Confirmation of Prediction of daily contagions of Covid-19 from February 20 to June 20 in Italy

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Abstarct : We study a fractal model for prediction of Covid-19 contagions from February 20 to June 20 in Italy . We obtain that the model confirms the experimental data obtained in the past seven days . The time of the peak is estimated to be at March 21-26 and the number of contagions will be about 240000 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 February 20 to June 20 . 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, gives confirmation of the experimental data of the last seven days and indicates that the size of the epidemic will be about 240000 cases of contagions in Italy in the period from February 20 to June 20 and the time of peak will be about March 21-26 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. The experimental data are not corrected for the missing buffers to the population.

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 =0.96

γ =3.44

t_0=9.66

They confirm that we are in presence of a fractal regime given by the non-integer value of γ . The value γ t_0 represents the Time of the Peak . The results are in Fig. 1 . The time explored is from February 20 to June 20. It is seen that the time peak is about the 31-36th day that corresponds to March 21-26 with a total of contagions about 240000 cases. We report in literature our previous predictions [3],[4],[5].

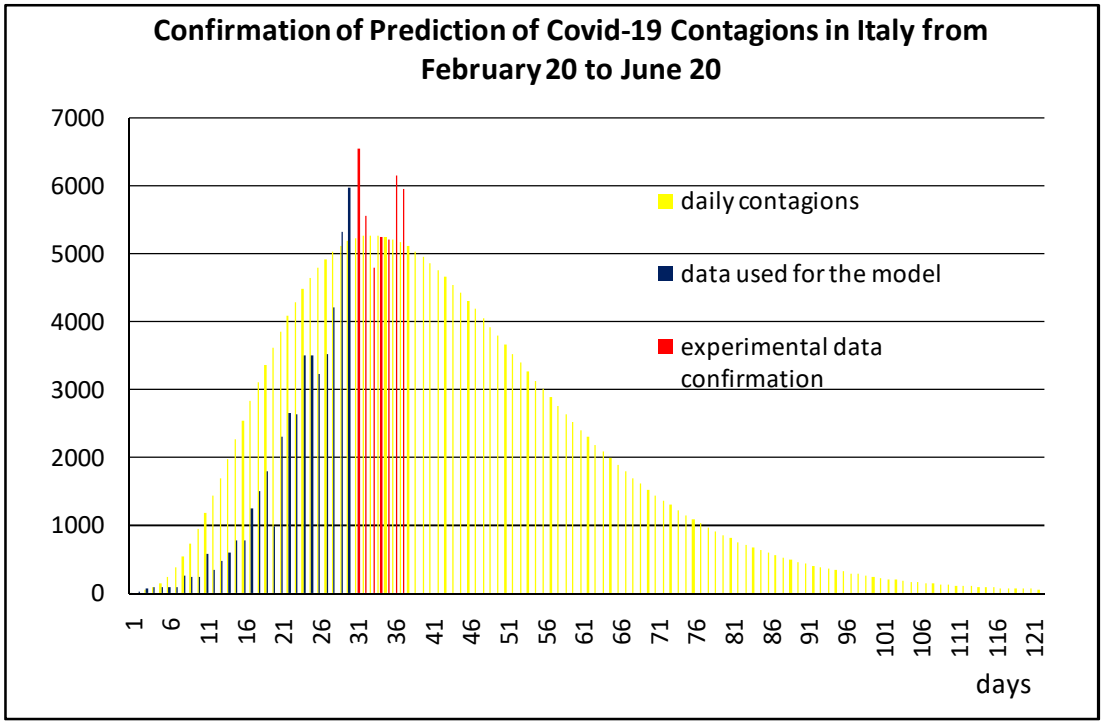

Fig.1 .

References

[1]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.

[2]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.

[3]Calogero Rinzivillo, Sergio Conte, Elio Conte, Prediction of Daily Contagions of Covid-19 from March 03 to June 01 in Sicily , a Region of Italy, viXra:2003.0498

[4] Calogero Rinzivillo, Sergio Conte, Elio Conte, Prediction of Daily Contagions of Covid-19 from March 01 to May 19 in Italy, viXra:2003.0345

[5] Sergio Conte, Ferda Kaleagasioglu, Alberto Foletti, Elio Conte, Estimation of the Size of the Corona Virus in Italy in the Next Ten Days Made by Nonparametric Time Series Prediction