CODE MANUAL – USER GUIDE

María Bugallo Porto[1]

[1]Operations Research Center, Miguel Hernández University of Elche, Spain

About the project

In this repository you will find the complete implementation of the model proposed in the paper entitled "*Pattern recognition and modelling of virulent wildfires in Spain*". In addition, we have included the necessary code to provide all graphical representations and tabular results.

Installation and requirements

This project was performed on a desktop computer with a 16 GB RAM computer processing unit Intel®Core™ i7 and under the 64-bit Microsoft Windows 10 operating system. Moreover, it is pure implemented in R. Specifically, we have decided to use the version 4.1.3 (2022-03-10), entitled "One Push-Up". As no other external software is used, no additional installation is required.

Nevertheless, the core structure have strong dependencies with the following R packages:

1. glmmTMB (version 1.1.3), which is linked to the TMB (version 1.8.0) (Template Model Builder) package with the aim of providing generalized linear mixed model fits.

2. car (version 3.0-12) and confintr (version 0.1.2).

As optional dependencies to support the graphical representation of the results through the use of maps and colour scales, the following R packages are needed:

1. maptools (version 1.1-3) and RColorBrewer (version 1.1-2).

2. tidyverse (version 1.3.2). Namely, the graphics package ggplot2 (version 3.3.5).

In order to facilitate the manipulation of the code, we recommend the GUI, "Graphical User Interface", R Studio. Once all the libraries are installed, simply download the project sources and run the scripts.

Getting started

Some instructions are given to get a copy of the project ready to use on your local machine, understanding its purpose and all the results achieved. Contact us to report any problem.

To install the development version, run the following statements in the console (R or R Studio).

```
>  # install.packages("devtools")
>  devtools::install_github("mbugallo/aZIG11Fires")
```

Repository structure

Data are stored in the following files:

- original_prov_week.csv and original_AEMET_prov_week.csv: Source data.

- features_prov_week.csv: Preprocessed data. They are aggregated by year, week and province, from 2007 to 2015. The provinces of Cantabria, Madrid, the Basque Country, Navarre, the Balearic Islands, the Canary Islands, Ceuta and Melilla have been deleted and the research has been carried out for weeks 27 (1st week of July) to 44 (4th week of October).

- **SPAIN_MAP**: folder that contains several files necessary to map the Spanish results.

The source code is structured in the following scripts:

- data.R: Script for data preprocessing tasks.

- ZIGammaModels.R: Main script to perform the selection, fitting and diagnosis of the model. It includes plots and creates external files containing predictions and error measures.

- boot500_MSE.R: This script calculates confidence intervals for the model parameters and error measures of fire predictions at the provincial level using bootstrap resampling.

- Spanish_maps.R: Essential script for the graphical interpretation of the results. It provides maps for 2015 Spanish predicted values and error measures.

License

This project is licensed under the terms of the license GNU Affero GPL v3.0.

INFORMATION

Researchers

María Bugallo Porto	–	Miguel Hernández University of Elche
María Dolores Esteban Lefler	–	Miguel Hernández University of Elche
Manuel Francisco Marey Pérez	–	University of Santiago de Compostela
Domingo Morales González	–	Miguel Hernández University of Elche

DOWNLOAD

Github repository $\longrightarrow$ Click here