MEASURING EXTENT OF RELIABILITY OF DEADLY COVID - 2019 USING GOEL-OKUMOTO SRGM

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ABSTRACT

COVID- 2019, A pandemic, a deadly disease, a monster and many more terms define this virus that outbreak globally in the past 3 months. It has lightened up a bizarre wave of medical as well as technical research to seek the track of its cause, spread, effects and cure. The word corona can be rerated to mathematics too. In mathematics, the corona theorem is a result of the spectrum of the bounded holomorphic functions on the open unit disc, conjectured by Kakutani (1941) and proved by Lennart Carleson (1962), whereas medically speaking it is analysed as the SARS and CoV-2 virus combined causing COVID – 19. In this research paper, an attempt has been done to find out the extent of reliability of COVID – 19 using Goel-Okumoto Software Reliability Growth Model (SRGM) to the extent the dataset is available. Since COVID – 19 is spreading at an exponential rate, so Goel-Okumoto SRGM is used since it uses exponential distribution method to find out the dreadfulness of the disease.

KEYWORDS: COVID - 19, Reliability, SARS, CoV-2, SRGM, Exponential Distribution

Received: Jun 09, 2020; **Accepted:** Jun 29, 2020; **Published:** Jun 30, 2020; **Paper Id.:** IJMPERDJUN2020307

INTRODUCTION

COVID – 19 is detected as a respiratory tract viral infection caused due to emerging novel corona virus outbreak in the city Wuhan, China. Originated from this city, it has now reached more than 160 countries of the world, including India. As per the latest data report (from 30th Jan 2020 – 22nd March, 2020), 2019 a total of 365 cases have been confirmed in India.

*The table below shows the latest data report of the cases w.r.t. COVID – 2019:

Table 1

	FIGURES (IN NUMBERS)	FIGURES (IN PERCENT)
Total No. of Cases	35902	
Migrated cases	1	.002%
Recovered Cases	15266	42.52%
Deaths	1783	4.96%

*The cumulative trend follows as under:

Figure 1

*The transmission source for the same can be recognised as:

*Data source: Covidout

Figure 2

The conventional methods of safety as directed by the medical advisors include Washing of hands frequently with soap, use of sanitiser, not touching face area, avoiding public appearances and many more. Moreover, the government has done a complete lockdown of the country, state wise till 31st March 2020.

METHODOLOGY

Dataset taken into consideration would include some of the countries where there is drastic outbreak of the disease like China, Italy, Iran and lastly India.

Factors to be taken into consideration would be Total No. of Positive cases, Total no. of deaths due to the same and in turn the mortality rate. In some of the cases, the Mortality rate may increase, decrease or remain constant.

After statistical analysis, test cases are conducted to find the actual deaths per day till date.

This Model uses Statistical techniques like Confidence Interval (CI) and many more.

The data used for the same is:

Table 2

Countries	No. of Deaths (In Thousands)	Total Cases (In Thousands)	Fatality Rate
China	3	81	.04
Italy	5	59	.08
Iran	1	23	.04
Spain	2	33	.06
UK	1	6	.17
France	1	16	.06
USA	1	35	.03
Germany	1	26	.04
India	1	4	.25
	16	282	.06

This can be shown graphically as:

Figure 3

Now,

Step 1: Calculate the Mean Value Function i.e., $\mu(t)$ as

$$\mu(t) = a(1 - e^{-bt})$$

Where,

a = Total No. of Deaths i.e., 16 and ,

b = Fatality rate i.e., .06

t = No. of days. In this case its 10 days

So, $\mu(t) = 7.21$

Also,

Step 2: Calculate Failure intensity Function. i.e., $\lambda(t)$ as

$$\lambda(t) = \mu'(t) = abe^{-bt}$$

$$= 0.52$$

$$R(t) = e^{-\lambda t}$$

$$= 0.59$$

CONCLUSIONS

This paper focus on the data rate at which the pandemic is increases and the number of deaths occurred. For the same purpose, actual data has been taken and thus the reliability is calculated, which came out to be 0.59. This shows that the said Corona Virus is having a reliability of 0.59 to effect people and on the basis of the effect an individual recovers or not. Goel Okumoto proved to be a perfect software reliability growth model as it calculates the reliability with the data with exponential increase and the considered pandemic is increases exponentially.

In the upcoming paper, we will try to calculate reliability for a particular country taken on regular interval and its increase/decrease in reliability with values and graph.

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