Gravity of COVID-19 cases in regions of Brazil

Introduction

The worldwide spread of Coronavirus disease (COVID-19) brought a revolution in the lifestyle of everyone. Political decisions have fundamental influence on the situation each country faces. In Brazil, the political scenario already was tense, with the controversial president Jair Bolsonaro in command, making ideological decisions without caring about the well-being of the population. The greatest example the country faces now is his denial about the gravity of the Coronavirus pandemic, refusing to adopt political measures to hold down the increase in the number of cases in Brazil, encouraging non-essential economic activities to stay occurring normally and speaking against governors of states and cities who are doing what is possible for avoiding the worst possible case to happen in their cities and states. The situation of Brazil has rapidly become one of the gravest in the world relative to the pandemic, either economically or in the public health sector.

The objective of this work is to analyze the gravity of the situation for different cities in Brazil in each region of the country, independently and present it with maps of different regions and marking cities with points of different colors, according to the gravity of its situation. For that, I use the K-means clustering algorithm, forming three clusters for each region, each one corresponding to one level of intensity of the number of cases or number of deaths.

Data

The data used for this work was extracted from Brazil's official informative website about Coronavirus:

https://covid.saude.gov.br/

The data file is updated every working day and for this work I used the one corresponding to 07/01/2020, which means that the data contains numbers of the cases in Brazil from 03/27/2020 until 07/01/2020.

The data file contains the following columns:

- regiao: Brazilian region;
- estado: The state of the corresponding data;
- municipio: City name;
- coduf: Code of the state;
- codmun: Code of the city;
- codRegiaoSaude: Code of the Health region;
- nomeRegiaoSaude: Name of the Health region;
- data: Date;
- semanaEpi: Number of the week;
- populacaoTCU2019: Population number, according to IBGE (available to TCU), in 2019
- casosAcumulado: Number of accumulated cases;
- casosNovos: Number of new cases;
- obitosAcumulado: Number of accumulated deaths;
- obitosNovos: Number of new deaths;
- RecuperadosNovos: Number of recoveries;
- emAcompanhamentoNovos: Number of new followed-up cases;
- interior/metropolitana: Whether the city is from metropolitan or rural area