Examples

```
## Not run:
tpp_pp <- twoparty_pollingbooth_download()
library(dplyr)
tpp_pp %>% filter(year == 2016) %>% arrange(-LNP_Percent) %>% head

## End(Not run)
```

weighted_avg_census	<i>Function to compute weighted average of Census information using imputed populations as weights.</i>
---------------------	---

Description

This is a less refined method than using SA1 centroids, because it uses Census data aggregated at Census division level.

Usage

```
weighted_avg_census(mapping_df, abs_df)
```

Arguments

mapping_df	data frame detailing how much Census divisions intersect with each electoral division at the time of the election.
abs_df	data frame holding Census information from Census year

Value

data frame with imputed Census data for electoral boundaries at the time of the Census

Examples

```
## Not run:
data("abs2016")

# Each 2013 electorate boundary's composition in terms of the
# boundaries in place for the 2016 Census
aec_sF_2013 <- loadShapeFile(path_to_aec_shapefile)
abs_sF_2016 <- loadShapeFile(path_to_abs_shapefile)
mapping_2016 <- mapping_fn(aec_sF = aec_sF_2013, abs_sF = abs_sF_2016)

# Estimate 2016 Census data for the 2013 electorates
imputed_data_2016 <- weighted_avg_census(mapping_df = mapping_2016, abs_df = abs2016)

## End(Not run)
```

```
weighted_avg_census_sa1
```

Function to compute weighted average of Census information using imputed populations as weights

Description

Function to compute weighted average of Census information using imputed populations as weights

Usage

```
weighted_avg_census_sa1(mapping_df, abs_df)
```

Arguments

mapping_df	data frame detailing how much Census divisions intersect with each electoral division at the time of the election.
abs_df	data frame holding Census information from Census year

Value

data frame with imputed Census data for electoral boundaries at the time of the Census

Examples

```
## Not run:
# Each 2013 electorate boundary's characteristics as at the time of the 2016 Census
mapping_c16_e13 <- allocate_electorate(centroids_ls = centroids_sa1_2016, electorates_sf = sf_13,
  census_year = "2016", election_year = "2013")

# Estimate 2016 Census data for the 2013 electorates
imputed_data_2016 <- weighted_avg_census_sa1(mapping_df = mapping_2016, abs_df = abs2016_cd)

## End(Not run)
```

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