
happyGISCO Documentation

Release 1.0

J. Grazzini

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This is the documentation of the *happygisco* module.

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1.1 About

1.1.1 Rationale

happyGISCO is a simple interface API to Eurostat GISCO web-services.

The background motivation for *happyGISCO* implementation and development is developed in the following paper:

Grazzini J., Museux J.-M. and Hahn M. (2018): *Empowering and interacting with statistical producers: A practical example with Eurostat data as a service*, in Proc. of *Conference of European Statistics Stakeholders*.

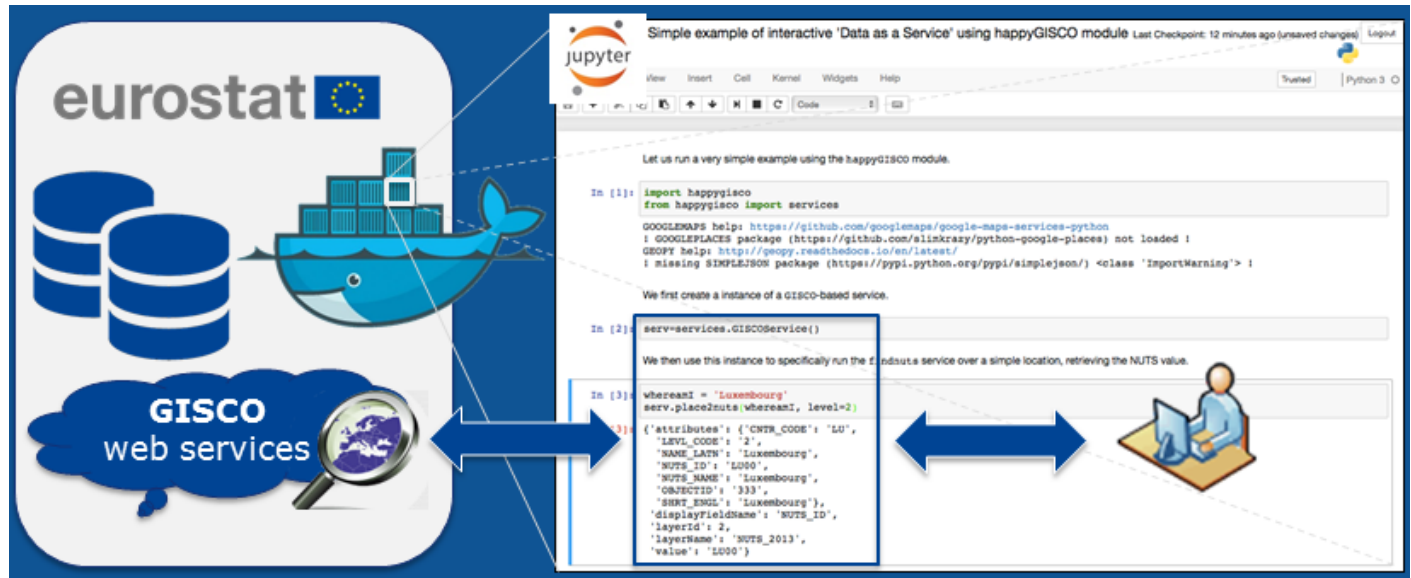
Ultimately, *happyGISCO* should be distributed as a lightweight containerized computing notebook where a *Python* kernel is running and where the module *happygisco* is distributed.

Online documentation is available on *readthedocs* (this site): <http://happygisco.readthedocs.io/en/latest/>.

1.1.2 Metadata

```
{
"project"      : "happyGISCO",
"package"     : "happygisco",
"url"         : "https://github.com/eurostat/happyGISCO",
```

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```

"copyright"      : "European Union",
"organisation"   : "European Commission (EC - DG ESTAT)",
"date"           : "2018",
"author"         : "J. Grazzini",
"contact"        : "jacopo.grazzini@ec.europa.eu",
"license"        : "European Union Public Licence (EUPL)",
"version"        : "1.0",
"description"    : "Simple API to Eurostat GISCO web-services."
}

```

1.2 Quick start

Simply load the module in your *Python* console:

```
>>> import happygisco
```

and create an instance of a service:

```
>>> from happygisco import services
>>> serv = services.GISCOService()
```

and you are ready to run the service!

1.3 Installation

Using *pip*

Using *docker*

1.4 First examples

Check the *Jupyter* notebooks in <https://github.com/eurostat/happyGISCO/tree/master/notebooks>.

For instance, simple/dummy examples illustrating how to run the package are available: * a [simple call](http://nbviewer.jupyter.org/github/eurostat/happyGISCO/blob/master/notebooks/example_GISCO_services.ipynb) to the geocoding services, * a [basic use](http://nbviewer.jupyter.org/github/eurostat/happyGISCO/blob/master/notebooks/example_GISCO_features.ipynb) of NUTS vector features,

2.1 Module contents

Simple microservice (API) built on top of [Eurostat GISCO](#) web-services, and not only.

Description

The `happyGISCO` project will enable you to perform very basic geospatial operations, *e.g.*:

- geospatial units conversion,
- geographical system transformation,
- geolocation retrieval,

using common online web-based geoservices (with or without authentication requested):

- [Nominatim](#) web-services based on [Open Street Map](#),
- [GISCO](#) web-services hosted at [Eurostat](#) and replicating [Open Street Map](#) web-services,
- [Google](#) web-services, *e.g.* [Google Maps](#) and [Google Places](#).

Usage

```
>>> import happygisco
>>> print(happygisco.__all__)
['settings', 'base', 'tools', 'services', 'features']
```

2.2 Submodules

2.2.1 features module: Simple geographical entities

2.2.2 services module: APIs to web-based geoservices

2.2.3 tools module: Tools for geographical data handling and transformation

2.2.4 base module: Base implementations of generic classes and methods

2.2.5 settings module: Basic definitions and settings

Basic definitions for the use of various geolocation web-services.

Description

This module contains some basic definitions (classes and variables) that are used for:

- query and collection through [Eurostat GISCO](#) webservices,
- query and collection through external GIS webservices,
- simple geographical data handling and geospatial processing.

Note

The classes exposed in this module (*i.e.*, type class `happyType` and logging classes `happyVerbose`, `happyWarning`, `happyError`) **can be ignored** at the first glance since they are not strictly requested to run the services. They are provided here for the sake of an exhaustive documentation.

Dependencies

require: `sys`, `warnings`, `six`, `inspect`, `collection`, `itertools`, `functools`

Contents

`settings.CODER_GEONAME = 'GeoNames'`

Default geocoder used when the generic `geopy` package (see website [geopy](#)) is run for connecting to the “external” (all but [GISCO](#)) web-services.

`settings.CODER_GISCO = 'GISCO'`

Identifier of [GISCO](#) geocoder.

`settings.CODER_GOOGLE = 'GoogleV3'`

Identifier of [GISCO](#) geocoder.

`settings.CODER_GOOGLE_MAPS = 'GMaps'`

Identifier of [Google Maps](#) geocoder.

`settings.CODER_GOOGLE_PLACES = 'GPlace'`

Identifier of [Google Places](#) geocoder.

`settings.CODER_LIST = ['GISCO', 'GoogleV3', 'GMaps', 'GPlace']`

List of geocoders available.

`settings.CODER_OSM = 'osm'`

Identifier of [Open Street Map](#) geocoder.

`settings.CODER_PROJECTIONS = {'GISCO': 4326, 'GMaps': 'EPSG3857', 'GPlace': 'EPSG3857',`

Default geographical projections available with the different geocoders.

```

settings.DEF_DRIVER_NAME = 'ESRI Shapefile'
    Geospatial Data Abstraction Library (GDAL) driver name.

settings.DEF_GISCO_FORMAT = 'geojson'
    Default format for GISCO vector datasets.

settings.DEF_GISCO_LEVEL = 0
    Default NUTS background level.

settings.DEF_GISCO_PROJECTION = 4326
    Default projection used by GISCO services.

settings.DEF_GISCO_SCALE = '60m'
    Default scale for GISCO vector datasets.

settings.DEF_GISCO_TILE = 'osmec'
    Default GISCO background tile.

settings.DEF_GISCO_TILEPROJ = 3857
    Default GISCO background tile projection.

settings.DEF_GISCO_VECTOR = 'RG'
    Default spatial typology.

settings.DEF_GISCO_YEAR = 2016
    Default year considered for NUTS background datasets (not the most recent, but up-to-date).

settings.DEF_GISCO_ZOOM = 4
    Default zooming value in map displays.

settings.DEF_LANG = 'en'
    Default language used when launching Eurostat GISCO API.

settings.DEF_NUTS2JSON_FORMAT = 'topojson'
    Default format for Nuts2json vector datasets.

settings.DEF_NUTS2JSON_PROJECTION = 3857
    Default projection used by Nuts2json services.

settings.DEF_NUTS2JSON_SCALE = '60m'
    Default map dimension (in pixel).

settings.DEF_PROTOCOL = 'https'
    Default protocol used by the APIs.

settings.EC_DOMAIN = 'europa.eu'
    Domain of European Commission generic web-services.

settings.EC_URL = 'ec.europa.eu'
    URL of the European Commission website.

settings.ESTAT_DOMAIN = 'eurostat'
    Domain of Eurostat website under European Commission URL.

settings.ESTAT_URL = 'https://ec.europa.eu/eurostat'
    Complete URL of Eurostat website.

settings.EU_AGGREGATES = {'CACO': ['ME', 'MK', 'AL', 'RS', 'TR'], 'EFTA': ['IS', 'LI', 'NO']}
    ISO-codes of countries (Member States) in the EU and other euro area aggregates; see this page.

settings.EU_GEOCENTRE = [50.033333, 10.35]
    //en.wikipedia.org/wiki/Gädheim>'_ (in the district of Haßberge in Bavaria) serves as the geographical centre
    of the European Union (when the United Kingdom leaves on April 2019).

```

See the Wikipedia page on the [geographical midpoint of Europe](#) for discussions on the topic. For the determination of the actual geographical coordinates (50°02N 10°21E), see also [this page](#).

Type The German municipality of ‘Gädheim <[https](#)

`settings.GISCO2GDAL_DRIVERS = {'geojson': {'driver': 'GeoJSON', 'options': ['RFC7946=YES']}`
Driver and translate options between [GISCO](#) disseminated dataset formats and [Geospatial Data Abstraction Library \(GDAL\)](#) accepted formats.

`settings.GISCO_ARCGIS = 'webgate.ec.europa.eu/estat/inspireec/gis/arcgis/rest/services/'`
[GISCO ArcGIS](#) server.

`settings.GISCO_CACHEDOMAIN = 'eurostat/cache/GISCO/distribution/v2'`
Domain of cache database, *e.g.* countries and [NUTS background](#) vector datasets themes, for download/distribution.

`settings.GISCO_CACHEURL = 'ec.europa.eu/eurostat/cache/GISCO/distribution/v2'`
Complete URL of [GISCO](#) cache database.

`settings.GISCO_CTRYDOMAIN = 'countries'`
Subdomain of countries.

`settings.GISCO_CTRYTHEME = 'countries'`
NUTS theme used for URL naming.

`settings.GISCO_CTRYURL = 'ec.europa.eu/eurostat/cache/GISCO/distribution/v2/countries'`
Complete URL of countries download/distribution services.

`settings.GISCO_DATA_DIMENSIONS = ['SOURCE', 'YEAR', 'PROJECTION', 'SCALE', 'VECTOR', 'LEVEL']`
Descriptors/parameters used to define a given [GISCO](#) dataset, *e.g.* a NUTS or a country file.

`settings.GISCO_DATA_INPUT = ['UNIT', 'FILE', 'URL', 'LAYER', 'FEATURE', 'GEOMETRY', 'RESPONSE']`
Type/nature of data parsing a given [GISCO](#) dataset, *e.g.* a NUTS or a country file.

`settings.GISCO_FORMATS = {'csv': 'csv', 'geojson': 'geojson', 'pbf': 'pbf', 'shp': 'shp'}`
Format of [GISCO](#) vector data files.

`settings.GISCO_LAUDOMAIN = 'documents/345175/501971'`

`settings.GISCO_LAUURL = 'https://ec.europa.eu/eurostat/documents/345175/501971'`
Complete URL of [GISCO LAU](#) resources.

`settings.GISCO_LEVELS = [0, 1, 2, 3]`
Levels of [NUTS background](#) areas.

`settings.GISCO_NUTSDOMAIN = 'nuts'`
Subdomain of [NUTS background](#).

`settings.GISCO_NUTSTHEME = 'nuts'`
NUTS theme used for URL naming.

`settings.GISCO_NUTSURL = 'ec.europa.eu/eurostat/cache/GISCO/distribution/v2/nuts'`
Complete URL of [NUTS background](#) download/distribution services.

`settings.GISCO_PATTERNS = {'bulk': {'compress': 'zip', 'domain': 'download'}, 'country': 'download'}`
download for bulk datasets or distribution for single areas,

- name and type of the file storing all `nuts` unit datasets,
- name and type of the file storing all `country` unit datasets,
- Name and type of the file storing the correspondance table between NUTS names

and their IDs.

Type String patterns used to define

Type

- domains of the services used for theme vector datasets

`settings.GISCO_PROJECTIONS = {'EPSG3035': 3035, 'EPSG3857': 3857, 'EPSG4258': 4258, 'EPSG4326': 4326}`

Projections and EPSG codes currently supported by **GISCO** services. See <http://spatialreference.org> for the list of all EPSG codes and corresponding spatial references.

```
settings.GISCO_RESTDOMAIN = 'rest/gisco/'
```

Domain of **GISCO** REST webservices and webtools.

```
settings.GISCO_RESTURL = 'europa.eu/webtools/rest/gisco/'
```

Complete URL of **GISCO** REST webservices and webtools.

settings.**GISCO_SCALES** = {1: '01m', 3: '03m', 10: '10m', 20: '20m', 60: '60m'}
scale Million) of vector datasets.

Type Scale (1

```
settings.GISCO_TILEDOMAIN = 'webtools/maps/tiles'
```

Domain of **GISCO** background tiling service.

```
settings.GISCO_TILEORDER = '{z}/{y}/{x}'
```

GISCO background tile ordering (used for visualisation).

`settings.GISCO_TILES = {'bmarble': {'attr': '@ NASA's Earth Observatory', 'bckgrd': 'bma`
 Dictionary for the various [GISCO](#) background tiles service. See the list of [available tiles servers](#).

```
settings.GISCO_TILEURL = 'europa.eu/webtools/maps/tiles'
```

Complete URL of **GISCO** background tiling service.

```
settings.GISCO_VECTORS = {'boundary': 'BN', 'label': 'LB', 'line': 'BN', 'region': 'RG'
    Dictionary of spatial typologies, i.e. the vector features of GISCO datasets.
```

```
settings.GISCO_WEBDOMAIN = 'webtools'
```

Domain of **GISCO** web-service under the European Commission URL.

```
settings.GISCO_YEARS = [2003, 2006, 2010, 2013, 2016]
```

Years of adoption/revision of **NUTS background** areas.

```
settings.HTTP_ERROR_STATUS = {100: {'desc': 'Continue with the request.', 'name': 'Continue'},
                               //en.wikipedia.org/wiki/List_of_HTTP_status_codes.
```

Type Descriptions of HTTP status codes. See <https://en.cppreference.com/w/http/status>

`settings.KEY_GISCO = None`
 Dummy `GISCO` key. It is set to `None` since connection to `GISCO` web-services does not require authentication.

`settings.KEY_GOOGLE = 'key'`
Personal key used for connecting to the various Google web-services.

`settings.KEY_OSM = None`
 Dummy [Open Street Map](#) key (connection to [Open Street Map](#) web-services does not require authentication).

`settings.LANGS = ('en', 'de', 'fr')`
Languages supported by this package.

```
settings.NUTS2JSON_DOMAIN = 'raw.githubusercontent.com/eurostat/Nuts2json/gh-pages'
```

Domain of `Nuts2json` database.

`settings.NUTS2JSON_FORMATS = {'geojson': 'json', 'topojson': 'json'}`
Format of `Nuts2json` vector data files.

`settings.NUTS2JSON_PROJECTIONS = {'EPSG3035': 3035, 'EPSG3857': 3857, 'EPSG4258': 4258,`
Projections and encoding strings currently supported by `Nuts2json` service (for dissemination). See <http://spatialreference.org> for the list of all EPSG codes and corresponding spatial references.

`settings.NUTS2JSON_SCALES = {1: '01m', 3: '03m', 10: '10m', 20: '20m', 60: '60m'}`
Map dimension (in pixel) adopted for the fetching of `Nuts2json`. Currently, all maps are squared.

`settings.NUTS2LAU = {2013: {2010: 'EU-28_2010.xlsx', 2011: 'EU-28_2011.xlsx', 2012: 'EU-28_2012.xlsx'}}`
Conversion tables between LAU and NUTS datasets.

`settings.OSM_URL = 'nominatim.openstreetmap.org/'`
`Open Street Map` web-service complete URL.

`settings.POLYLINE = False`
Boolean flag set to import the package `polylines` that will enable you to generate polylines (see the [package website](#)). Not really necessary to generate the routes.

`settings.PROTOCOLS = ('http', 'https', 'ftp')`
Recognised protocols (APIs, bulk downloads,...).

CHAPTER 3

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