

Prediction of daily contagions of Covid-19 from March 03 to June 01 in Sicily, a region of Italy

Calogero Rinzivillo<sup>(1)</sup>, Sergio Conte<sup>(2)</sup>, Elio Conte<sup>(2)</sup>

<sup>(1)</sup> Department of Medical and Surgical Sciences, University of Catania, Italy.

<sup>(2)</sup> School of Advanced International Studies on Applied Theoretical and non Linear Methodologies of Physics, Bari, Italy.

**Abstract :** We study a fractal model for prediction of Covid-19 contagions from March 03 to June 01 in Sicily, a region of Italy. We obtain that the time of the peak is estimated to be at March 20-25 and the number of contagions will be about 3130 cases.

## Introduction

The aim of the present work is to effect a prediction of the contagions of Covid-19 in a region of Italy, the Sicily in the period from March 03 to June 01. In the work we use the methods of the fractal analysis, fitting the model that was still used by Ziff and Ziff [1] during the contagions in China. The current prediction, effected by such method, is that the size of the epidemic will be about 3130 cases of contagions in Sicily with a time of peak that will be about March 20-25 of 2020 in theoretical line, depending instead the actual size of the process from the respect or an increase or decrease of the prevention measures that are fixed from the governing bodies.

## Materials and Methods

The power-law (fractal) behavior has been postulated and applied in epidemic studies of Corona virus disease in China. It is related to the properties of the networks that carry out the propagation of the disease. Vazquez [2] developed a network model, Anna L. Ziff and Robert M. Ziff [1] applied a fractal behavior model in contagions in China. The daily number of new contagions cases,  $n(t)$ , in an epidemic follows a power-law with an exponential cutoff

$$n(t) = kt^x \exp(-t/t_0)$$

The values found in China are the following:  $K = 0.0854$ ,  $x = 2.28 - 3.09$ , and  $t_0 = 8.90$  days (the time constant of decay).

## Results

We apply the same model for the contagions of Corona Virus in Sicily. The parameter values that we estimate are the follows

$$k = 0.405$$

$$\gamma = 2.57$$

$$t_0 = 8.59$$

They confirm that we are in presence of a fractal regime given by the non-integer value of  $\gamma$ . The value  $\gamma t_0$  represents the Time of the Peak. The results are in Fig. 1. The time explored is from March 03 to June 01. It is seen that the time peak is about the 18-23th day that corresponds to March 20-25 with a total of contagions about 3130 cases.

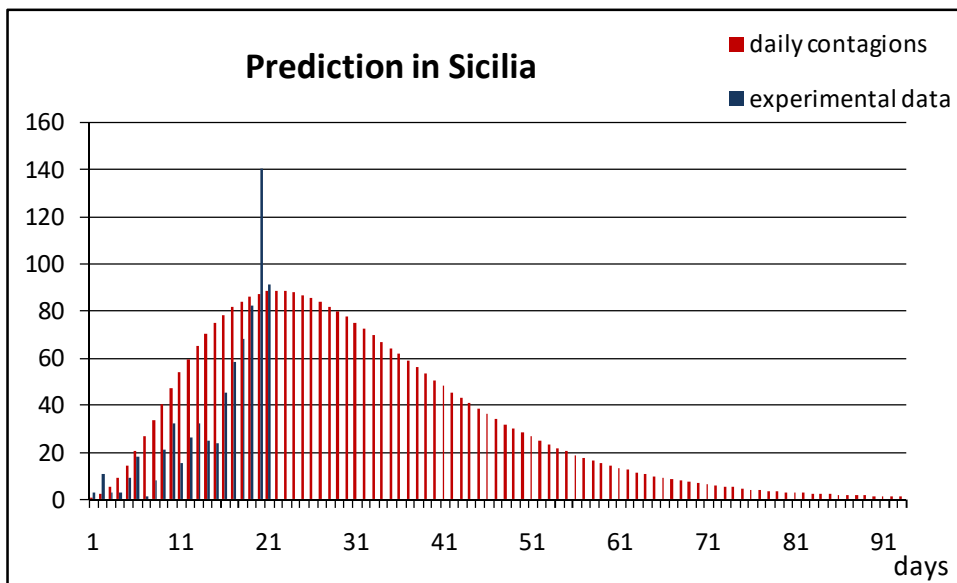


Figure 1

## References

Alexei Vazquez. Polynomial growth in age-dependent branching processes with diverging reproductive number. *Physical Review Letters*, 96(3):038702, January 2006. ISSN 0031-9007, 1079-7114. doi: 10.1103/PhysRevLett.96.038702. URL <http://arxiv.org/abs/cond-mat/0505116>. arXiv: cond-mat/0505116.

Anna L. Ziff and Robert M. Ziff, Fractal kinetics of COVID-19 pandemic (with update 3/1/20), medRxiv preprint doi: <https://doi.org/10.1101/2020.02.16.20023820>.

