

# COVID-19 Dashboard

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## 1 Introduction

Coronaviruses are a family of viruses that can cause diseases in humans. The infection can range from a common flu-like illness to a more severe condition, such as pneumonia.

The new Coronavirus (initially designated as 2019-nCoV) was identified on January 7, 2020, in China. This discovery followed China's report to the World Health Organization (WHO) on December 31, 2019, of several cases of individuals with pneumonia of unknown origin among workers and visitors to the seafood market in Wuhan, Hubei province.[1]

Currently, this virus is named COVID-19 and has affected a vast number of individuals worldwide, reaching 5.53 million in Portugal, with 25,365 unfortunately succumbing to the disease.

In assessing the consequences of the COVID-19 pandemic, official statistics have gained increased significance and visibility, both in Portugal and globally.

In this project, I will address various visualizations to provide healthcare professionals and other interested parties with answers to questions such as the number of daily infections, daily vaccinations, and more.

## 2 Related Works

The pandemic has been the subject of numerous investigations and visualizations that have provided updates on the pandemic's status to the general population, proving to be a valuable resource for discoveries.

There are, therefore, numerous works on which I relied to achieve the result of the proposed Dashboard.

Reference [2] addresses examples of how visualization can help understand different aspects of the pandemic.

Reference [3] analyzes COVID-19 based on data, providing a series of aspects of COVID-19, including symptoms, the difference from other viruses, and the impact of temperature. In addition, data visualization provides a comparison of infections in men/women, the pattern in the increase of confirmed cases, and the relative number of confirmed/recovery/death cases in different countries.

Reference [4] proposes a Dashboard with various visualizations where we can observe both active cases and the number of hospitalized or vaccinated individuals per day.

Reference [5] aims to visualize the virus's growing cases on an interactive visual map that facilitates users in understanding data that, otherwise, would be raw and difficult to comprehend.

## 3 Data

Based on the projects mentioned in section 2, the project's objective is to build a Dashboard that aims to illustrate active/total cases or deaths for the selected date, vaccination, and hospitalized individuals globally or for a specific country chosen by the user, updating its data regularly. To achieve this goal, a dataset that aligns with the desired outcome was chosen [6].

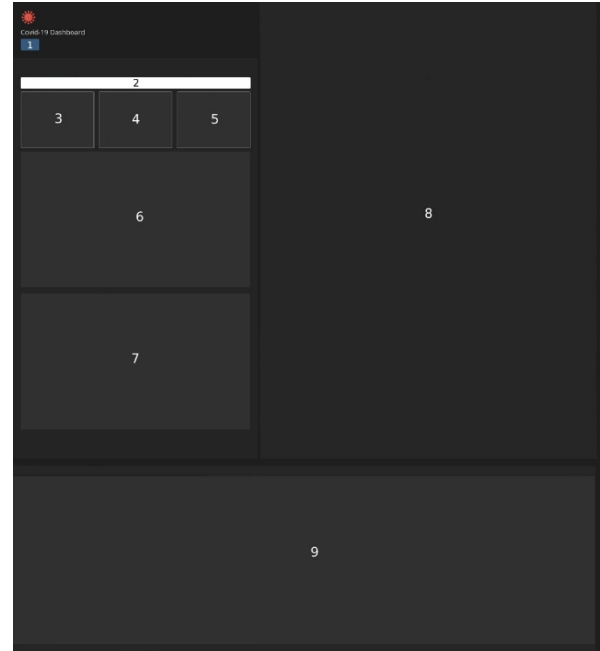
### 3.1 Descrição dos Dados

The selected dataset has 51 columns. However, as not all columns are necessary or useful for creating the Dashboard, some were eliminated to make the dataset manageable. Thus, the final dataset includes the following columns:

Variables	Description
iso_code	ISO 3166-1 alpha-3 – three-letter country codes.
continent	Continent of the geographical location.
location	Geographical location. 'International' location considers special regions (cruises "Diamond Princess" and "MS Zaan-dam").
date	Observation date.
population	Population (latest available values).
total_cases	Total confirmed cases of COVID-19. Counts may include probable cases when reported.
new_cases	New confirmed cases of COVID-19.
total_deaths	Total deaths attributed to COVID-19.
new_deaths	New deaths attributed to COVID-19
icu_patients	Number of patients with COVID-19 in intensive care units (ICUs) on a specific day.
hosp_patients	Number of patients with COVID-19 hospitalized on a specific day.
people_vaccinated	Total number of people who have received at least one dose of the vaccine.
people_fully_vaccinated	Total number of people who have received all prescribed doses in the initial vaccination protocol.
new_vaccinations	New doses of COVID-19 vaccination administered.

## 4 Design Requirements

To create the Dashboard, I began by developing an idea for the designs/visualizations, aiming to create a comprehensive Dashboard to extract the most relevant information for the target audience. The Dashboard will have the following format:



From it, it will be possible to observe 4 visualizations (6, 7, 8, 9), 3 informative cards (3, 4, 5), and two interactive buttons (1, 2).

I intended to create a map where it's possible to observe the new active cases worldwide for a date selected by the user through an interactive calendar (2).

The described visualization will be used as an intermediary to obtain a location from the world, meticulously studied in other visualizations, and stored in an interactive button (1).

I aimed to create a Pie Plot that shows the top 10 countries with the highest active cases for a selected date. The user can further examine the number of cases and deaths through an informative card.

In the fourth visualization, I decided to create various Scatter Plots with the previously selected location, where the user can choose which one to view to address the intended purpose. In each Scat-

ter Plot, it is also possible to choose another country/continent to provide the user with context about the displayed data.

Finally, I intend to create a Bar Plot with vaccination data for a specific date and country previously selected by the user.

## 4 Design

During the design of the project, I strived to obtain a Dashboard where the elements are seen as a whole, working with different scales of visualizations and creating contrast through colors.

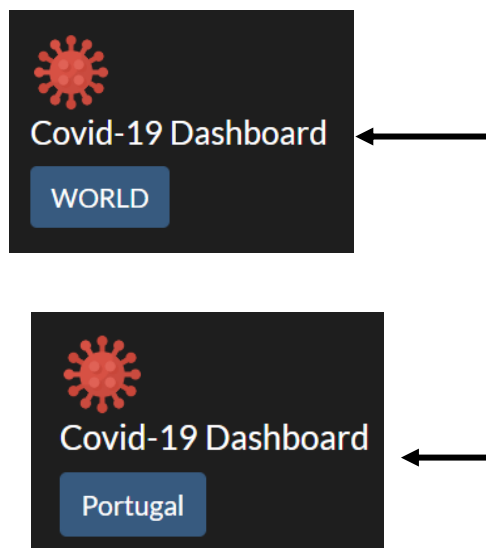
To select the best colors for each visualization in this project, I used the [7] site, specifying details for each one, ultimately presenting colors that capture the user's attention and connect the visualizations to draw greater attention from one to another.

## 5 Implementation

### 5.1 Title

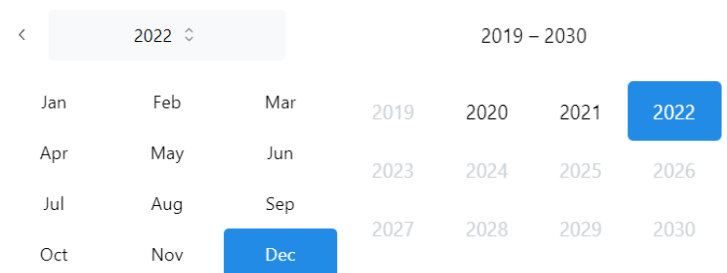
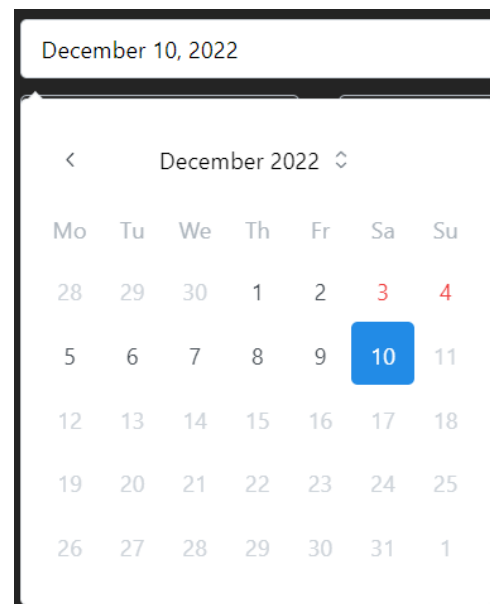
On the Dashboard, a title was placed consisting of a logo, a name, and a button.

The logo was selected considering the theme, trying to make it more representative. The button placed was used as an interactive tool to show the location chosen by the user, and clicking it returns to the global location.



### 5.2 Date Picker

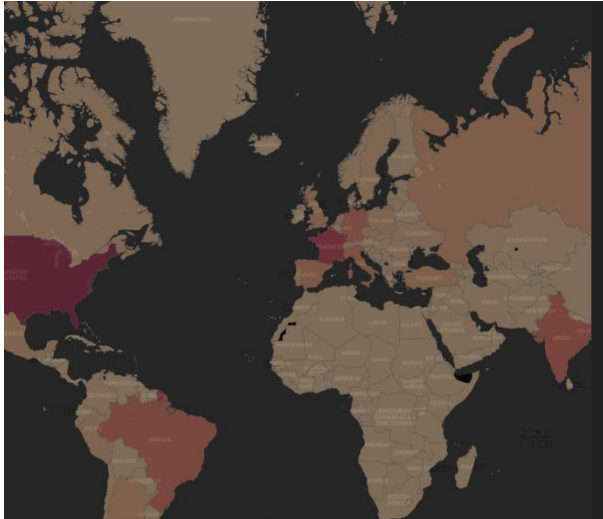
To facilitate the visualizations for a specific date, I implemented an interactive calendar (Date Picker) whose dates are embedded within the dataset's date range, allowing easy selection of the month and year.



### 5.3 Map

Using the Plotly Express library, I created a choropleth mapbox using a geojson file corresponding to all countries worldwide for new cases on a date

selected by the user. When the Dashboard is initiated, the initial value is the most recent date in the dataset. This visualization is interactive; clicking on a country alters the data in other visualizations or the button mentioned in 5.1. If the user does not click on any country, global data will be displayed in other visualizations.



## 5.4 Informative Cards

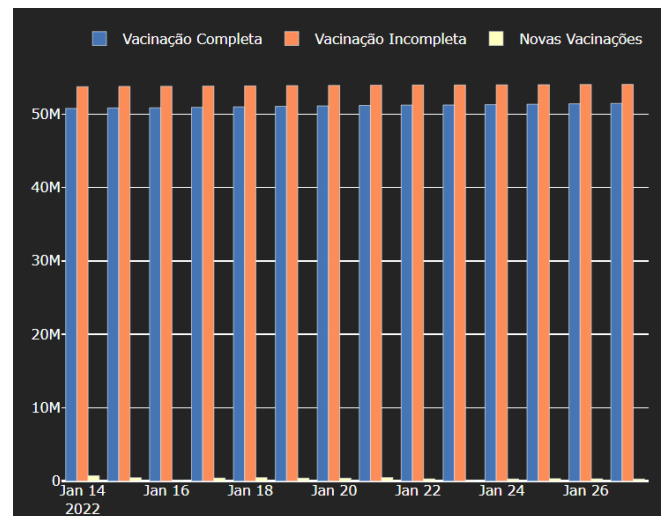
I placed informative cards on the Dashboard that correspond to information on new cases, new deaths, hospitalized patients, and ICU patients for the date selected in 5.2 and the selected country. Along with these, I presented the total cases and



total deaths in the respective country up to the selected date.

## 5.5 Vaccination Bar Plot

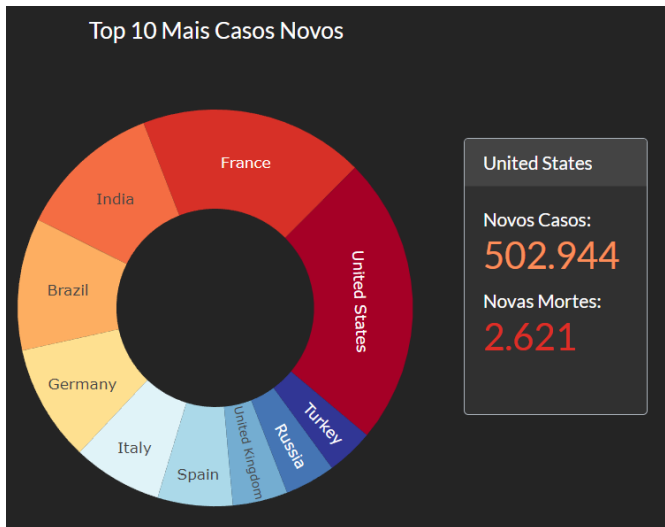
In this visualization, I addressed the vaccination factor, specifically the columns (people\_vaccinated, people\_fully\_vaccinated, new\_vaccinations), creating a Bar Plot that illustrates data for the 15 days preceding the selected date for the chosen country.



## 5.6 Pie Plot

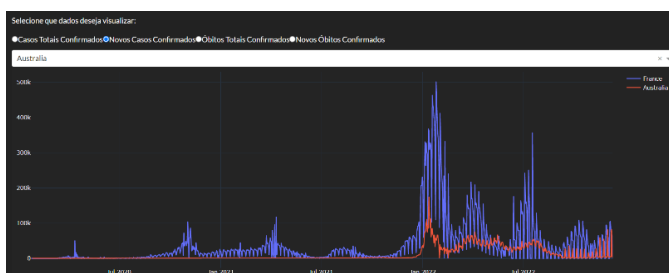
Seeking to provide context and information to the user, I opted for a Pie Chart displaying the top 10 countries with the more new cases for the selected date. In addition to the visualization, I created interactivity so that clicking on a slice of the Pie Chart updates the accompanying informative card, showing the quantity of new cases and new deaths in that country. If the user does not use the interactivity, the informative card displays

information for the country with the most new cases.



## 5.7 Scatter Plot

Finally, I created a Scatter Plot with RadioItems, allowing the user to choose the type of information to be displayed: Total Cases, New Cases, Total Deaths, or New Deaths. This chosen information initially pertains to the country initially selected for all dates in the dataset. If the user has not selected a location in 5.3, global data will be considered. In this visualization, it is also possible to select another country/continent for comparison through a dropdown.



## 6 Reflection

Given the result of the Dashboard, we can believe that it is capable of answering various questions about the dataset, making it effective. The presented visualizations feature interactivity,

allowing the user to customize what they want to observe.

## References

- [1] <https://www.cuf.pt/mais-saude/coronavirus-o-que-e-sintomas-e-como-prevenir>
- [2] <https://ieeexplore.ieee.org/abstract/document/9222822>
- [3] [https://www.researchgate.net/profile/Itisha-Nowrin/publication/340793227\\_Data\\_Visualization\\_and\\_Analyzation\\_of\\_COVID-19/links/5e9df548299bf13079ad84c5/Data-Visualization-and-Analyzation-of-COVID-19.pdf](https://www.researchgate.net/profile/Itisha-Nowrin/publication/340793227_Data_Visualization_and_Analyzation_of_COVID-19/links/5e9df548299bf13079ad84c5/Data-Visualization-and-Analyzation-of-COVID-19.pdf)
- [4] <https://coronavirus.rr.sapo.pt/>
- [5] [https://d1wqtxts1xzle7.cloudfront.net/63648332/47120200616-30503-1afvky5-with-cover-page-v2.pdf?Expires=1668883138&Signature=GBa7ujxAVASNYn2WaXk57UjCPozinDyK3X9UfPlvdJL-vp8H4zEC3UhyGHxeEv2FbFHP3pj1cFT45P~Etl9YpUYvn3CyOAqfYqScqJC7~wHD93ED4ulhyo5xPvQUod~Ew4UR9aXrBhsmhq-kmuhRF4YRIxExy7RbtyeYfIN4C4IXZHQ71UgCj0~QvqXLnTLfo0FFBqr31S23dn0SvVIBNU~0oOAzX5N-IKbFHSJkxT~qMIwzIbtZzp29mQUnz41Kslht5obLGshKXz04gyakPkpBLKj0-eUVH~riPkXIwg64XsbgEQHe~DVRZo7-mEnw\\_&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA](https://d1wqtxts1xzle7.cloudfront.net/63648332/47120200616-30503-1afvky5-with-cover-page-v2.pdf?Expires=1668883138&Signature=GBa7ujxAVASNYn2WaXk57UjCPozinDyK3X9UfPlvdJL-vp8H4zEC3UhyGHxeEv2FbFHP3pj1cFT45P~Etl9YpUYvn3CyOAqfYqScqJC7~wHD93ED4ulhyo5xPvQUod~Ew4UR9aXrBhsmhq-kmuhRF4YRIxExy7RbtyeYfIN4C4IXZHQ71UgCj0~QvqXLnTLfo0FFBqr31S23dn0SvVIBNU~0oOAzX5N-IKbFHSJkxT~qMIwzIbtZzp29mQUnz41Kslht5obLGshKXz04gyakPkpBLKj0-eUVH~riPkXIwg64XsbgEQHe~DVRZo7-mEnw_&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA)
- [6] <https://github.com/owid/covid-19-data/blob/master/public/data/README.md>
- [7] <https://colorbrewer2.org/#type=sequential&scheme=BuGn&n=3>