Prediction of daily contagions of Covid-19 from March 01 to May 19 in Italy

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Abstarct : We study a fractal model for prediction of Covid-19 contagions from March 01 to May 19 in Italy . We obtain that the time of the peak is estimated to be at March 22-23 and the number of contagions will be about 110000 cases.

Introduction

The aim of the present work is to effect a prediction of the contagions of Covid-19 in Italy in the period from March 01 to May 19 . 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 110000 cases of contagions in Italy and the time of peak will be about March 22-23 of 2020 in theoretical line, depending instead the actual size of the process from the respect or an increase o 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

$n(t)=kt^{\gamma}exp(-t/t_0)$

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 Italy. The parameter values that we estimate are the follows

k =0.024

γ =4.93

t_0=6.19

They confirm that we are in presence of a fractal regime given by the non-integer value of γ. The value $\gamma\, t_0$ represents the Time of the Peak . The results are in Fig. 1 . The time explored is from March1 to May 19. It is seen that the time peak is about the 22-23th day that corresponds to March 22-23 with a total of contagions about 110000 cases.

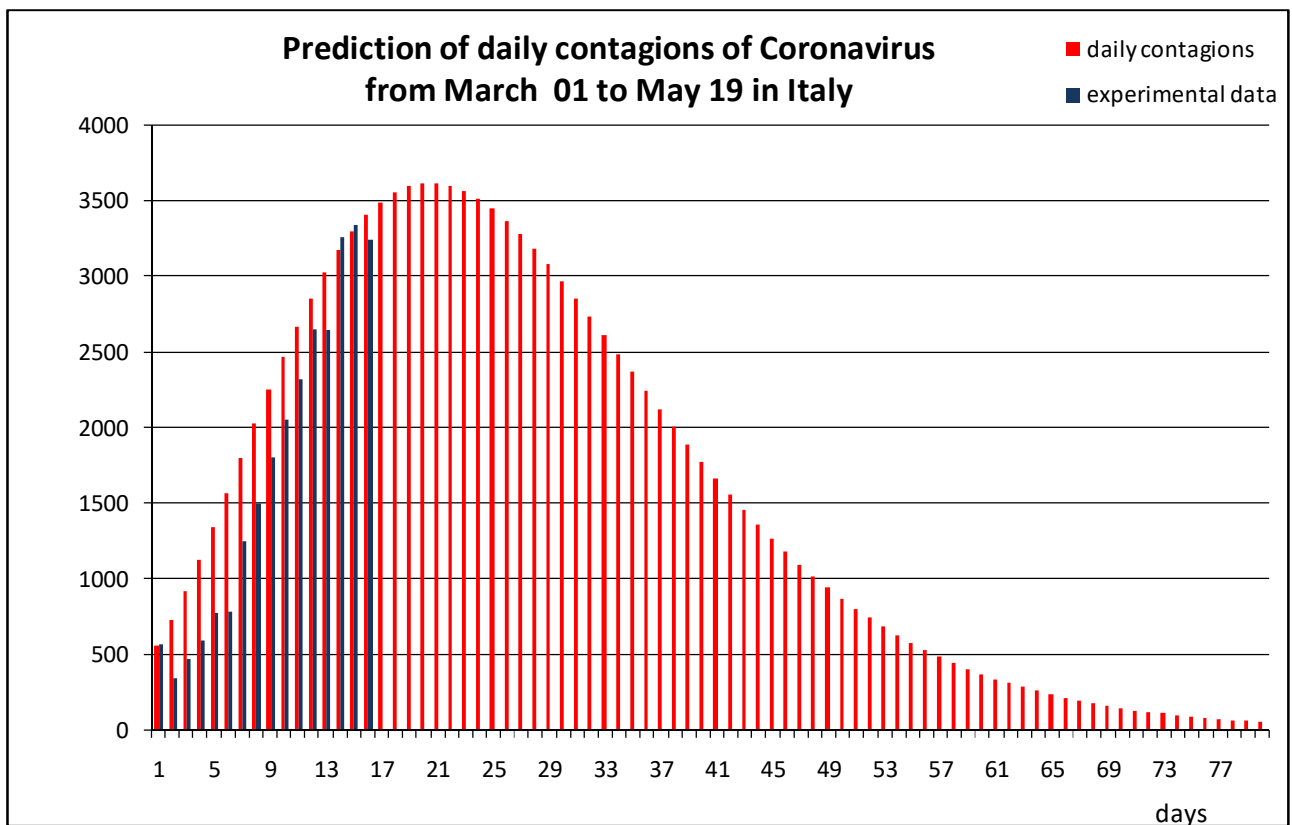Fig.1 .

References

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