Multi-scale dynamics of COVID-19

John M. Drake

May 23, 2022

COVID-19 is a respiratory diseases caused by the virus SARS-CoV-2. SARS-CoV-2 originated in Wuhan, China in late 2019 and subsequently caused a worldwide pandemic leading to the death of tens of millions of people. The spatial spread of SARS-CoV-2 in the US followed a wave-like pattern in which new variants were typically reported first from urban and coastal regions and then flowed to rural and interior locations. However, the spatial spread of SARS-CoV-2 within states was often idiosyncratic.

The UGA COVID-19 working group has created a tracker allowing the user to visualize trends in data sourced from various providers. These data, updated daily, may be viewed online, and downloaded using the following code:

```r
library(here) # for building file paths relative to project root directory ("here")

source('R/get_covid_data.R')

# Download, save and load data into R
# The dataset is a very large file.
# For efficiency, the code below will download fresh data only once per day.

# data filename for today (tagged with today's date)
filename <- paste0("covid_data_",format(Sys.Date(), format="%Y%m%d"))
fullpath <- here::here(paste0("data/",filename,'.rds'))

# load existing data, or download and save fresh data
if (file.exists(fullpath)) {
  # load data from saved file
  covid_data <- readRDS(file = fullpath)
} else {
  # download fresh data
  covid_data <- get_covid_data()
  # save newly downloaded data locally, in the "data/" folder
  saveRDS(covid_data, fullpath)
}
```

Your task is to create a visualization to compare temporal trends in the number COVID-19 cases at the state level with trends of the individual counties in Georgia. Do the dynamics at the state level largely reflect the dynamics at key locations? Are there leading and lagging counties? Are there consistent patterns? How do the dynamics in the individual counties aggregate to produce a state-level pattern?