Package: rurality (via r-universe)

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Title Classification and Scoring of U.S. County and ZIP Code Rurality

Version 0.2.0.9000

Description Provides USDA Rural-Urban Continuum Codes (RUCC 2023), Rural-Urban Commuting Area codes (RUCA 2020), and a composite rurality score for all U.S. counties. Functions enable lookup by FIPS code, ZIP code, or county name, and easy merging with existing datasets. Data sources include the USDA Economic Research Service, U.S. Census Bureau American Community Survey, and Census TIGER/Line shapefiles.

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RemoteUrl https://github.com/cwimpy/rurality

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Contents

`add_rurality` *Merge Rurality Data onto a Data Frame*

Description

Joins rurality data onto an existing data frame by FIPS code.

Usage

```
add_rurality(
  data,
  fips_col = "fips",
  vars = c("rurality_score", "rurality_classification", "rucc_2023")
)
```

Arguments

`data`	A data frame with a FIPS code column.
`fips_col`	The name of the FIPS code column (default: "fips").
`vars`	Which rurality variables to add. Default adds score and classification. Use "all" for all variables.

Value

The input data frame with rurality columns appended.

Examples

```
my_data <- data.frame(fips = c("05031", "06037", "48453"), value = 1:3)
add_rurality(my_data)
add_rurality(my_data, vars = "all")
```

classify_rurality *Classify a Rurality Score*

Description

Converts numeric rurality scores to classification labels.

Usage

```
classify_rurality(score)
```

Arguments

score	A numeric vector of rurality scores (0-100).

Value

A character vector of classifications.

Examples

```
classify_rurality(c(15, 35, 55, 75, 90))
```

county_crosswalk *County Crosswalk with Multiple Rurality Classification Schemes*

Description

A county-level crosswalk combining the four major U.S. rurality classification schemes (USDA RUCC, USDA RUCA, NCHS Urban-Rural, and OMB Metropolitan/Micropolitan), along with Census urban/rural percentage and ACS 2022 5-year demographic covariates. Used by `rurality_spec()` to run specification curve analyses comparing schemes.

Usage

```
county_crosswalk
```

Format

A tibble with 3,143 rows and the following columns:

fips 5-digit county FIPS code (character)

state_fips 2-digit state FIPS code (character)

county_fips 3-digit county FIPS code (character)

county_name County name

state_abbr Two-letter state abbreviation

rucc_2023 USDA Rural-Urban Continuum Code 2023 (1-9)

ruca_2020_county County-level RUCA 2020 (modal ZCTA code, 1-10)

nchs_2023 NCHS Urban-Rural Classification 2023 (1-6)

omb_class OMB class: "metro", "micro", or "noncore"

pct_urban_2020 Percent of county population in Census urban areas (2020)

pop_total ACS 2022 5-year total population

median_inc ACS 2022 5-year median household income

pct_ba_plus Percent of adults 25+ with bachelor's degree or higher

pct_nh_white Percent non-Hispanic white

log_inc log(median household income)

log_pop log(total population)

pop_density Population per square mile of land area

Source

- USDA Economic Research Service: RUCC 2023, RUCA 2020
- NCHS Urban-Rural Classification Scheme for Counties 2023
- U.S. Office of Management and Budget, CBSA delineations
- U.S. Census Bureau: 2020 Decennial (urban/rural), ACS 2022 5-year

Examples

```
county_crosswalk
```

`county_rurality` *County-Level Rurality Data for the United States*

Description

A dataset containing rurality scores, USDA classifications, and demographic data for all U.S. counties. Includes RUCC 2023 codes, population density, distance to metro areas, and a composite rurality score.

Usage

```
county_rurality
```

Format

A tibble with approximately 3,233 rows and 23 columns:

fips 5-digit county FIPS code (character)
state_fips 2-digit state FIPS code (character)
county_fips 3-digit county FIPS code (character)
state_abbr Two-letter state abbreviation
county_name County name
pop_2020 2020 Census population
acs_pop ACS 2022 5-year population estimate
land_area_sqmi Land area in square miles
pop_density Population per square mile
rucc_2023 USDA Rural-Urban Continuum Code (1-9)
rucc_description RUCC code description
omb_designation OMB designation: Metropolitan, Micropolitan, or Nonmetro
lat County centroid latitude
lng County centroid longitude
dist_large_metro Distance to nearest large metro (>1M pop) in miles
dist_medium_metro Distance to nearest medium metro (250K-1M) in miles
dist_small_metro Distance to nearest small metro (50K-250K) in miles
rucc_score RUCC-derived score component (0-100)
density_score Population density score component (0-100)
distance_score Distance to metro score component (0-100)
rurality_score Composite rurality score (0-100)
rurality_classification Classification: Urban, Suburban, Mixed, Rural, Very Rural
median_income ACS 2022 median household income
median_age ACS 2022 median age

Details

The composite rurality score is calculated as a weighted average:

- RUCC score: 55\
- Population density score: 28\
- Distance to metro score: 17\

Classifications:

- 80-100: Very Rural
- 60-79: Rural
- 40-59: Mixed
- 20-39: Suburban
- 0-19: Urban

Source

- USDA Economic Research Service, Rural-Urban Continuum Codes 2023
- U.S. Census Bureau, American Community Survey 2022 5-Year Estimates
- U.S. Census Bureau, TIGER/Line Shapefiles 2020

Examples

```
# View the data
county_rurality

# Filter to rural counties
library(dplyr)
county_rurality |> filter(rurality_classification == "Very Rural")

# Arkansas counties
county_rurality |> filter(state_abbr == "AR")
```

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get_ruca *Look Up RUCA Code by ZIP Code*

Description

Returns the USDA Rural-Urban Commuting Area code (2020) for one or more ZIP codes or ZCTAs.

Usage

```
get_ruca(zip)
```

Arguments

zip	A character vector of 5-digit ZIP codes.

Details

RUCA codes range from 1 (metropolitan core) to 10 (rural). The primary code reflects the majority commuting pattern; the secondary code captures additional commuting flows.

Value

A tibble with columns: zip, primary_ruca, secondary_ruca, state. Returns NA values for ZIPs not in the RUCA dataset.

Examples

```
get_ruca("72401")
get_ruca(c("72401", "90210", "59801"))
```

get_rucc *Get RUCC Code for a County*

Description

Returns the USDA Rural-Urban Continuum Code (2023) for one or more counties.

Usage

```
get_rucc(fips)
```

Arguments

fips	A character vector of 5-digit county FIPS codes.

Value

An integer vector of RUCC codes (1-9), or NA for unmatched FIPS.

Examples

```
get_rucc("05031")
get_rucc(c("05031", "06037"))
```

get_rurality *Look Up Rurality Data by FIPS Code*

Description

Returns the full rurality record for one or more county FIPS codes.

Usage

```
get_rurality(fips)
```

Arguments

fips	A character vector of 5-digit county FIPS codes.

Value

A tibble with rurality data for the matched counties.

Examples

```
get_rurality("05031")
get_rurality(c("05031", "06037", "48453"))
```

ruca_codes *RUCA Code Data for U.S. ZIP Codes*

Description

USDA Rural-Urban Commuting Area codes (2020) for approximately 41,000 ZCTAs.

Usage

```
ruca_codes
```

Format

A tibble with columns:

zip 5-digit ZIP/ZCTA code (character)
state Two-letter state abbreviation
primary_ruca Primary RUCA code (1-10)
secondary_ruca Secondary RUCA code (1-10)

Source

USDA Economic Research Service, Rural-Urban Commuting Area Codes 2020

rurality_score *Get Rurality Score for a County*

Description

Returns the composite rurality score (0-100) for one or more counties.

Usage

```
rurality_score(fips)
```

Arguments

fips	A character vector of 5-digit county FIPS codes.

Value

A numeric vector of rurality scores, or NA for unmatched FIPS.

Examples

```
rurality_score("05031")
rurality_score(c("05031", "06037", "48453"))
```

`rurality_spec` *Specification Curve Analysis Across Rurality Classification Schemes*

Description

Runs a specification curve across four rurality classification schemes (RUCC, RUCA, NCHS, OMB), two functional forms (ordinal and binary metro/nonmetro), and three covariate sets, for one or more user-supplied county-level outcome variables. Returns a tidy data frame of coefficient estimates suitable for plotting or further analysis.

Usage

```
rurality_spec(
  data,
  outcome,
  fips_col = "fips",
  covariates = NULL,
  schemes = c("rucc", "ruca", "nchs", "omb"),
  forms = c("ordinal", "binary"),
  covar_sets = c("minimal", "full", "state_fe"),
  plot = TRUE
)
```

Arguments

`data`	A data frame containing a 5-digit county FIPS column and at least one numeric outcome variable.
`outcome`	A character vector naming one or more outcome columns in `data`.
`fips_col`	Name of the FIPS column in `data`. Default `"fips"`.
`covariates`	Optional character vector of additional covariate column names already present in `data`. These are added on top of the three built-in covariate sets (see Details). Default `NULL`.
`schemes`	Character vector of schemes to include. Any subset of `c("rucc", "ruca", "nchs", "omb")`. Default: all four.
`forms`	Character vector of functional forms. Any subset of `c("ordinal", "binary")`. Default: both.
`covar_sets`	Character vector of built-in covariate sets to use. Any subset of `c("minimal", "full", "state_fe")`. Default: all three. See Details.
`plot`	Logical. If `TRUE` (default), print a specification curve plot. Requires **ggplot2**.

Details

`rurality_spec()` joins the package's `county_crosswalk` dataset (FIPS backbone with RUCC, RUCA, NCHS, OMB, and ACS covariates) onto `data` by FIPS code, then fits OLS models for every combination of scheme, form, and covariate set requested.

Built-in covariate sets (using ACS 2022 variables from the crosswalk):

- `"minimal"`: log(population) + log(median income)
- `"full"`: minimal + percent BA or higher + percent non-Hispanic white
- `"state_fe"`: full + state fixed effects (`factor(state_fips)`)

Ordinal predictors are standardized (mean 0, SD 1) so that coefficients are comparable across schemes with different scale lengths (RUCC: 1-9, RUCA: 1-10, NCHS: 1-6, OMB: 1-3).

Binary predictors code metropolitan = 0, nonmetropolitan = 1, using standard cutpoints: RUCC >= 4, RUCA >= 4, NCHS >= 5, OMB != "metro".

Any user-supplied `covariates` are appended to all three built-in covariate sets.

Value

A tibble with one row per specification per outcome, containing:

outcome Outcome variable name

scheme Rurality scheme (`rucc`, `ruca`, `nchs`, `omb`)

form Functional form (`ordinal` or `binary`)

covars Covariate set label

n Number of observations

estimate Coefficient on the rurality predictor

std.error Standard error

statistic t-statistic

p.value p-value

conf.low Lower 95% confidence interval

conf.high Upper 95% confidence interval

r.squared Model R-squared

Examples

```
## Not run:
# Minimal example with a built-in outcome proxy
library(dplyr)

# Attach a synthetic outcome to the crosswalk
df <- county_rurality |>
  select(fips) |>
  mutate(y = rnorm(n()))

results <- rurality_spec(df, outcome = "y")
print(results)

## End(Not run)
```

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