Analyse Impact and Prediction of Trend of Covid-19 in India

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Abstract

The coronavirus COVID-19 is affecting 212 countries and territories around the world. COVID-19 is a strange but dangerous virus. It has spread like an epidemic overall at the global level. For this purpose, it is tried to find out whether COVID-19 has equally effected all the countries. The facts of Top 10 highly affected countries by epidemic coronavirus and facts of India is considered for study purposes. To test the hypothesis the statistical techniques correlation is used to measure it. For result verification purposes and finding model fitness, an artificial neural network technique is used.

It is also tried to know the trend of growing cases and to understand the similarity in the increasing trend of cases and deaths in the countries. So that the reason and some techniques can be found out to control it. Growth of cases and other factors included for the study are found similar and highly positive in Germany and Turkey to India while the low level of correlation is found with the USA and Spain. In the last, some recommendation has been made to reduce the growth rate of cases by a coronavirus.

Keywords: COVID-19, Artificial Neural Network, Increasing trend, India, Death percentage

Introduction

Coronaviruses are a large family of viruses that may cause illness in animals or humans. In humans, several coronaviruses are known to cause respiratory infections ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The most recently discovered coronavirus causes coronavirus disease COVID-19.[1]

COVID-19 is a disease that can cause what doctors call a respiratory tract infection. It can affect your upper respiratory tract (sinuses, nose, and throat) or lower respiratory tract (windpipe and lungs). It's caused by a coronavirus named SARS-CoV-2.[2]

It spread by human to human transmission. It is the most worrisome part of COVID-19. The number of cases infected by the epidemic is increasing so rapidly. Novel Coronavirus disease is very dangerous. There are three parameters to understand in order to assess the magnitude of the risk posed by this coronavirus:

·Transmission Rate (Ro) - number of newly infected people from a

single case

·Case Fatality Rate (CFR) - percent of cases that result in death

·Determine whether the asymptomatic transmission is possible[3]

Review of Literature

J. S. Malik Peiris, S. Y. Lam, L. L. M. Poon, K. Y. Yuen, and W. H. Set (2011) analyzed and found that a nebulizer under a controlled condition was used to generate a high and relatively low humidity environment. All the experiments conducted in duplicate and the residual viral infectivity was titrated.

Casanova LM, Jeon S, Rutala WA, Weber DJ, Sobsey MD (2010) explored in the paper that the rate of risks arises by the severe acute respiratory syndrome (SARS) coronavirus (SARS-CoV) on surfaces requires data on the survival of this virus on environmental surfaces is very high.

Grant WB, Lahore H, McDonnell SL, Baggerly CA, French CB, Aliano JL, Bhattoa HP (2020) discussed in the paper that the world is in the grip of the COVID-19 pandemic can reduce the risk of infection and death can be reduced to quarantines and it is desperately required.

Material and Methods

The research methodology comprises the research design, sample design, sources of data, selection of data, various designs, and techniques used for analyzing the data. The methodology is explained using the following points:

Research Design: The research the design used for the research problem is causal research based on the relationship between the dependent and independent variables as the objective is to determine which variable might be causing certain factors, i.e. whether there are cause and effect relationships or not.

Table 1 Status of Highly effected counties by COVID -19 as on 18th April2020

Variables	USA	Spain	Italy	France **	Germany	UK	China	Iran	Turkey	Belgium	India
period national lockdown	0	36	39	25	25	25	0	32	0	33	26
time taken in doubled	8	16	19	12	10	10	58	22	9	9	8
density of popalatio n	36	94	206	119	240	281	153	52	110	383	420
urban %	83	80	69	82	76	83	61	76	76	17	66
male:female at birth	1.05	1.06	1.06	1.05	0	1.05	1.17	1.05	1.05	1	1.11
Cases	7,10,272	1,90,839	1,72,434	1,47,969	1,41,397	1,08,692	82,719	80,868	78,546	37,183	14,425
Deaths	37,175	20,002	22,745	18,681	4,352	14,576	4,632	5,031	1,769	5,453	488
%death	5.401	12.92	14.69	12.07	3.81	9.41	2.99	3.25	1.14	3.52	0.33

Source- https://www.worldometers.info/coronavirus/

Table 1 shows the status of countries of highly infected cases by COVID-19 and death percentages by corona virus-infected till 18 April 2020.

Methods of data collection

For the study in hand, the secondary data was collected through the reports from the World Health Organization, government official websites,

Result And Discussions

Following statistical tests and tools will be used to meet with the above-mentioned objectives and for proving the hypothesis:

Correlation

Artificial Neural Network

For applying this statistical tool software SPSS 19 is used.

Objective

To understand the trend of Coronavirus in India

To find the association between the trend of infected cases in India and any other country.

To know the impact of COVID-19 on all the countries equally

To study the country in which trend is equal to India

All the countries are not equally effected by COVID-19

LIST OF DEPENDENT AND INDEPENDENT VARIABLE

Table 2 Description of variables

Independent	Co-Variables	dependent
USA	Social distancing (lockdown)	India
Spain	Density of population	
Italy	Urban population	
France	Gender ratio	
Germany	Rate of double cases	
China	Death percentages	
UK	Risk cases	
Iran	Death rate	
Turkey	No. of Deaths	
Belgium		

Table 2 shows how variable are segregated in dependent & independent variables as shown

Hypothesis

In terms of hypothesis, it can be written as

H01 All the countries are not equally affected by COVID-19

H11 All the countries are equally affected by COVID-19

Testing Of Hypothesis By Correlation

H01 All the countries are not equally affected by COVID-19

Table 3 Correlations

		USA	SPAIN	ITALY	FRANCE	GERMANY	UK	CHINA	IRAN	TURKEY	BELGIUM	INDIA
USA	Pearson Correlation	1	.764	.411	.710	.431	.415	.459	.908*	.745	.169	.291
	Sig. (2-tailed)		.132	.492	.179	.469	.487	.437	.033	.149	.786	.635
	Sum of Squares and Cross-products	4970.742	4338.106	4740.836	5065.032	6038.890	6840.822	4040.345	3669.192	5320.262	3926.820	7317.538
	Covariance	1242.686	1084.527	1185.209	1266.258	1509.723	1710.206	1010.086	917.298	1330.066	981.705	1829.385
	N	5	5	5	5	5	5	5	5	5	5	5
SPAIN	Pearson Correlation	.764	1	.868	.981**	.861	.848	.775	.902*	.939*	.699	.772
	Sig. (2-tailed)	.132		.057	.003	.061	.069	.124	.037	.018	.189	.126
	Sum of Squares and Cross-products	4338.106	6477.875	11422.791	7983.374	13760.388	15948.042	7786.044	4160.446	7662.090	18577.544	22160.529
	Covariance	1084.527	1619.469	2855.698	1995.844	3440.097	3987.011	1946.511	1040.112	1915.523	4644.386	5540.132
	N	5	5	5	5	5	5	5	5	5	5	5
ITALY	Pearson Correlation	.411	.868	1	.931*	.997**	.996**	.910*	.575	.903*	.962**	.984**
	Sig. (2-tailed)	.492	.057		.021	.000	.000	.032	.311	.036	.009	.002
	Sum of Squares and Cross-products	4740.836	11422.791	26760.907	15404.704	32397.988	38050.972	18579.206	5393.176	14977.620	51932.344	57424.775
	Covariance	1185.209	2855.698	6690.227	3851.176	8099.497	9512.743	4644.802	1348.294	3744.405	12983.086	14356.194
	N	5	5	5	5	5	5	5	5	5	5	5
FRANCE	Pearson Correlation	.710	.981**	.931*	1	.934*	.926*	.860	.816	.981**	.801	.866
	Sig. (2-tailed)	.179	.003	.021		.020	.024	.062	.092	.003	.103	.058
	Sum of Squares and Cross-products	5065.032	7983.374	15404.704	10226.122	18755.690	21864.712	10845.971	4733.482	10057.952	26725.220	31224.896
	Covariance	1266.258	1995.844	3851.176	2556.531	4688.923	5466.178	2711.493	1183.371	2514.488	6681.305	7806.224
	N	5	5	5	5	5	5	5	5	5	5	5
	Pearson	.431	.861	.997**	.934*	1	1.000*	.918*	.564	.919*	.961**	.988**

GERMANY	Correlation						*					
	Sig. (2-tailed)	.469	.061	.000	.020		.000	.028	.322	.027	.009	.002
	Sum of Squares and Cross-products	6038.890	13760.388	32397.988	18755.690	39460.800	46389.	22759.	6425.	18503.	63028.	69964.
	Covariance	1509.723	3440.097	8099.497	4688.923	9865.200	11597.373	5689.867	1606.473	4625.823	15757.100	17491.020
	N	5	5	5	5	5	5	5	5	5	5	5
UK	Pearson Correlation	.415	.848	.996**	.926*	1.000*	1	.919*	.545	.913*	.967**	.991**
	Sig. (2-tailed)	.487	.069	.000	.024	.000		.027	.343	.030	.007	.001
	Sum of Squares and Cross-products	6840.822	15948.042	38050.972	21864.712	46389.490	54568.102	26780.897	7295.272	21623.142	74505.620	82535.154
	Covariance	1710.206	3987.011	9512.743	5466.178	11597.373	13642.026	6695.224	1823.818	5405.786	18626.405	20633.789
	N	5	5	5	5	5	5	5	5	5	5	5
CHINA	Pearson Correlation	.459	.775	.910*	.860	.918*	.919*	1	.541	.892*	.873	.905*
	Sig. (2-tailed)	.437	.124	.032	.062	.028	.027		.347	.042	.053	.035
	Sum of Squares and Cross-products	4040.345	7786.044	18579.206	10845.971	22759.466	26780.897	15570.999	3868.475	11278.233	35956.308	40280.975
	Covariance	1010.086	1946.511	4644.802	2711.493	5689.867	6695.224	3892.750	967.119	2819.558	8989.077	10070.244
	N	5	5	5	5	5	5	5	5	5	5	5
IRAN	Pearson Correlation	.908*	.902*	.575	.816	.564	.545	.541	1	.777	.330	.430
	Sig. (2-tailed)	.033	.037	.311	.092	.322	.343	.347		.122	.588	.470
	Sum of Squares and Cross-products	3669.192	4160.446	5393.176	4733.482	6425.890	7295.272	3868.475	3287.642	4517.712	6244.820	8787.328
	Covariance	917.298	1040.112	1348.294	1183.371	1606.473	1823.818	967.119	821.911	1129.428	1561.205	2196.832
	N	5	5	5	5	5	5	5	5	5	5	5
TURKEY	Pearson Correlation	.745	.939*	.903*	.981**	.919*	.913*	.892*	.777	1	.781	.854
	Sig. (2-tailed)	.149	.018	.036	.003	.027	.030	.042	.122		.119	.066
	Sum of Squares and Cross-products	5320.262	7662.090	14977.620	10057.952	18503.290	21623.142	11278.233	4517.712	10270.982	26134.020	30856.442

	Covariance	1330.066	1915.523	3744.405	2514.488	4625.823	5405.786	2819.558	1129.428	2567.746	6533.505	7714.111
	N	5	5	5	5	5	5	5	5	5	5	5
	Pearson Correlation	.169	.699	.962**	.801	.961**	.967**	.873	.330	.781	1	.992**
	Sig. (2-tailed)	.786	.189	.009	.103	.009	.007	.053	.588	.119		.001
BELGIUM	Sum of Squares and Cross-products	3926.820	18577.544	51932.344	26725.220	63028.400	74505.620	35956.308	6244.820	26134.020	108899.200	116742.764
	Covariance	981.705	4644.386	12983.086	6681.305	15757.100	18626.405	8989.077	1561.205	6533.505	27224.800	29185.691
	N	5	5	5	5	5	5	5	5	5	5	5
	Pearson Correlation	.291	.772	.984**	.866	.988**	.991**	.905*	.430	.854	.992**	1
	Sig. (2-tailed)	.635	.126	.002	.058	.002	.001	.035	.470	.066	.001	
INDIA	Sum of Squares and Cross-products	7317.538	22160.529	57424.775	31224.896	69964.078	82535.154	40280.975	8787.328	30856.442	116742.764	127186.106
	Covariance	1829.385	5540.132	14356.194	7806.224	17491.020	20633.789	10070.244	2196.832	7714.111	29185.691	31796.526
	N	5	5	5	5	5	5	5	5	5	5	5

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

The result shows that trend of No. of the case and the number of deaths are equal to Turkey, Germany, France, Italy, UK, and. There is no association found in case history and status of the USA, Belgium, and China.

Test For Model Adequacy (artificial Neural Network)

The neural network technique is used to predict the demand for higher education and to prove the hypothesis.

Fg-1 Input, hidden and output layer

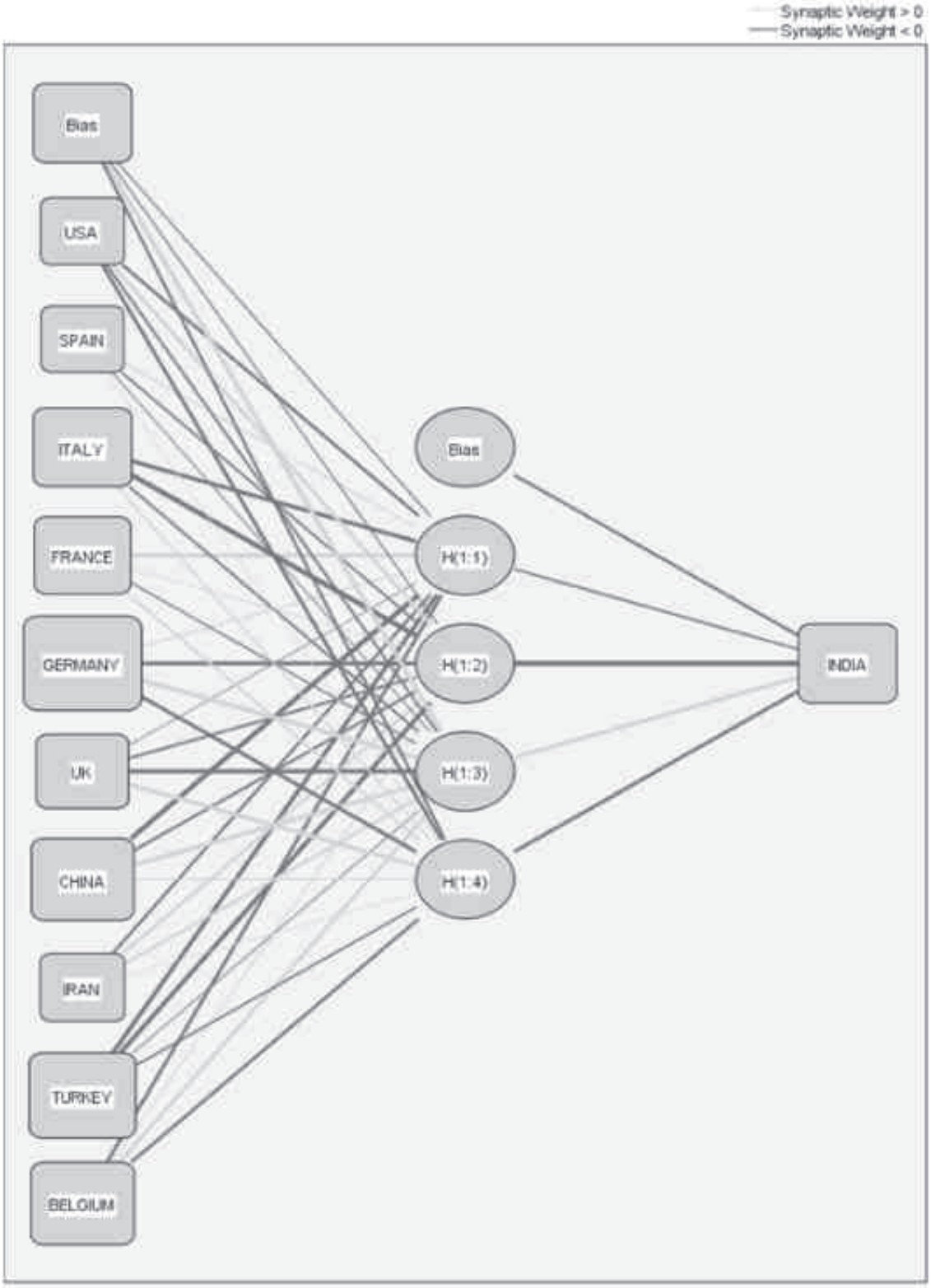


Figure 1 gives the network information. It describes the process of working. It works into three-layer: the input layer, hidden layer, and output layer. These layers describing out of the entire factor which components have more weight or more important.

Table 4 Independent Variable Importance

	Importance	Normalized Importance
USA	.026	12.1%
SPAIN	.021	9.4%
ITALY	.109	50.1%
FRANCE	.098	45.1%
GERMANY	.218	100.0%
UK	.076	34.8%
CHINA	.131	59.9%
IRAN	.031	14.1%
TURKEY	.154	70.7%
BELGIUM	.136	62.2%

Fig 2 Normalised Importance

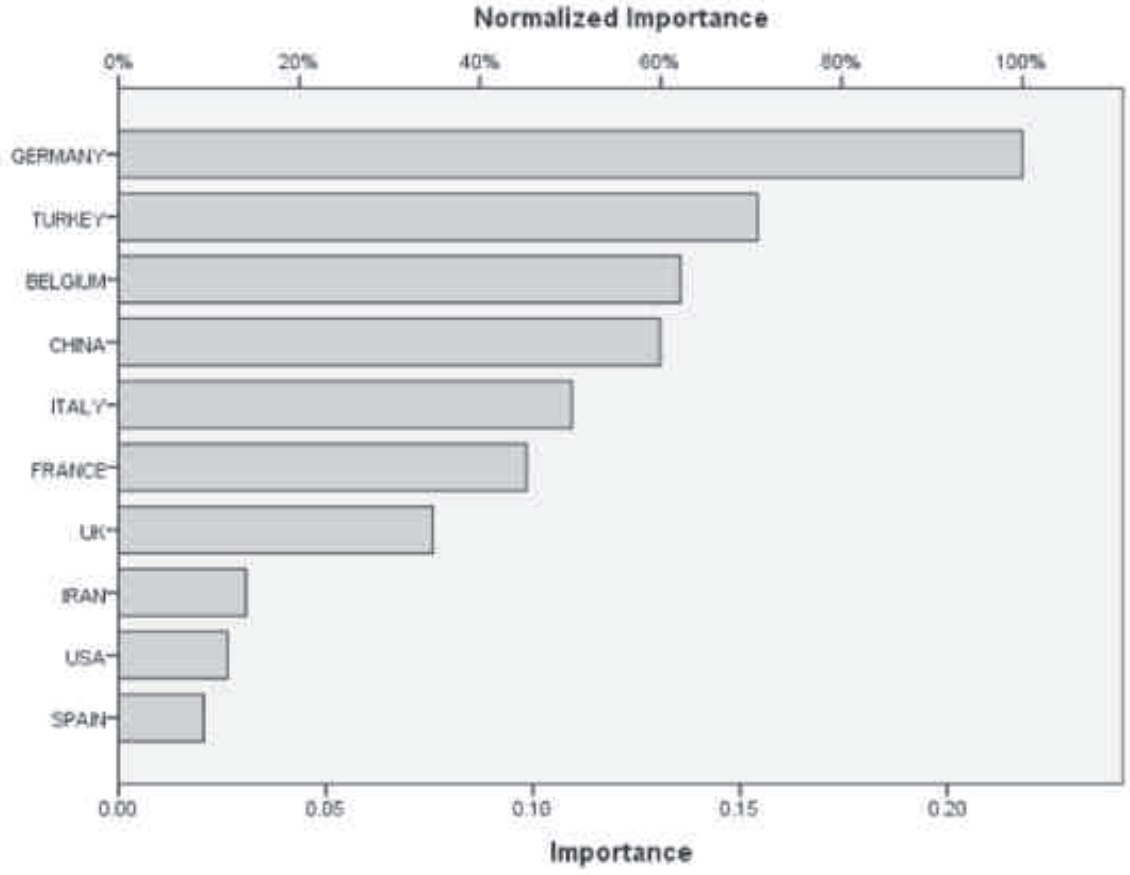


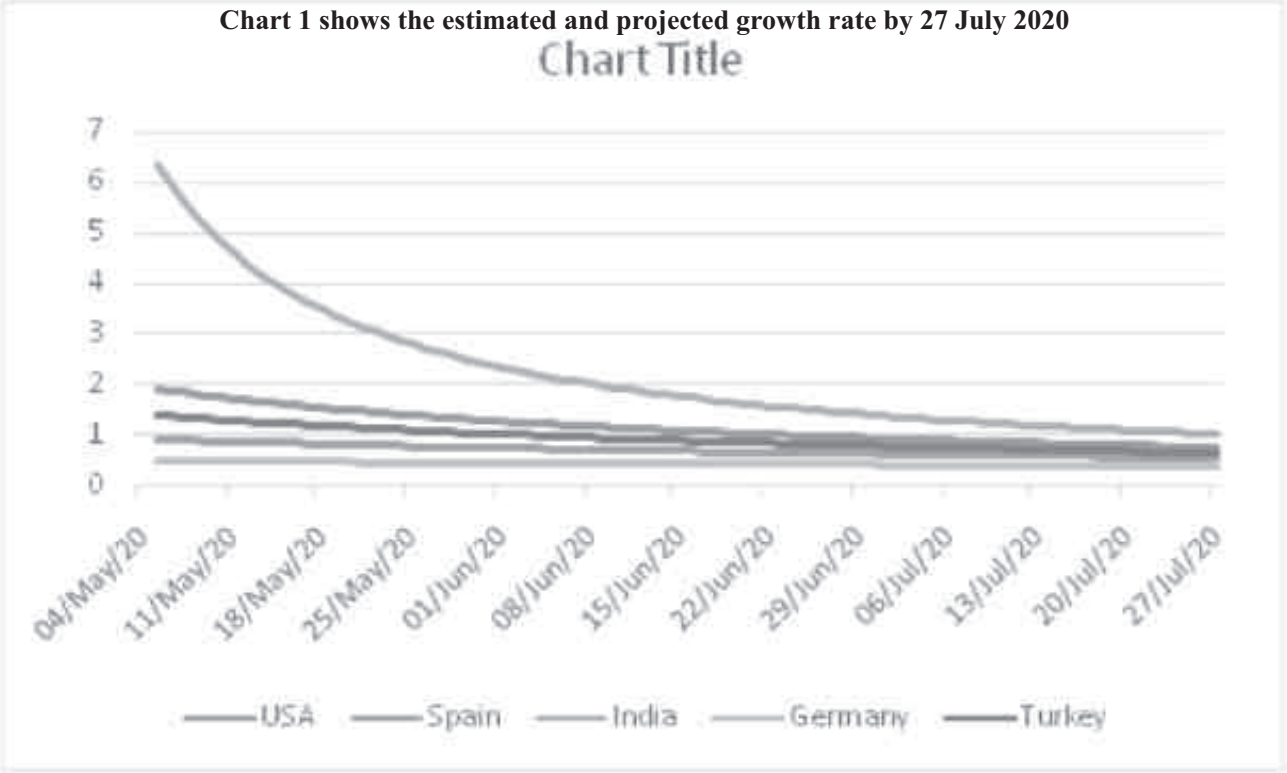
Table 4 and figure 2 shows the importance of how the network classifies the prospective applicants. So, statistical models will help in this situation. Result says that performance mainly depends on the economic factor and social factor has less affected the performance of a country.

The result of this model is almost equal to Correlation. Indian trend of the increasing status of dependent and independent variables is found equal to Germany, Belgium. Less associated countries with India are Turkey, China, Italy, France, the UK, Iran, the USA, and Spain.

Projection and Estimation of Coronavirus Cases

As the result shows that India's growth history of the case is close to Germany and Turkey and the opposite of the USA and Spain. It identifies out of selected eleven countries that are highly affected by a coronavirus in the world.

Chart 1 shows the estimated and projected growth rate by 27 July 2020



It is predicted June 15, 2020, the growth the rate will be reduced to less than 1% and it will totally be recovered by 27 July, 2020.

Recommendations

The factors are taken for study which are proved much influencing. So on the basis the result, it is recommended:

Need to more aware, protected in urban area

Take it seriously where the high-density populated area.

Follow the rules decided by the government of the concerned countries.

Conclusion

It can be concluded that all the approaches applied to prove the hypothesis and measure the result i.e. correlation and artificial the neural network used for measuring results say almost the same result that the Indian the trend of the increasing status of dependent and independent variable is found equal to Germany, Belgium. Less associated countries with India are Turkey, China, Italy, France, the UK, Iran, the USA, and Spain.

Finally, we can say that the attack of coronavirus disease is a big challenge. The study will help out to come over and to control the dragon coronavirus. It is clear the area which is highly concentrated on the infected patient of the virus can be evaluated, monitored, and controlled.

It will recommend that it is required to be more aware, more precaution in the urban areas. It should be taken very seriously where the high-density populated area. It is predicted on June 15, 2020, the growth rate will be reduced to less than 1% and it will totally be recovered by 27 July

2020.

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