Package: wildfires (via r-universe)

March 3, 2025

Title Mapping Risk and Resilience to wildfires in the UK

Version 0.9.0

Description Build an social vulnerability index using PCA and identify areas of high wildfire risk and high social vulnerability.

License GPL (>= 3)

Encoding UTF-8

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Depends R (>= 2.10)

LazyData true

Imports dplyr, ggplot2, raster

Config/pak/sysreqs libgdal-dev gdal-bin libgeos-dev libproj-dev libsqlite3-dev

Repository https://r-multiverse-staging.r-universe.dev

RemoteUrl https://github.com/humaniverse/wildfires

RemoteRef 228c24be602b16073ff2bc8096d5df9d42dc6ea1

RemoteSha 228c24be602b16073ff2bc8096d5df9d42dc6ea1

Contents

`fires_spring_uk` *Spring Wildfires in the UK (2002-2022)*

Description

A dataset containing point data of all wildfires that happened in the UK in the months of March, April and May between 2002 and 2022. From the MODIS Collection 6.1 of the NASA FIRMS Archive

Usage

```
fires_spring_uk
```

Format

A data frame of class "sf" with 9448 rows and 5 variables:

LATITUDE Latitude of the fire

LONGITUDE Longitude of the fire

geometry Point coordinates of the fire

year Year

month Month

Author(s)

Matteo Larrode

Source

https://firms.modaps.eosdis.nasa.gov/download/

fires_summer_uk *Summer Wildfires in the UK (2002-2022)*

Description

A dataset containing point data of all wildfires that happened in the UK in the months of June, July, August, andSeptember between 2002 and 2022. From the MODIS Collection 6.1 of the NASA FIRMS Archive

Usage

```
fires_summer_uk
```

Format

A data frame of class "sf" with 5221 rows and 5 variables:

LATITUDE Latitude of the fire

LONGITUDE Longitude of the fire

geometry Point coordinates of the fire

year Year

month Month

Source

https://firms.modaps.eosdis.nasa.gov/download/

indic_msoa_eng_wales *Socioeconomic Indicators for England and Wales at MSOA Level*

Description

This dataset provides a comprehensive collection of socioeconomic variables for Middle Layer Super Output Areas (MSOAs) in England and Wales. Derived primarily from Census data, these indicators have been used for constructing the Social Vulnerability Index (SoVI).

Usage

```
indic_msoa_eng_wales
```

Format

A tibble with 7,264 rows and 26 variables:

msoa_code `character` MSOA code uniquely identifying each area.

msoa_name `character` Descriptive name of the MSOA.

pop_age_15below_normalised `double` Percentage of the population aged below 15 years old.

pop_age_65over_normalised `double` Percentage of the population aged over 65 years old.

no_qualification_normalised `double` Percentage of the population without educational qualifications.

... Other socioeconomic indicators such as disability, health status, household composition, housing status, employment, and ethnicity, all normalised by MSOA population.

Details

The indicators within this dataset were selected based on a comprehensive literature review that identified key factors contributing to social vulnerability, particularly in the context of wildfire risk. The normalisation process facilitates comparison across different MSOAs and enhances the dataset's utility in spatial analyses.

References

The selection of variables is based on the methodology and literature review conducted in "Spatial Assessment of Wildfire Vulnerability in England and Wales: Coupling Social Vulnerability with Predicted Wildfire Susceptibility" by Hasan Guler.

`indic_msoa_scotland` *Socioeconomic Indicators for Scotland's Middle Layer Super Output Areas (MSOAs)*

Description

This dataset contains socioeconomic indicators from the 2021 Census for MSOAs in Scotland, essential for understanding demographic patterns, social vulnerability, and aiding in socio-economic analyses and policy formulation.

Usage

```
indic_msoa_scotland
```

Format

A tibble with 1,279 rows and 20 variables. Key variables include:

iz11_code `character` Unique identifier for each MSOA, known as Intermediate Zone (IZ) code.

iz11_name `character` Name of the MSOA, known as Intermediate Zone (IZ) name.

under15_normalised `double` Normalised proportion of the population under 15 years.

over65_normalised `double` Normalised proportion of the population over 65 years.

no_qualifcations_normalised `double` Normalised proportion of the population without formal qualifications.

... Other socioeconomic indicators such as employment status, housing conditions, and ethnic diversity, all normalised for comparative analysis.

Details

The indicators within this dataset were selected based on a comprehensive literature review that identified key factors contributing to social vulnerability, particularly in the context of wildfire risk. The normalisation process facilitates comparison across different areas and enhances the dataset's utility in spatial analyses.

References

The selection of variables is based on the methodology and literature review conducted in "Spatial Assessment of Wildfire Vulnerability in England and Wales: Coupling Social Vulnerability with Predicted Wildfire Susceptibility" by Hasan Guler.

Northern Ireland Statistics and Research Agency (NISRA) - Census 2021 data.

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indic_sdz_ni *Socioeconomic Indicators for Northern Ireland's Super Data Zones*

Description

This dataset encapsulates a range of socioeconomic indicators derived from the 2021 Census for Super Data Zones (SDZs) in Northern Ireland.

Usage

```
indic_sdz_ni
```

Format

A tibble with 850 rows and 16 variables:

sdz21_code `character` Unique identifier for each Super Data Zone.

under15_normalised `double` Proportion of the population under 15 years.

over65_normalised `double` Proportion of the population over 65 years.

no_qual_normalised `double` Proportion of the population without any formal qualifications.

disabled_normalised `double` Proportion of the population with disabilities.

longterm_condition_normalised `double` Proportion of the population with long-term health conditions.

unemployed_normalised `double` Proportion of the unemployed population.

skilled_occupation_normalised `double` Proportion of the population in skilled occupations.

private_renter_normalised `double` Proportion of the population living in privately rented accommodations.

social_renter_normalised `double` Proportion of the population living in socially rented accommodations.

no_car_normalised `double` Proportion of households without access to a car.

caravan_normalised `double` Proportion of the population living in caravans or other temporary structures.

single_person_house_normalised `double` Proportion of single-person households.

other_ethnicity_normalised `double` Proportion of the population belonging to ethnic minorities, excluding the major ethnic groups.

migrant_inside_normalised `double` Proportion of the population who migrated from within the UK.

migrant_outside_normalised `double` Proportion of the population who migrated from outside the UK.

Details

The indicators within this dataset were selected based on a comprehensive literature review that identified key factors contributing to social vulnerability, particularly in the context of wildfire risk. The normalisation process facilitates comparison across different areas and enhances the dataset's utility in spatial analyses.

References

The selection of variables is based on the methodology and literature review conducted in "Spatial Assessment of Wildfire Vulnerability in England and Wales: Coupling Social Vulnerability with Predicted Wildfire Susceptibility" by Hasan Guler.

Northern Ireland Statistics and Research Agency (NISRA) - Census 2021 data.

`map_worst_decile_ltla` *Map Worst Decile Local Authorities in the UK*

Description

Given a binary 'worst-decile' type variable at the MSOA level or equivalent, aggregates it to the Lower Tier Local Authority level and maps it. In this function, the theme is designed for the mapping of a 'worst quintile' binary variable for the wildfire risk and social vulnerability index.

Usage

```
map_worst_decile_ltla(df, nation = "All")
```

Arguments

df	Dataset including a 'is_worst_deciles' column
nation	(default is "All"). Nation to be mapped: one of "All", "England", "Wales", "Scotland", or "Northern Ireland"

Value

An image (png) with the map (not yet)

`map_worst_decile_msoa` *Map Worst Decile MSOAs in the UK*

Description

Maps a binary variable at the MSOA level or equivalent for the UK or a given nation. In this function, the theme is designed for the mapping of a 'worst quintile' binary variable for the wildfire risk and social vulnerability index.

Usage

```
map_worst_decile_msoa(df, nation = "All")
```

Arguments

df	Dataset including a 'is_worst_deciles' column
nation	(default is "All"). Nation to be mapped: one of "All", "England", "Wales", "Scotland", or "Northern Ireland"

Value

An image (png) with the map (not yet)

sovi_england *Social Vulnerability Index (SoVI) for England's MSOAs*

Description

This dataset quantifies the Social Vulnerability Index (SoVI) across Middle Layer Super Output Areas (MSOAs) in England. The SoVI is a composite measure derived from various socio-economic and demographic variables, providing insights into relative vulnerability across the UK.

Usage

```
sovi_england
```

Format

A tibble with 6,856 rows and 4 columns:

msoa21_code `character` MSOA code.

msoa21_name `character` MSOA name.

SoVI `double` Social Vulnerability Index score.

SoVI_standardised `double` Standardised Social Vulnerability Index score.

Details

The SoVI is constructed using Principal Component Analysis (PCA) on a set of socio-economic and demographic variables sourced from the Census, as detailed in the referenced study. This index provides insights into the relative vulnerability of communities to social and environmental hazards, with higher scores indicating greater vulnerability.

References

The methodology for constructing the SoVI is detailed in "Spatial Assessment of Wildfire Vulnerability in England and Wales: Coupling Social Vulnerability with Predicted Wildfire Susceptibility," by Hasan Guler.

sovi_ni *Social Vulnerability Index (SoVI) for Northern Ireland's Super Data Zones*

Description

This dataset quantifies the Social Vulnerability Index (SoVI) across Super Data Zones (SDZs) in Northern Ireland. The SoVI is a composite measure derived from various socio-economic and demographic variables, providing insights into relative vulnerability across the UK.

Usage

```
sovi_ni
```

Format

A tibble with 850 rows and 4 columns:

sdz21_code `character` Super Data Zone code.

sdz21_name `character` Super Data Zone name.

SoVI `double` Social Vulnerability Index score.

SoVI_standardised `double` Standardised Social Vulnerability Index score.

Details

The SoVI is constructed using Principal Component Analysis (PCA) on a set of socio-economic and demographic variables sourced from the Census, as detailed in the referenced study. This index provides insights into the relative vulnerability of communities to social and environmental hazards, with higher scores indicating greater vulnerability.

References

The methodology for constructing the SoVI is detailed in "Spatial Assessment of Wildfire Vulnerability in England and Wales: Coupling Social Vulnerability with Predicted Wildfire Susceptibility," by Hasan Guler.

`sovi_scotland` *Social Vulnerability Index (SoVI) for Scotland's Intermediate Zones*

Description

This dataset presents the Social Vulnerability Index (SoVI) for Intermediate Zones (IZs) in Scotland; The SoVI is a composite measure derived from various socio-economic and demographic variables, providing insights into relative vulnerability across the UK.

Usage

```
sovi_scotland
```

Format

A tibble with 1,279 rows and 4 columns:

iz11_code `character` Intermediate Zone code.

iz11_name `character` Intermediate Zone name.

SoVI `double` Social Vulnerability Index score.

SoVI_standardised `double` Standardised Social Vulnerability Index score.

Details

The SoVI is constructed using Principal Component Analysis (PCA) on a set of socio-economic and demographic variables sourced from the Census, as detailed in the referenced study. This index provides insights into the relative vulnerability of communities to social and environmental hazards, with higher scores indicating greater vulnerability.

References

The methodology for constructing the SoVI is detailed in "Spatial Assessment of Wildfire Vulnerability in England and Wales: Coupling Social Vulnerability with Predicted Wildfire Susceptibility," by Hasan Guler.

`sovi_wales` *Social Vulnerability Index (SoVI) for Wales' MSOAs*

Description

This dataset indicates the Social Vulnerability Index (SoVI) for Middle Layer Super Output Areas (MSOAs) in Wales. The SoVI is a composite measure derived from various socio-economic and demographic variables, providing insights into relative vulnerability across the UK.

Usage

```
sovi_wales
```

Format

A tibble with 408 rows and 4 columns:

msoa21_code `character` MSOA code.

msoa21_name `character` MSOA name.

SoVI `double` Social Vulnerability Index score.

SoVI_standardised `double` Standardised SoVI score.

Details

The SoVI is constructed using Principal Component Analysis (PCA) on a set of socio-economic and demographic variables sourced from the Census, as detailed in the referenced study. This index provides insights into the relative vulnerability of communities to social and environmental hazards, with higher scores indicating greater vulnerability.

References

The methodology for constructing the SoVI is detailed in "Spatial Assessment of Wildfire Vulnerability in England and Wales: Coupling Social Vulnerability with Predicted Wildfire Susceptibility," by Hasan Guler.

`spring_independent_var_stack` *Predictors of Spring Wildfires in the UK*

Description

This RasterStack object contains a collection of raster layers representing various environmental predictors related to spring wildfires in the UK.

Usage

```
spring_independent_var_stack
```

Format

A RasterStack object with the following layers:

Slope Raster layer representing the slope of the terrain.

Aspect Raster layer representing the aspect of the terrain.

Average.Temperature Raster layer representing the average temperature during spring.

Precipitation Raster layer representing precipitation during spring.

Wind.Speed Raster layer representing average wind speed during spring.

Proximity.to.Major.Roads Raster layer representing proximity to major roads.

Population.Counts Raster layer representing population counts in the UK.

Details

The RasterStack has the following properties:

- `class`: RasterStack
- `dimensions`: 263 rows, 250 columns, 65750 cells, 7 layers
- `resolution`: 0.04166667 x 0.04166667 (x, y)
- `extent`: -8.666667, 1.75, 49.875, 60.83333 (xmin, xmax, ymin, ymax)
- `crs`: +proj=longlat +datum=WGS84 +no_defs
- `names`: Slope, Aspect, Average.Temperature, Precipitation, Wind.Speed, Proximity.to.Major.Roads, Population.Counts
- `min values`: 0.00000, 0.00000, 0.00000, 33.96667, 2.93600, -0.09200, 0.00000
- `max values`: 0.0930622, 6.2831853, 10.5779605, 193.2136383, 10.3826666, 68.3430023, 441.3430481

Author(s)

Matteo Larrode

See Also

`raster`, `stack`

`summer_independent_var_stack` *Predictors of Summer Wildfires in the UK*

Description

This RasterStack object contains a collection of raster layers representing various environmental predictors related to summer wildfires in the UK.

Usage

```
summer_independent_var_stack
```

Format

A RasterStack object with the following layers:

Slope Raster layer representing the slope of the terrain.

Aspect Raster layer representing the aspect of the terrain.

Average.Temperature Raster layer representing the average temperature during summer.

Precipitation Raster layer representing precipitation during summer.

Wind.Speed Raster layer representing average wind speed during summer.

Proximity.to.Major.Roads Raster layer representing proximity to major roads.

Population.Counts Raster layer representing population counts in the UK.

Details

The RasterStack has the following properties:

- `class`: RasterStack
- `dimensions`: 263 rows, 250 columns, 65750 cells, 7 layers
- `resolution`: 0.04166667 x 0.04166667 (x, y)
- `extent`: -8.666667, 1.75, 49.875, 60.83333 (xmin, xmax, ymin, ymax)
- `crs`: +proj=longlat +datum=WGS84 +no_defs
- `names`: Slope, Aspect, Average.Temperature, Precipitation, Wind.Speed, Proximity.to.Major.Roads, Population.Counts
- `min values`: 0.000000, 0.000000, 8.392517, 44.140907, 2.506667, -0.092000, 0.000000
- `max values`: 0.0930622, 6.2831853, 18.0772878, 203.4393921, 8.6173331, 68.3430023, 441.3430481

Author(s)

Matteo Larrode

See Also

`raster`, `stack`

wildfire_risk_spring_england

Spring Wildfire Risk Prediction for England's MSOAs

Description

This dataset provides predicted wildfire risk levels for Middle Layer Super Output Areas (MSOAs) in England in the spring, based on a Random Forest model incorporating various environmental and anthropogenic factors.

Usage

```
wildfire_risk_spring_england
```

Format

A tibble with 6,856 rows and 5 columns:

msoa21_name `character` MSOA name.

msoa21_code `character` MSOA code.

wildfire_risk_spring `double` Predicted wildfire risk score. Higher values signify greater risk.

ltla21_code `character` Local Authority code (higher level geography).

wildfire_risk_spring_standardised `double` Standardised wildfire risk score.

Details

Wildfire risk predictions are generated using a Random Forest model, considering climatological, topographical, and land use variables, as detailed in "Spatial Assessment of Wildfire Vulnerability in England and Wales: Coupling Social Vulnerability with Predicted Wildfire Susceptibility" by Hasan Guler.

wildfire_risk_spring_ni

Spring Wildfire Risk Prediction for Northern Ireland's Super Data Zones

Description

This dataset outlines predicted wildfire risk levels for Super Data Zones (SDZs) in Northern Ireland in the spring, derived from a Random Forest analysis that integrates environmental and anthropogenic variables.

Usage

```
wildfire_risk_spring_ni
```

Format

A tibble with 850 rows and 5 columns:

sdz21_name `character` SDZ name.

sdz21_code `character` SDZ code.

wildfire_risk_spring `double` Predicted wildfire risk score. Higher values signify greater risk.

ltla21_code `character` Local Authority code (higher level geography).

wildfire_risk_spring_standardised `double` Standardised wildfire risk score.

Details

Wildfire risk predictions are generated using a Random Forest model, considering climatological, topographical, and land use variables, as detailed in "Spatial Assessment of Wildfire Vulnerability in England and Wales: Coupling Social Vulnerability with Predicted Wildfire Susceptibility" by Hasan Guler.

`wildfire_risk_spring_scotland`

Spring Wildfire Risk Prediction for Scotland's Intermediate Zones

---

Description

Predicted wildfire risk levels for Intermediate Zones (IZs) in Scotland in the spring, utilizing a Random Forest model that integrates environmental and anthropogenic variables.

Usage

```
wildfire_risk_spring_scotland
```

Format

A tibble with 1,279 rows and 5 columns:

iz11_name `character` IZ name.

iz11_code `character` IZ code.

wildfire_risk_spring `double` Predicted wildfire risk score. Higher values signify greater risk.

ltla21_code `character` Local Authority code (higher level geography).

wildfire_risk_spring_standardised `double` Standardised wildfire risk score.

Details

Wildfire risk predictions are generated using a Random Forest model, considering climatological, topographical, and land use variables, as detailed in "Spatial Assessment of Wildfire Vulnerability in England and Wales: Coupling Social Vulnerability with Predicted Wildfire Susceptibility" by Hasan Guler.

wildfire_risk_spring_wales

Spring Wildfire Risk Prediction for Wales' MSOAs

Description

This dataset assesses wildfire risk across Middle Layer Super Output Areas (MSOAs) in Wales in the spring, derived from a Random Forest analysis that integrates environmental and anthropogenic variables.

Usage

```
wildfire_risk_spring_wales
```

Format

A tibble with 408 rows and 5 columns:

msoa21_name `character` MSOA name.

msoa21_code `character` MSOA code.

wildfire_risk_spring `double` Predicted wildfire risk score. Higher values signify greater risk.

ltla21_code `character` Local Authority code (higher level geography).

wildfire_risk_spring_standardised `double` Standardised wildfire risk score.

Details

Wildfire risk predictions are generated using a Random Forest model, considering climatological, topographical, and land use variables, as detailed in "Spatial Assessment of Wildfire Vulnerability in England and Wales: Coupling Social Vulnerability with Predicted Wildfire Susceptibility" by Hasan Guler.

wildfire_risk_summer_england

Summer Wildfire Risk Prediction for England's MSOAs

Description

This dataset provides predicted wildfire risk levels for Middle Layer Super Output Areas (MSOAs) in England in the summer, based on a Random Forest model incorporating various environmental and anthropogenic factors.

Usage

```
wildfire_risk_summer_england
```

Format

A tibble with 6,856 rows and 5 columns:

msoa21_name `character` MSOA name.

msoa21_code `character` MSOA code.

wildfire_risk_summer `double` Predicted wildfire risk score. Higher values signify greater risk.

ltla21_code `character` Local Authority code (higher level geography).

wildfire_risk_summer_standardised `double` Standardised wildfire risk score.

Details

Wildfire risk predictions are generated using a Random Forest model, considering climatological, topographical, and land use variables, as detailed in "Spatial Assessment of Wildfire Vulnerability in England and Wales: Coupling Social Vulnerability with Predicted Wildfire Susceptibility" by Hasan Guler.

`wildfire_risk_summer_ni`

Summer Wildfire Risk Prediction for Northern Ireland's Super Data Zones

---

Description

This dataset outlines predicted wildfire risk levels for Super Data Zones (SDZs) in Northern Ireland in the summer, derived from a Random Forest analysis that integrates environmental and anthropogenic variables.

Usage

```
wildfire_risk_summer_ni
```

Format

A tibble with 850 rows and 5 columns:

sdz21_name `character` SDZ name.

sdz21_code `character` SDZ code.

wildfire_risk_summer `double` Predicted wildfire risk score. Higher values signify greater risk.

ltla21_code `character` Local Authority code (higher level geography).

wildfire_risk_summer_standardised `double` Standardised wildfire risk score.

Details

Wildfire risk predictions are generated using a Random Forest model, considering climatological, topographical, and land use variables, as detailed in "Spatial Assessment of Wildfire Vulnerability in England and Wales: Coupling Social Vulnerability with Predicted Wildfire Susceptibility" by Hasan Guler.

wildfire_risk_summer_scotland

Summer Wildfire Risk Prediction for Scotland's Intermediate Zones

Description

Predicted wildfire risk levels for Intermediate Zones (IZs) in Scotland in the summer, utilizing a Random Forest model that integrates environmental and anthropogenic variables.

Usage

```
wildfire_risk_summer_scotland
```

Format

A tibble with 1,279 rows and 5 columns:

iz11_name `character` IZ name.

iz11_code `character` IZ code.

wildfire_risk_summer `double` Predicted wildfire risk score. Higher values signify greater risk.

ltla21_code `character` Local Authority code (higher level geography).

wildfire_risk_summer_standardised `double` Standardised wildfire risk score.

Details

Wildfire risk predictions are generated using a Random Forest model, considering climatological, topographical, and land use variables, as detailed in "Spatial Assessment of Wildfire Vulnerability in England and Wales: Coupling Social Vulnerability with Predicted Wildfire Susceptibility" by Hasan Guler.

wildfire_risk_summer_wales

Summer Wildfire Risk Prediction for Wales' MSOAs

Description

This dataset assesses wildfire risk across Middle Layer Super Output Areas (MSOAs) in Wales in the summer, derived from a Random Forest analysis that integrates environmental and anthropogenic variables.

Usage

```
wildfire_risk_summer_wales
```

Format

A tibble with 408 rows and 5 columns:

msoa21_name `character` MSOA name.

msoa21_code `character` MSOA code.

wildfire_risk_summer `double` Predicted wildfire risk score. Higher values signify greater risk.

ltla21_code `character` Local Authority code (higher level geography).

wildfire_risk_summer_standardised `double` Standardised wildfire risk score.

Details

Wildfire risk predictions are generated using a Random Forest model, considering climatological, topographical, and land use variables, as detailed in "Spatial Assessment of Wildfire Vulnerability in England and Wales: Coupling Social Vulnerability with Predicted Wildfire Susceptibility" by Hasan Guler.

`w_sovi_uk` *Combined Summer Wildfire Risk and Social Vulnerability Index (SoVI) for UK MSOAs*

Description

This dataset integrates the Social Vulnerability Index (SoVI) and summer wildfire risk predictions across Middle Layer Super Output Areas (MSOAs) in the UK. It includes a binary indicator identifying MSOAs within the worst deciles (8th, 9th, or 10th) for both SoVI and wildfire risk.

Usage

```
w_sovi_uk
```

Format

A tibble with 9,393 rows and 5 columns:

msoa21_code `character` MSOA (or equivalent) code.

ltla21_code `character` Local Authority code.

SoVI_standardised `double` Standardised Social Vulnerability Index score.

wildfire_risk_standardised `double` Standardised wildfire risk score.

is_worst_deciles `character` Indicator for MSOAs in the worst deciles (8th, 9th, or 10th) for both SoVI and wildfire risk. 'yes' indicates presence in the worst deciles, 'NA' denotes otherwise.

References

The approach for combining SoVI and wildfire risk scores and the methodology for determining the worst deciles are based on principles outlined in "Spatial Assessment of Wildfire Vulnerability in England and Wales: Coupling Social Vulnerability with Predicted Wildfire Susceptibility" by Hasan Guler.

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