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REAL-TIME DATA ANALYTICS AND PREDICTION OF THE COVID-19 PANDEMIC

(PERIOD TO APRIL 10TH, 2020)

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Abstract

This brief paper is versioned 6 in a series of short papers that describe a set of descriptive and predictive analytics of the pandemic COVID-19 around the world. We exceptionally propose this new and uncommon way of publications because of the current emergency circumstances where Data are gathered and analyzed directly day by day. Because of the new behavior regarding the spread speed and the contagion features of this virus, we opted by comparative analytics based on demographic characteristics in localities and countries for prediction, without using historical data in epidemiology. The test proofs of our findings are done day by day with the real figures reported from the Data. To feed our models in algorithms, we refer to the reported cases from the Data of the World Health Organization (WHO). Because of the current circumstances of emergency, this paper is brief and will be succeeded with a series of versions until the end of the pandemic. The full paper will be published afterward with more details about the functions, the model, and the variables included in our algorithms.

List of our previous papers (preprints) in this special series about COVID-19

[1]	S. C. Gamoura, «Real-time Data Analytics and prediction of the COVID-19 pandemic (Period to March 22th, 2020),» *Published on March 22, 2020 - DOI: https://doi.org/10.13140/RG.2.2.33995.13607*
[2]	S. C. Gamoura, «Real-time Data Analytics and prediction of the COVID-19 pandemic (Period to March 26th, 2020),» *Published on March 26, 2020 - DOI: https://doi.org/10.13140/RG.2.2.12574.69444*
[3]	S. C. Gamoura, «Real-time Data Analytics and prediction of the COVID-19 pandemic (Period to March 28th, 2020),» *Published on March 28, 2020 - DOI: https://doi.org/10.13140/RG.2.2.25996.46726*
[4]	S. C. Gamoura, «Real-time Data Analytics and prediction of the COVID-19 pandemic (Period to April 2nd, 2020).,» *Published on April 02, 2020 - DOI: https://doi.org/10.13140/RG.2.2.36777.13921*
[5]	S. C. Gamoura, «Real-time Data Analytics and prediction of the COVID-19 pandemic (Period to April 4th, 2020),» *Published on April 04, 2020 - DOI: https://doi.org/10.13140/RG.2.2.16238.15686*

Findings 1: A new outlier in the daily new cases in France: Our analysis

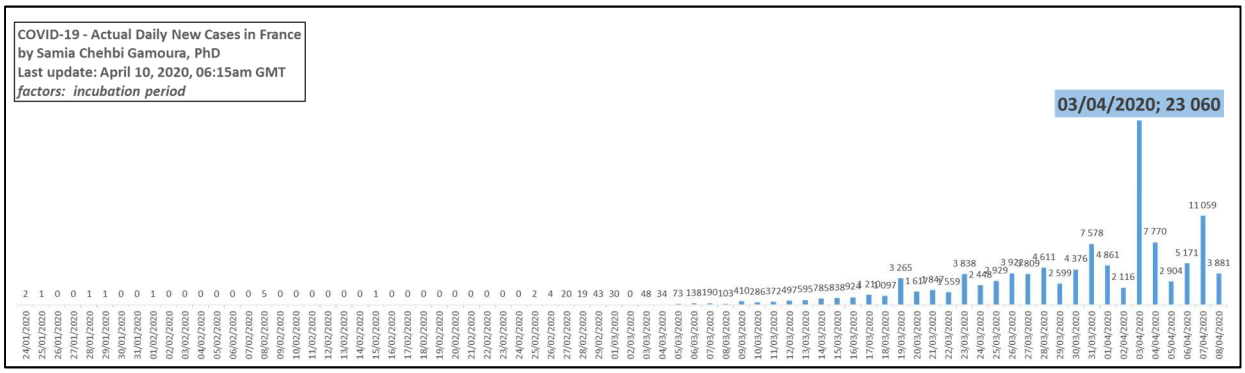


Figure 1. Screenshot of the daily new cases in France (Data source from French government)

We noticed a new outlier in the daily new cases in France corresponding to April 03, 2020. In one day (April 03), 23 060 new cases were recorded in France.

Based on the time series analysis, our algorithm has estimated the incubation period in Europe to 12 days (cf. our published preprint [1]). If we refer to this incubation period of 12 days, we can retro-project to 12th before, in the illustration of Figure 2.

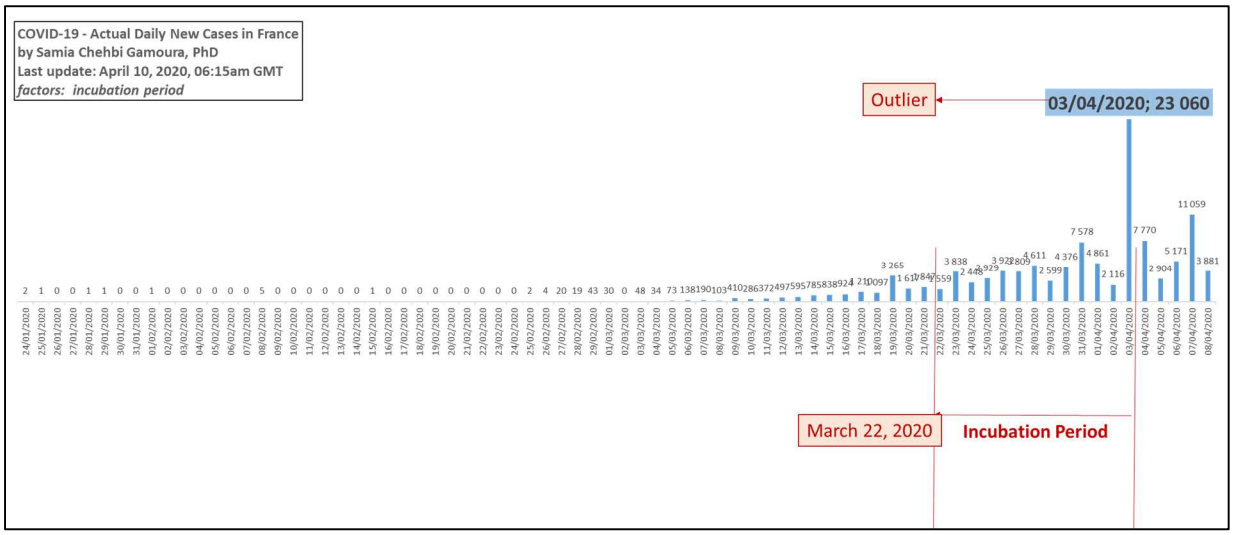


Figure 2. Retro-project of the outlier corresponding to (April 03 2020, 23 060) in France

We analyzed events regarding April 22, 2020, by using research (Big Data context). It was Sunday (off), the first day of spring 2020, a sunny day, and people went out for a walk. A religious mass was organized clandestinely this day in Savoie (Figure 3), with an increase in fines for breaches of confinement. We tried to have the data by regions to make the relationship between the local events this day of Sunday, March 22, and the reported new cases in the locality on April 03, 2020. Unfortunately, localities Datasets are not yet available on the website of the government Data.gouv.fr.

Figure 2. Screenshot from local French e-Newspaper (valeuractuelle.com) [6]

Findings 2: Prediction of Total cases for next period in France

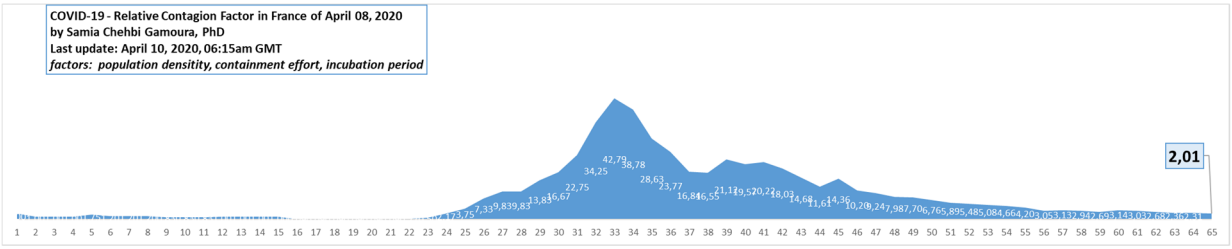
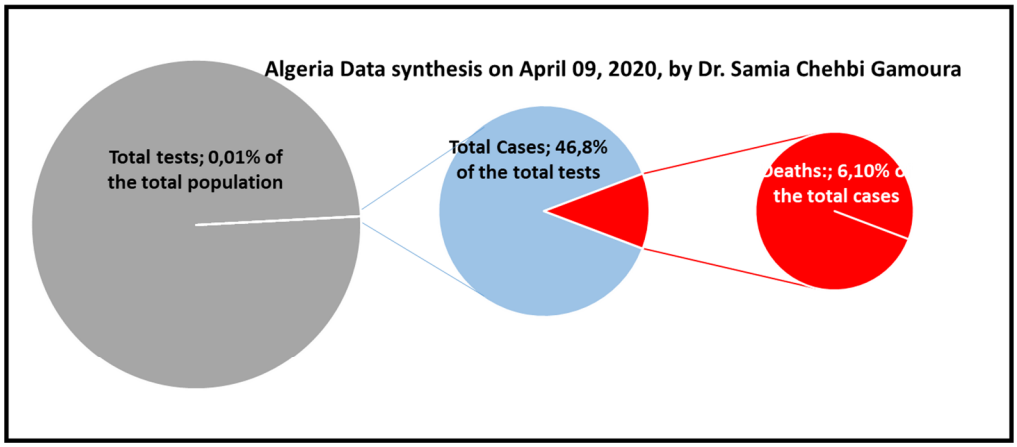


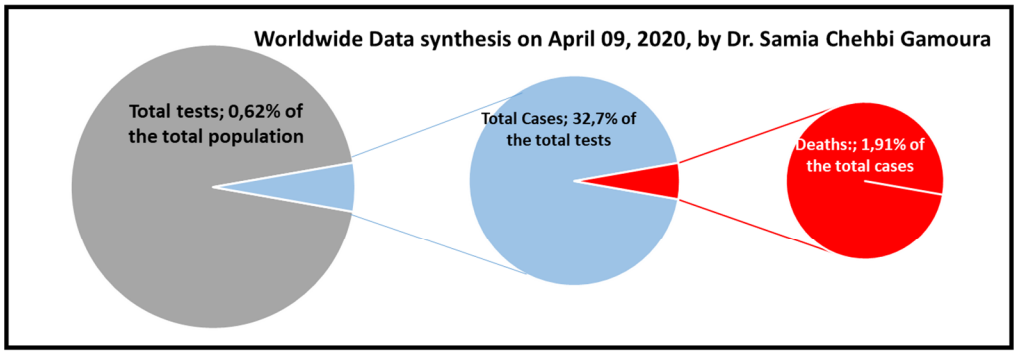
Figure 3. The actual Relative Contagion Factor (RCF) in France by using our algorithm

The Relative Contagion Factor we defined in [2] is computed in France today. The extracted value is 2,01 (Figure 3). It means one infected person has already infected two other persons in the last incubation period. Therefore, the French population in the previous period has not respected the containment. The value is more than 2; this means France is out from the peak and is back to go increasing in the epidemic curve. We predict an increasing number of daily cases from the 12 days from the next April 13, 2020 (next Monday).

Findings 3: Data analytics of pandemic situation in Algeria

Table 1 provides some comparative statistics between Algeria and worldwide, with the synthetized illustration in the pies chart in Figure 4.





April 09, 2020				
	Algeria		World	
Population	43 000 053,00		753 000 000,00	
Total tests	3 359,00	0,01%	4 705 889,00	0,62%
Total Cases	1 572,00	46,8%	1 541 113,00	32,7%
Deaths:	205,00	6,10%	90 056,00	1,91%

Figure 4. Comparative statistics between Algeria and worldwide (*testing, total cases, and deaths*)

In Algeria, up to the date of April 09, 2020, the testing rate based on the population is 0.01%, compared to the average rate worldwide, which is 0.62%. This rate is hugely low, about 62 times less than the global average rate of testing.

The percentage of confirmed cases represents 46% of the total tested cases, compared to 32% in the worldwide average rate. This confirms the hypothesis that in Algeria, the announcement of cases is limited to cases that are hospitalized or died. The sources of the hospitals can confirm this hypothesis.

The death rate represents 6.10% of the total confirmed cases, compared to the global worldwide rate of 1.90%. Thus, the mortality rate is about three times higher than the global average rate. This suggests the hypothesis that a significant portion of discovered cases is death-oriented. This means a part of positive cases is discovered postmortem.

Our conclusion, there is an issue in the testing procedure and the announcement of cases in Algeria. This is a reason to suggest that these figures do not reflect the real pandemic situation in the country.

Findings 4: Data analytics and peak detection in Iran

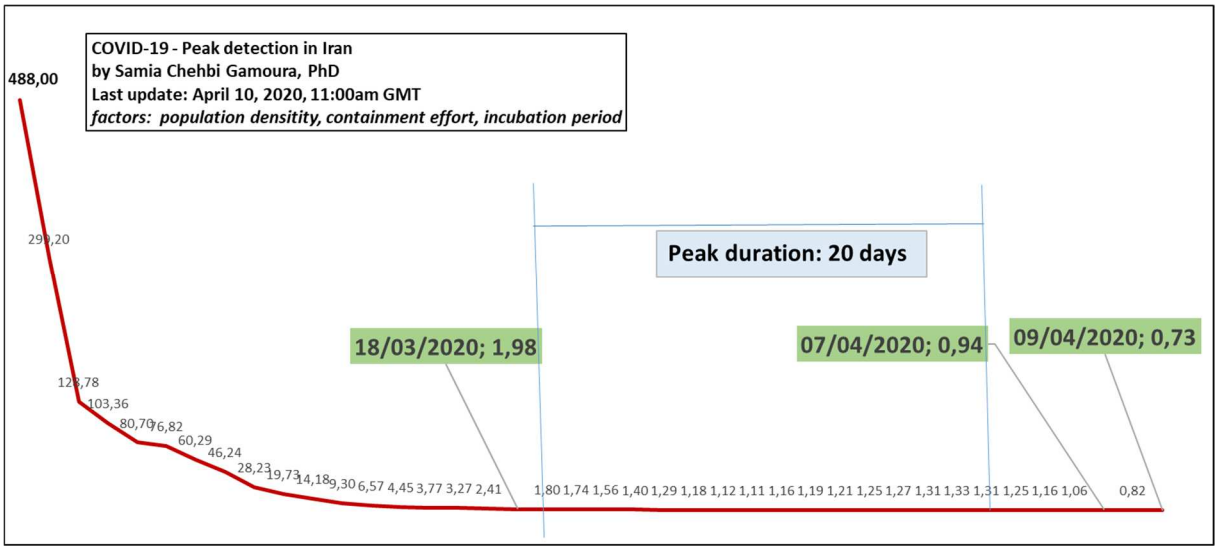


Figure 4. Comparative statistics between Algeria and worldwide (testing, total cases, and deaths)

The Relative Contagion Factor in Iran today is 0.73. This value less than 1 indicates Iran is going down in the epidemic curve. The algorithm detected the peak on March 18, 2020, with a value of less than 2 (1.98). After 20 days in the peak, it started decreasing since April 07, 2020.

Findings 5: Extraction of Relative Demographic Rate of Death (RDRD)

We extracted a factor of death that takes into account the mortality rate caused by COVID-19, the rate of old age (>60), the epidemic period. We will name this factor the Relative Demographic Rate of Death.

In figure 5, a comparative between some countries.

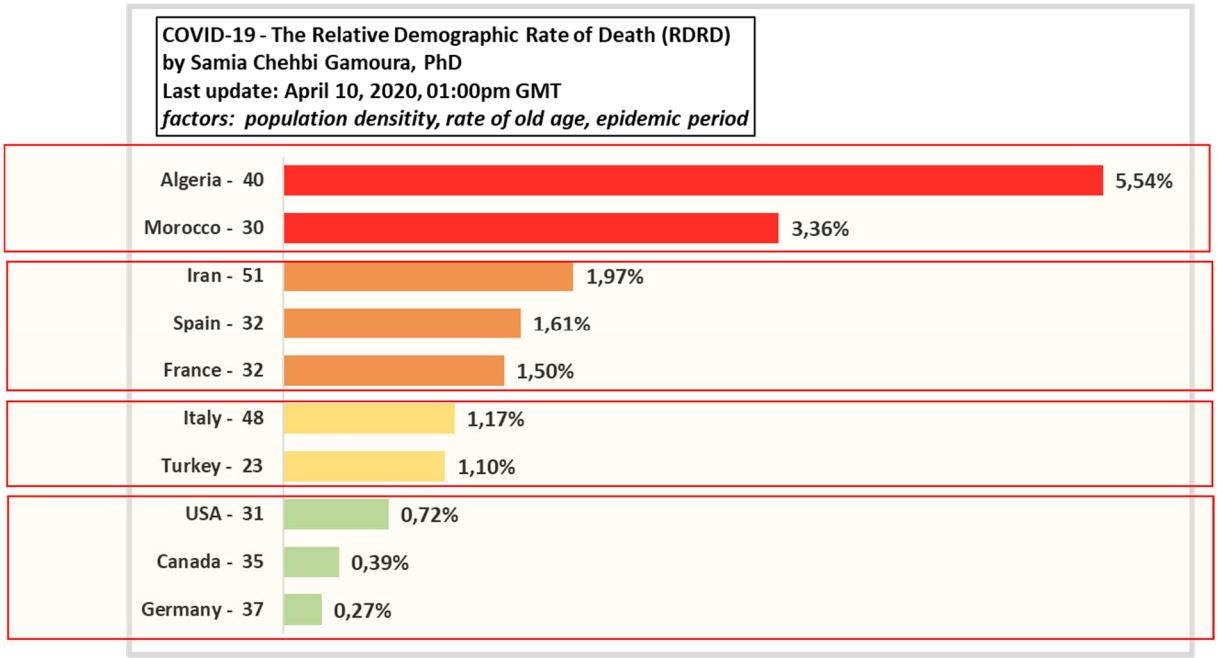


Figure 5. The extracted Relative Demographic Rate of Death (RDRD) of April 10, 202, in Algeria, Morocco, Iran, Spain, France, Italy, Turkey, USA, Canada, and Germany

We extracted the relative demographic death coefficient, which is not the same as the well-known rate of mortality, already used by epidemiologists. This factor is based on the number of tests in the country, the density of population, the ratio of elders, and the epidemic stage.

As we see in the figure, Algeria leads the countries with a factor of 5%, followed by Morocco (3%). Both countries display a huge proportion because of several reasons, such as the limited amount in testing and the quality of health systems.

Iran, Spain, and France indicate significant mortality rates even though Iran has a meager percentage of elders.

Italy, despite the significant number of deaths, the proportion seems reasonable given the population density and the aging rate.

Turkey, the country displays control over the mortality despite 42,000 of total cases.

The United States and Canada are controlling the percentage, which is minor, given the population density and the proportion of older people.

Germany seems having the best strategy in controlling the relative factor mortality with a rate of 0.27.

References

[1] S. C. Gamoura, «Real-time Data Analytics and prediction of the COVID-19 pandemic (Period to March 22th, 2020),» *Published on March 22, 2020 - DOI: https://doi.org/10.13140/RG.2.2.33995.13607.*

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[6] valeursactuelles, «https://www.valeursactuelles.com/societe/confinement-un-pretre-et-des-fideles-sanctionnes-apres-une-messe-117384,» [En ligne].