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Shiny Dashboard for Monitoring the COVID-19 Pandemic in Spain [†]

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Abstract: Real-time monitoring of events such as the recent pandemic caused by COVID-19, as well as the visualization of the effects produced by its expansion, has highlighted the need to join forces in fields already widely used to working hand in hand, such as medicine, biology and information technology. Our dashboard is developed in R and is supported by the Shiny package to generate an attractive visualization tool: COVID-19 Spain automatically produces daily updates from official sources (Carlos III Research Institute and Ministry of Health, Consumer Affairs and Welfare) in cases, deaths, recovered, ICU admissions and accumulated daily incidence. In addition, it shows on a georeferenced map the evolution of active, new and accumulated cases by autonomous community allowing to travel in time from the origin to the last available day, which allows to visualize the expansion of infections and serves as a visual support for epidemiological studies.

Keywords: COVID-19; R; Shiny; monitoring

1. Introduction

The pandemic generated by COVID-19 has highlighted concepts such as reproducibility or interactive publication of results for real-time monitoring of an event, two of the battlefields of research today where most of the models proposed in different scientific publications are not easily accessible, analyzable or reproducible. There is no doubt that since the end of 2019, once it became known that uncontrolled outbreaks of infection by a coronavirus were occurring and were severely affecting the respiratory system, the interest at a global level in obtaining information on the monitoring of this infection led to the search for multiple research groups for methods/systems that, in addition to predicting the evolution, would allow the evolution of the pandemic to be visualized as simply as possible. As of 20 July 2020, the World Health Organization (WHO) has records of more than 14.3 million confirmed cases and more than 600,000 deaths, of which more than 260,000 confirmed cases correspond to Spain and more than 28,000 deaths. The data are so overwhelming that they undoubtedly show the seriousness of the pandemic that has been experienced worldwide. In Spain, for example, the situation of saturation of the health systems led in mid-March to the declaration of a State of Alarm throughout the country, preventing the free movement of citizens and closing borders. It is precisely this situation that led to the development of a Dashboard using R [1] and Shiny [2].

2. Results

As previously mentioned the website is available at https://covid19.citic.udc.es and was created with the initial objective of serving as a visual aid to the spread of the pandemic in Spanish territory.

To this end, the dashboard has a dynamic and interactive general map of the country's evolution (Figure 1) which allows the data to be displayed from the beginning of the series.
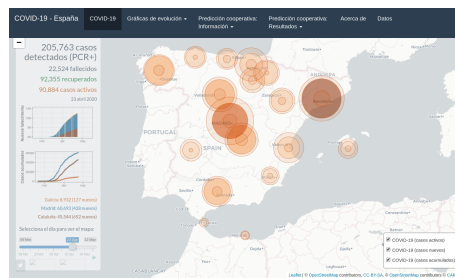

Figure 1. Overview of the shiny dashboard.

In the dashboard you can analyze the day-to-day evolution of the pandemic in Spain by Autonomous Community and variable of interest (Figure 2a) or the degree of infection by population pyramid (Figure 2b) using the ggplot2 [3] and plotly [4] libraries.
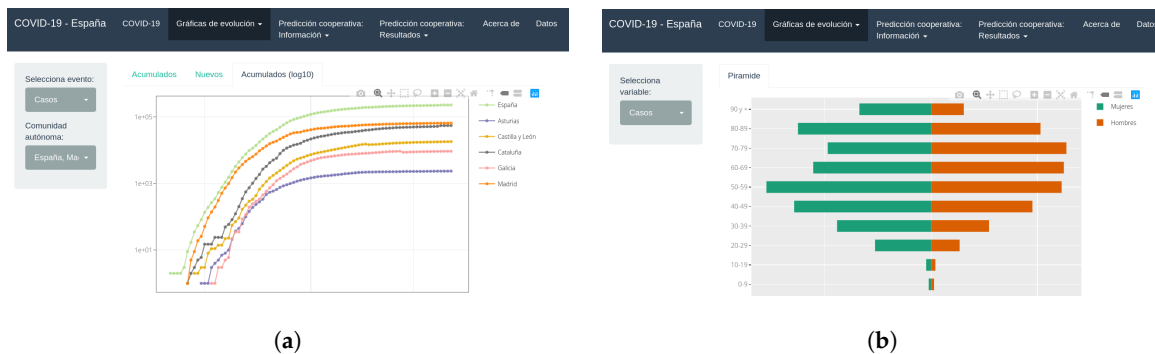

(**a**)   (**b**)

Figure 2. Interactive pandemic progress charts. (**a**) Accumulated cases (log10); (**b**) Confirmed counts by age range.

The deployment was carried out on a docker container with a swarm orchestrator in charge of balancing the load to avoid dashboard saturation in the face of a high number of simultaneous accesses.

3. Conclusions

A dynamic and interactive web dashboard has been developed to visualize the evolution of COVID-19 infection at a national level also segregating by autonomous community.

References

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