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PostcodesioR: An R package for UK geocoding

Eryk J. Walczak [1]

1 University College London

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Software

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Editor: Olivia Guest

Reviewers:

- @oliviaguest

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Summary

PostcodesioR is an API wrapper around postcodes.io. It is a free UK postcode look up and geocoder. This package helps to find and transform information about UK administrative geography like postcodes, LSOA, MSOA, constituencies, counties, wards, districts, CCG or NUTS. Here, we present a new geocoding package designed specifically for the UK context, which addresses these challenges and provides accurate and reliable geocoding results for a wide range of applications.

Statement of need

Geocoding is a process of converting location-based information such as addresses into corresponding geographic coordinates. It is a crucial step in many analytic tasks involving geographic data (Lovelace, Nowosad, & Muenchow, 2019). However, matching UK administrative borders with corresponding postcodes has long been a challenge for researchers and practitioners alike due to the complex and ever-changing nature of the UK's administrative geography (Office for National Statistics, 2023).

The package is based exclusively on open data provided by postcodes.io using open ONS data. PostcodesioR can be used by data scientists or social scientists working with geocoded UK data. A common task when working with such data is aggregating geocoded data on different administrative levels, e.g. turning postcode-level data into counties or regions. This package can help in achieving this and in many other cases when changing the aggregation of geographic data is required.

Examples

Installation

This package can be installed from GitHub (developmental version) or CRAN (stable version).

In order to install PostcodesioR use one of the following commands:

```
# stable version
install.packages("PostcodesioR")
```

or

```
# developmental version
if(!require("devtools")) {
  install.packages("devtools")
}
devtools::install_github("ropensci/PostcodesioR")
```

Loading

Load the package by typing

```
library(PostcodesioR)
```

Geocoding

Where possible, we tried to return a data frame. However, a lot of API calls return more complex data and in those cases it is safer to use lists. The API limits the number of returned calls. Consult the documentation for more details.

For additional information about the returned data and the function calls see the original documentation.

The main function of this package provides information related to a given UK postcode

```
lookup_result <- postcode_lookup("EC1Y8LX")

#overview
names(lookup_result)
```

```
##  [1] "postcode"                       "quality"
##  [3] "eastings"                       "northings"
##  [5] "country"                        "nhs_ha"
##  [7] "longitude"                      "latitude"
##  [9] "european_electoral_region"      "primary_care_trust"
## [11] "region"                         "lsoa"
## [13] "msoa"                           "incode"
## [15] "outcode"                        "parliamentary_constituency"
## [17] "admin_district"                 "parish"
## [19] "admin_county"                   "date_of_introduction"
## [21] "admin_ward"                     "ced"
## [23] "ccg"                            "nuts"
## [25] "pfa"                            "admin_district_code"
## [27] "admin_county_code"              "admin_ward_code"
## [29] "parish_code"                    "parliamentary_constituency_code"
## [31] "ccg_code"                       "ccg_id_code"
## [33] "ced_code"                       "nuts_code"
## [35] "lsoa_code"                      "msoa_code"
## [37] "lau2_code"                      "pfa_code"
```

Read the package's vignette to extensive documentation of all functions used in the package.

The remaining functions are:

- `bulk_postcode_lookup()` - Bulk postcode look up
- `bulk_reverse_geocoding()` - Bulk reverse geocoding
- `nearest_outcode()` - Find the nearest outcode
- `nearest_outcode_lonlat()` - Find the nearest outcodes given longitude and latitude
- `nearest_postcode()` - Find the nearest postcode
- `outcode_reverse_geocoding()` - Outcode reverse geocoding
- `outward_code_lookup()` - Outward code look up
- `place_lookup()` - Place look up
- `place_query()` - Place query
- `postcode_autocomplete()` - Postcode autocomplete
- `postcode_lookup()` - Postcode look up
- `postcode_query()` - Postcode query
- `postcode_validation()` - Postcode validation

- `random_place()` - Generate a random place
- `random_postcode()` - Generate a random postcode
- `reverse_geocoding()` - Reverse geocoding
- `scottish_postcode_lookup()` - Scottish postcode look up
- `terminated_postcode()` - Terminated postcode look up

Acknowledgements

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References

Lovelace, R., Nowosad, J., & Muenchow, J. (2019). *Geocomputation with R. The R Series*. CRC Press.

Office for National Statistics. (2023). Our changing geography. Retrieved March 19, 2023, from https://www.ons.gov.uk/methodology/geography/ukgeographies/administrativegeography/ourchanginggeography