Visualization and Analysis of data related to Government Restrictive Measures on COVID-19

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Overview

Study of relevant literature and Dashboars

Use of Data:
- Government measures
- Positive Test Rate (PTR)
- Health Certificates

Use of R to develop a Dashboard with visualizations:
- (Interactive) Maps
- bar plots

Use of Python for the Analyses:
- Cross-Correlation of Greece's government measures and COVID-19 PTR
- Correlation of selected European countries government measures
- Cross-Correlation and time lag of selected European countries government measures

Literature review (1)

Oxford COVID-19 government response tracker data

- for some selected countries (China, Germany, Austria and the USA) compared the effectiveness of the two COVID-19 lockdowns on virus spread.

Social Media responses

- The public sentiment on governmental COVID-19 measures in Dutch social media (Twitter, Reddit and Nu.nl) from February to September 2020. Dutch attitudes towards social distancing and the use of face masks measures.
- Link government performance to people's political expression on social media during the pandemic. Classified over 8 million tweets addressed to the governors of US states as civil or uncivil.
- Investigation of the perception of the Brazilian federal government through a quantitative and qualitative analysis of 3,756 tweets of users to a time window of 30 days before and 30 days after a tweet about a family member of them that victimized by COVID-19.

Digital Transformation

- The analysis of 150 usable questionnaires answered from Greece showed that the majority of the practices used by the government were well communicated in relation to the haste with which they were implemented

Literature review (2)

Scandinavian countries similarities

- Determine whether governmental responses to the COVID-19 pandemic were affected by political and cultural similarities and differences between three Scandinavian countries.

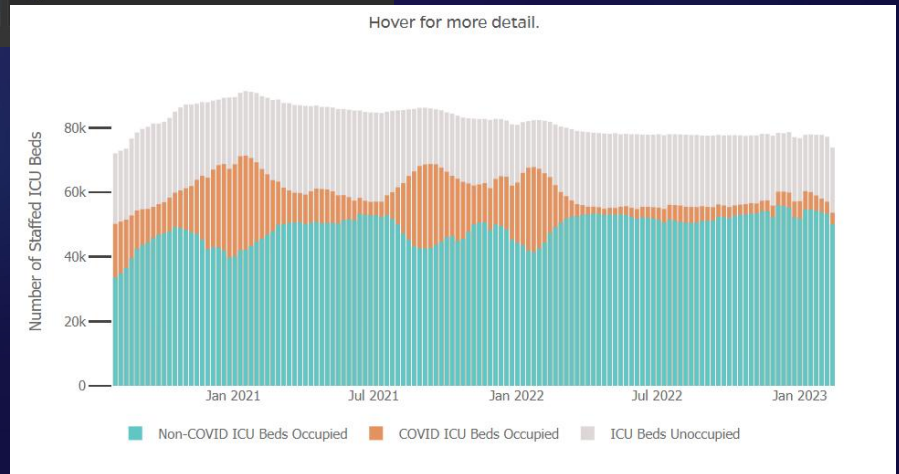## Analysis of the pandemic in order to choose the best policies and actions

- A preliminary data analysis to understand the rules followed by the virus during its spread in Italy and the Region of Lombardy.
- Survey data from 705 respondents in Indonesia, attempts to understand how the quality of government information and citizens' partisanship affect citizens' well-being in terms of life satisfaction and stress.
- "mandatory quarantine and strict isolation" identified as the most important strategy against the COVID-19 pandemic.
- Effectiveness of the local and state government restrictions and closures in Texas in limiting the spread of COVID-19.
- A methodology based either on Deep Q-Learning or Genetic Algorithms for helping governments in planning the phases to combat the pandemic.
- The impact of government policy interventions on the infection chain structure in Korea is measured showing that implemented policies decrease the high fluctuation in infection chain structures.
- Using data up to mid-April 2020 from five Countries (US, India, UK, Germany and Singapore) forecast the evolution of the pandemic at the country level to estimate the excess demand for products and services.

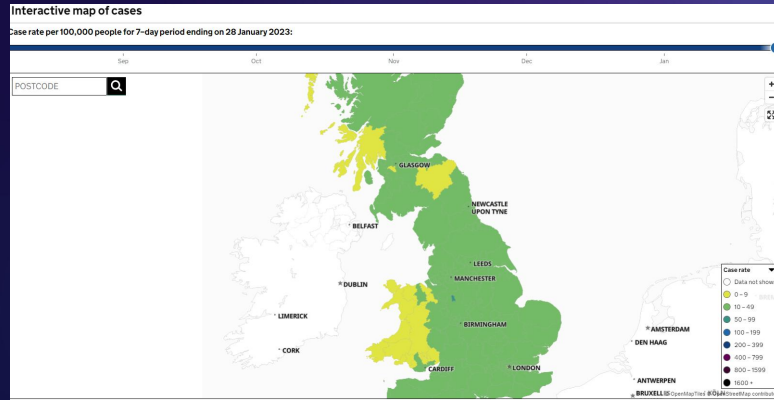# Dashboard review - Johns Hopkins coronavirus tracker
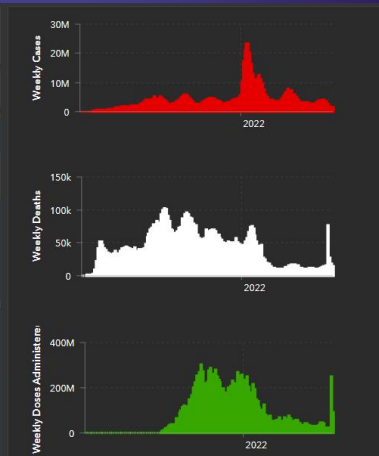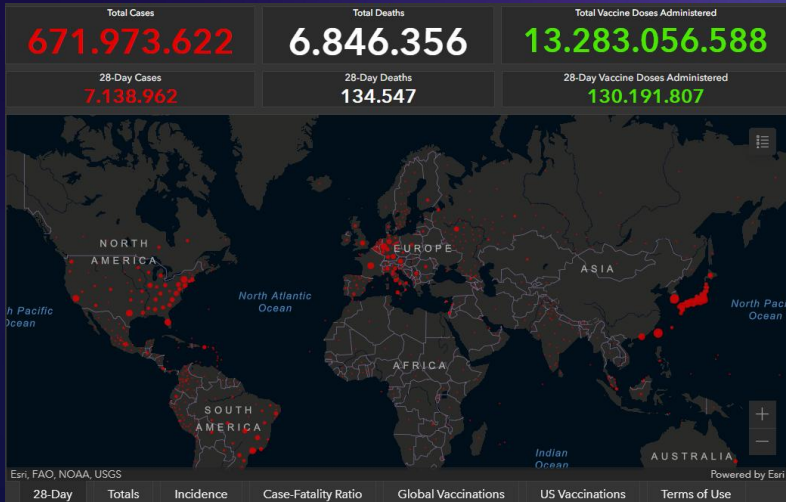
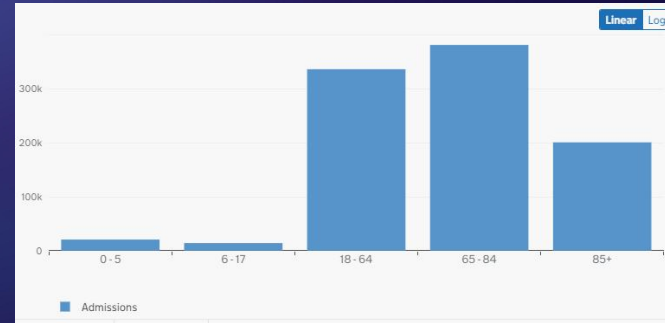Recognized by TIME as the "go-to data source" for COVID-19

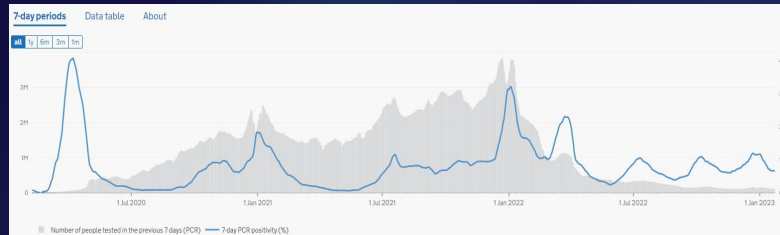CRC collect and analyze data related to cases, deaths, tests, hospitalizations and vaccines

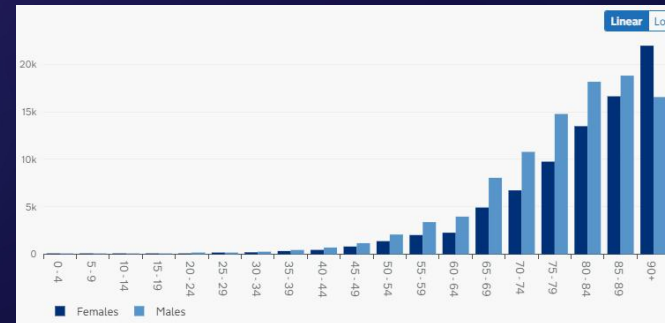# Dashboard review - UK government coronavirus tracker

Interactive map of cases
Case rate per 100,000 people for 7-day period ending on 28 January 2023:
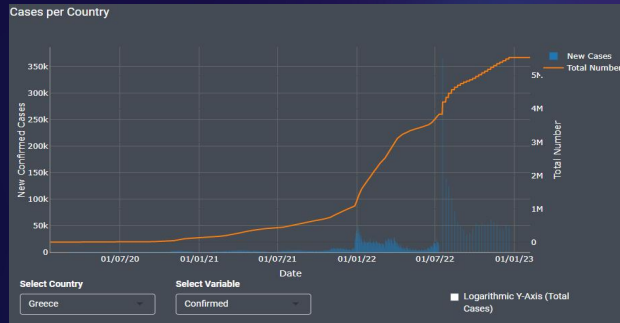
Weekly number of people receiving a PCR test and positivity

Developed and maintained by Public Health England.

Up-to-date and authoritative summary of key information about the COVID-19 pandemic

Patients admitted to hospital, by age

Deaths by age and sex

Dashboard review - CovidDEXP (Covid-19 Data Exploration)
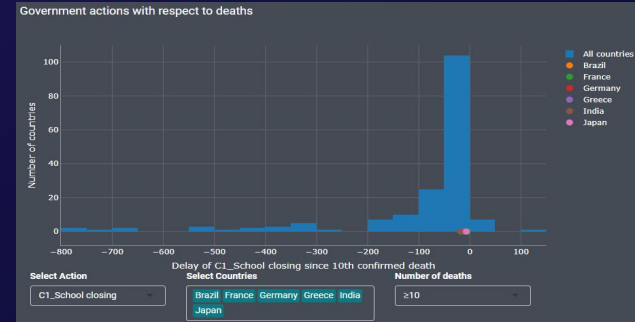
Data and Web Science Lab (DATALAB) Department of Informatics, Aristotle University of Thessaloniki, Greece.

Developed in the R programming language

Data - Government measures

Categories	
Religious places and ceremonies (churches, marriages, funerals, etc.)	Food retailers (supermarkets, grocery stores, etc., excluding food services)
Public Gathering	Education
Sports' Facilities (indoor, outdoor)	Use of Mask
Inner-country travel (between Municipalities, Regions, etc., excluding essential goods' transportation and trade)	International transportation (ships, planes, etc., excluding essential goods' transportation and trade)
Food services (restaurants, bars, etc., excluding food retailers)	Public Events (concerts, conferences, festivals, etc.)
Work and other interior spaces not included in other categories (civil service/public employees, beauty salons, barber shops, etc.,)	Retail stores (clothes shops, outlets, shopping malls, etc.)
Religious places and ceremonies (churches, marriages, funerals, etc.)	

- "Observatory of Government Restrictive Measures for the COVID-19 Pandemic (GovRM-COVID19)"
- Center for Research on Democracy & Law (CEDLAW) of the Department of International & European Studies of the University of Macedonia, Thessaloniki, Greece

All the measures take integer values from 0 to 3.

A single variable was created as the average value of all measures on a daily basis.

Countries

• Cyprus	• Ireland
• France	• Malta
• Greece	• Norway

Additional Data - Analyses

Positive Test Rate

Daily data of the COVID-19 PTR (Positive Test Rate) based on a 7-day rolling average

"Our World in Data" website

Health Certificates

- No need of Certifacate
- Vaccination/Recovery Certifacate only
- Vaccination/Recovery or test Certifacate

"GovRM-COVID19"

Analyses

- Year 2020 data for Greece
- Distance of days with the highest comparison of the behaviour of some selected countries, namely Cyprus,
- Cross-correlation method

- Comparison of the behaviour of Cyprus, France, Greece, Ireland, Malta and Norway
- Time period: Mar 12, 2020 to Dec 31, 2020
- Correlation method

- Time lag, measured in days, where Cyprus, France, Greece, Ireland, Malta and Norway exhibited the highest possible correlation
- Time period: Mar 12, 2020 to Dec 31, 2020
- Cross-correlation method
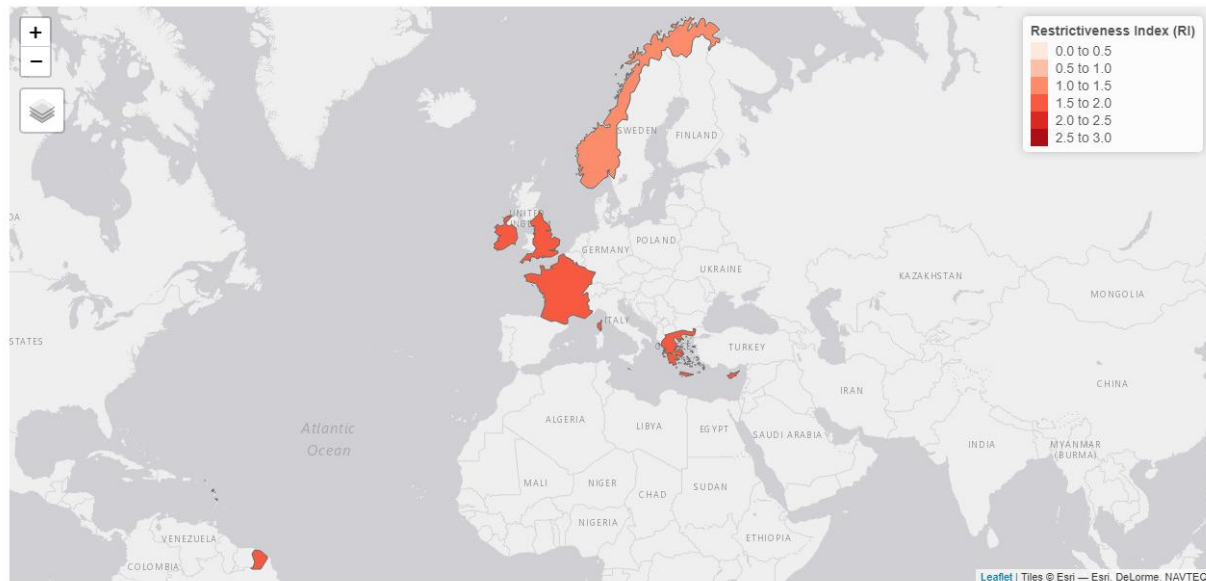
Restrictiveness Index (1)

Options
Date range

| 2020-01-03 | to | 2022-05-01 |
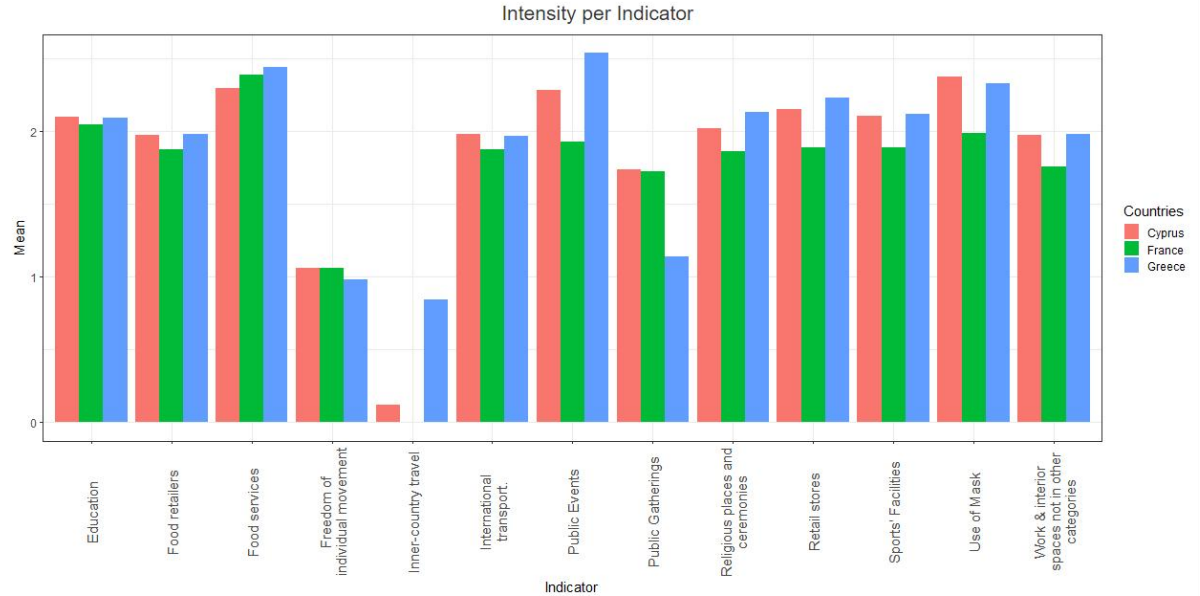
Restrictiveness Index of each country as follows:

$$RI = 2W \sum (X_{1-4}) + W \sum (X_{5-13})$$

and W is calculated as:

$$1 = 2W * 4 + W * 9$$

W = 5.88 percent

X1–4:

- freedom of individual movement

- public gatherings

- inner-country travel

- religious places and ceremonies

Restrictiveness Index (RI)
- 0.0 to 0.5
- 0.5 to 1.0
- 1.0 to 1.5
- 1.5 to 2.0
- 2.0 to 2.5
- 2.5 to 3.0

Leaflet | Tiles © Esri — Esri, DeLorme, NAVTEQ

© EuroGeographics for the administrative boundaries

Map

Intensity per Indicator (1)

Intensity per Indicator (2)

Duration of Intensity per Indicator

Covid-19 Health Certificates (1)

Covid-19 Health Certificates (2)

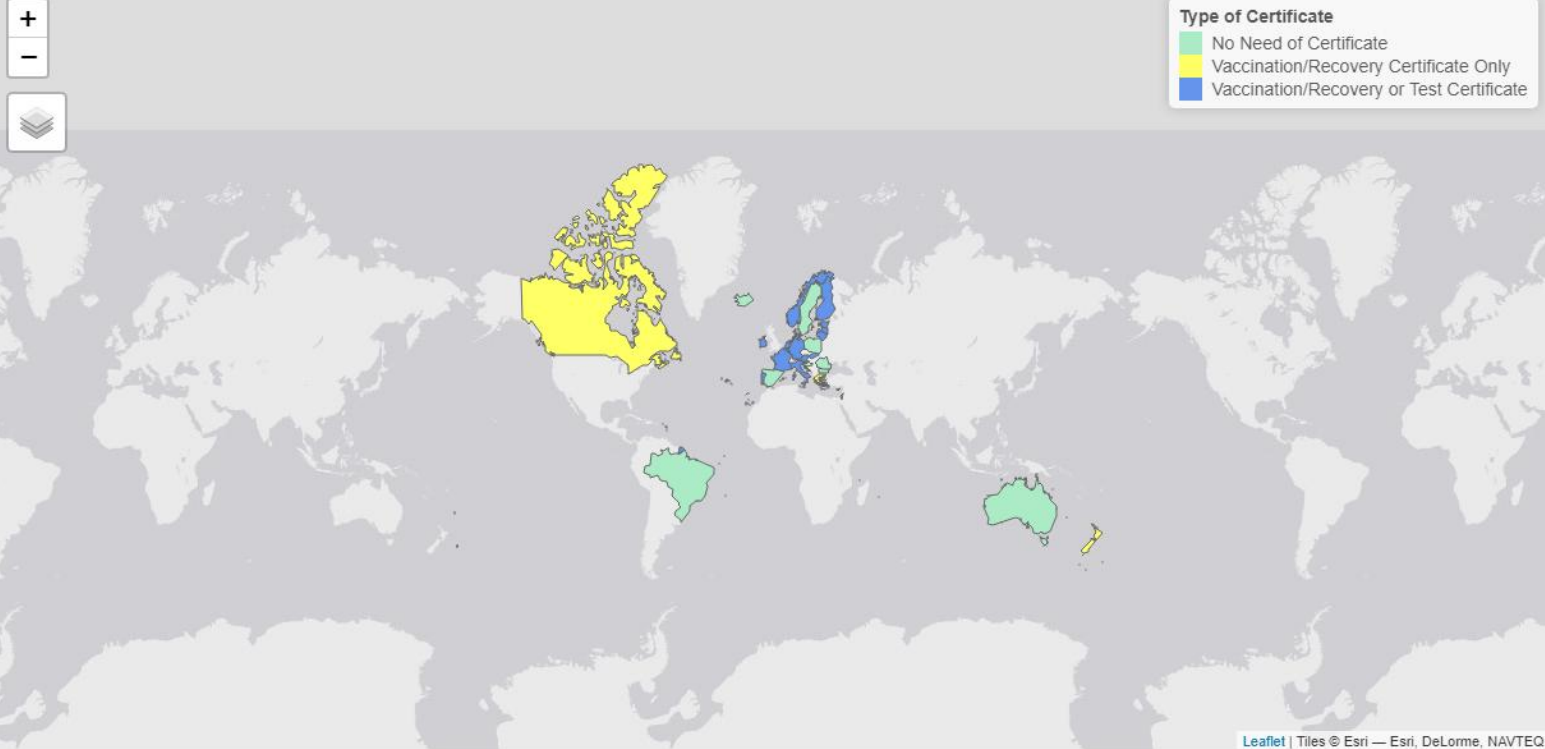© EuroGeographics for the administrative boundaries

Leaflet | Tiles © Esri — Esri, DeLorme, NAVTEQ

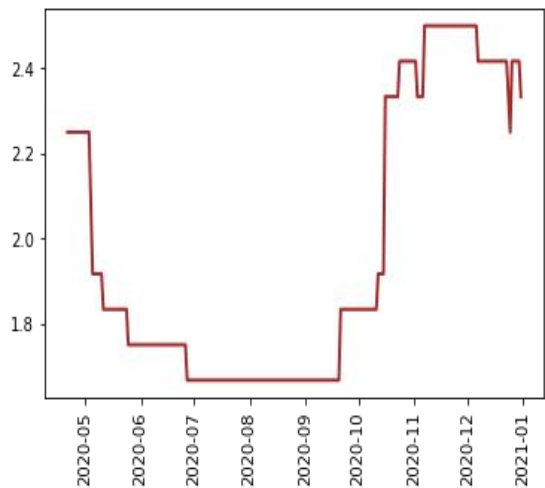Show 10 entries   Search:

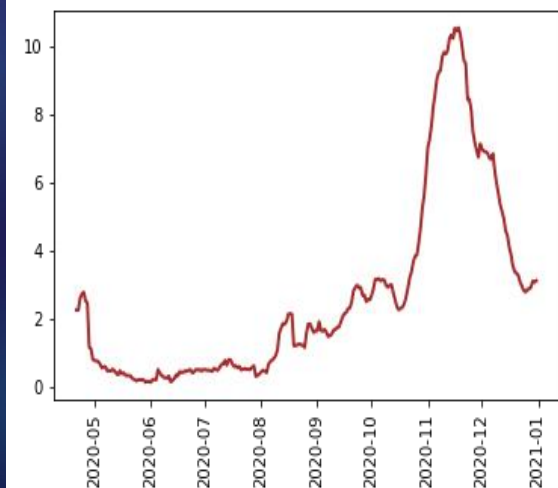| Country	Vaccination/Recovery Certificate Only	Vaccination/Recovery or Test Certificate
Australia		
Austria		28/05/2021
Belgium		02/08/2021
Brazil		
Bulgaria		
Canada	06/10/2021	
Croatia		
Cyprus		17/07/2021
Czech republic		03/05/2021
Denmark		06/04/2021
Country	Vaccination/Recovery Certificate Only	Vaccination/Recovery or Test Certificate

Showing 1 to 10 of 35 entries

Previous 1 2 3 4 Next

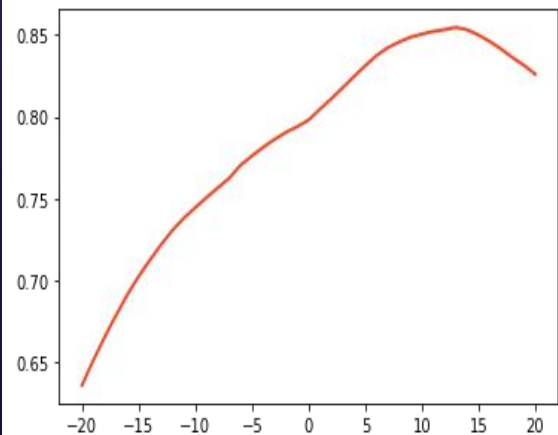# Cross-Correlation of Greece's government measures and COVID-19 PTR

| Time series of Greek government measures | .Time series of Greek COVID-19 positive test rate | Correlations between Greek government measures and COVID-19 PTR for various distance of days |

The highest value of correlation was found at +13 days (r = .85, P < .001)

Measures were usually taken for a period of week(s), until the next reassessment

Correlation of selected European countries government measures

Time series of government measures for Cyprus, France, Greece, Ireland, Malta and Norway
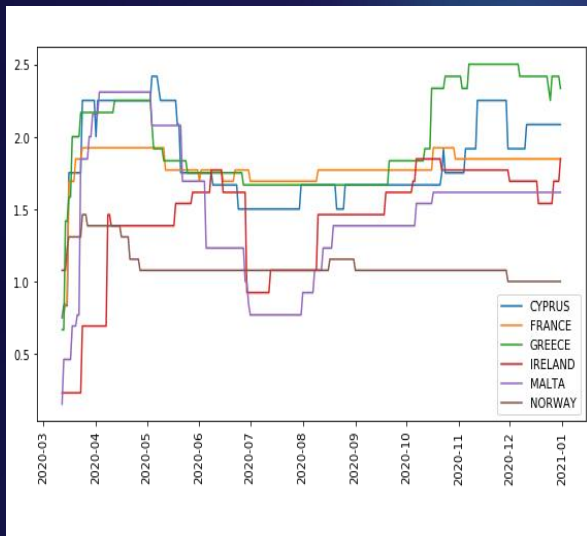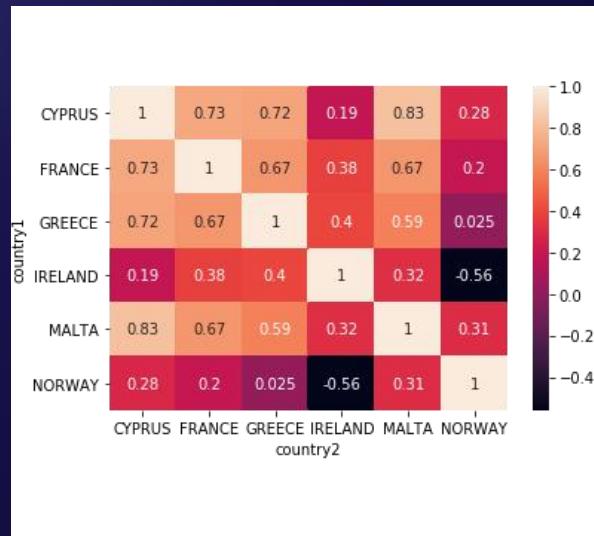

1. Cyprus and Malta (r = .83)

2. Cyprus and France (r = .73)

3. Cyprus and Greece (r = .72)

4. France and Greece (r = .67)

5. France and Malta (r = .67)

6. Greece and Malta (r = .59)

 all p-values < .05

Cyprus, France, Greece and Malta demonstrate similar behaviour. Ireland and Norway seem to have no or very low correlation with the other countries.

Correlations between government measures for Cyprus, France, Greece, Ireland, Malta and Norway

Cyprus, France, Greece and Malta are Mediterranean countries, rely on tourism during the summer periods, with a large percentage of the their GDP being contributed by travel and tourism.

Cross-Correlation and time lag of selected European countries government measures

For Cyprus, France, Greece, Ireland, Malta and Norway: government measures highest cross-correlation in distance of days


1. Cyprus and France 0 days (r = .73)

2. Cyprus and Greece 2 days (r = .73)

3. Cyprus and Malta 3 days (r = .84)

4. France and Greece 4 days (r = .74)

5. France and Malta 4 days (r = .73)

6. Greece and Malta 5 days (r = .61)

 all p-values < .05

Cyprus, France, Greece and Malta demonstrate similar behaviour.Norway good correlation values with Cyprus, France and Malta (0.59, 0.55 and 0.68), but long day distances.

For Cyprus, France, Greece, Ireland, Malta and Norway: government measures cross-correlation
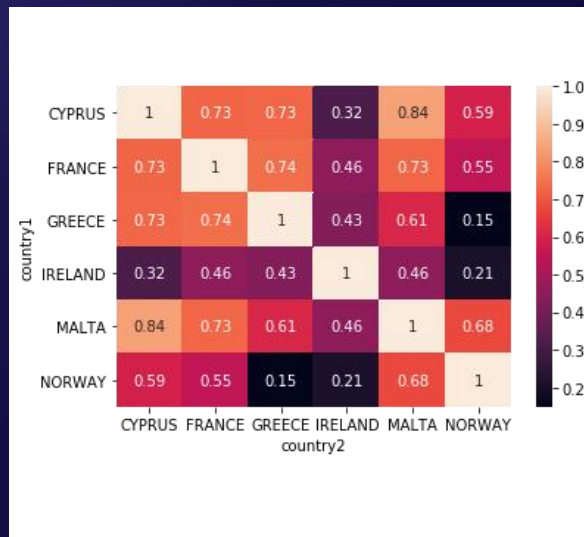
Cyprus, France, Greece and Malta are Mediterranean countries, rely on tourism during the summer periods, with a large percentage of the their GDP being contributed by travel and tourism.

Future Work

Dashboard

It could be enriched in the future with new visualisations or upgrading of existing ones, based on lab needs in terms of analyses or potential additional data collection.

Analyses

Perform all the above analyses on all or most countries of the world.

Include a numerical time series reflecting the quality of weather for each country during the examined periods.

Conference

Analyses of the thesis have been accepted for presentation at the 2023 7th International Conference on Medical and Health Informatics (ICMHI 2023) that will be held in Kyoto, Japan during May 12-14, 2023.

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Thank you!
Questions?