IE 5617 Lean Concepts and Applications Spring 2020

Homework #7

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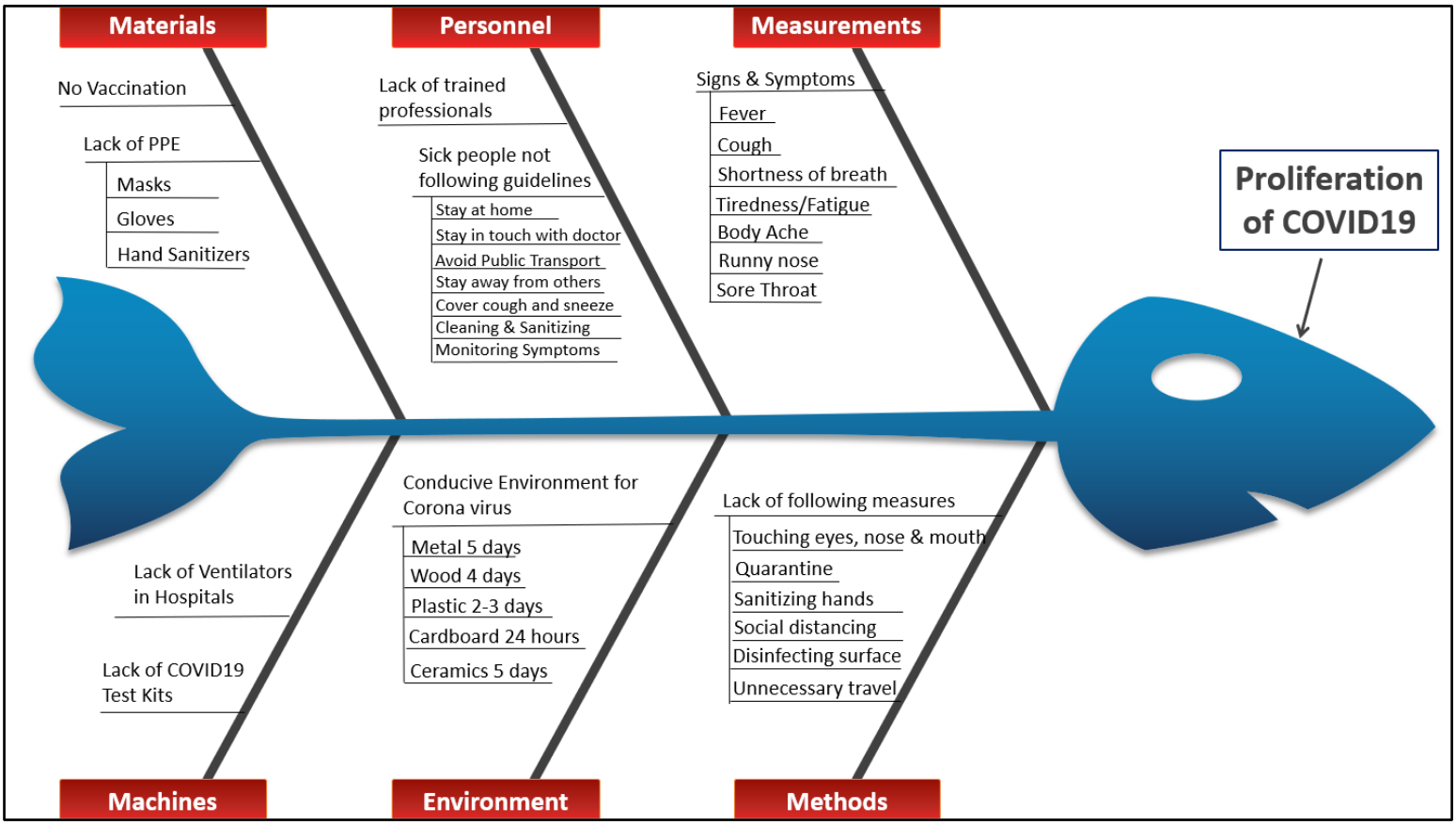
We are presenting the case of pandemic COVID19, which the whole world is witnessing and suffering from. We are going to discuss the root causes of COVID19 and will be using the data & information of the same to represent the statistical analysis of the virus outbreak.

Here, we will be providing the root cause analysis of COVID19 pandemic and zeroing down on the causes of its omnipresence across the world through Fishbone a.k.a. Ishikawa Diagram.

For the analysis, we have used the data from:

- https://www.cdc.gov/coronavirus/2019-ncov/index.html
- https://www.mayoclinic.org/diseases-conditions/coronavirus/symptoms-causes/syc-20479963



Here, we have represented the statistical analysis of COVID19 using the data of Growth Factor (Except China) from 24-Jan-20 to 24-Feb-20 through **Control Chart**.

For the analysis, we have used the data from:

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

Day	24-Jan	25-Jan	26-Jan	27-Jan	28-Jan	29-Jan	30-Jan	31-Jan	01-Feb	02-Feb	03-Feb	04-Feb	05-Feb	06-Feb	07-Feb	08-Feb
Growth Factor	2.5	0.67	1.6	0.63	1.8	1	1.61	0.97	0.5	0.93	0.31	7.75	0.87	1.11	1.73	0.46
Day	09-Feb	10-Feb	11-Feb	12-Feb	13-Feb	14-Feb	15-Feb	16-Feb	17-Feb	18-Feb	19-Feb	20-Feb	21-Feb	22-Feb	23-Feb	24-Feb
Growth Factor	1.17	2.82	0.25	2.25	1.36	0.34	4.24	0.94	1.37	0.9	1.21	0.7	1.97	1.91	1.03	1.1

Count, N: 32
Sum, Σx: 48
Mean, μ: 1.5
Variance, σ^2: 1.9

Steps

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2}.$$

$\sigma^2 = \frac{\Sigma(xi - \mu)^2}{N}$

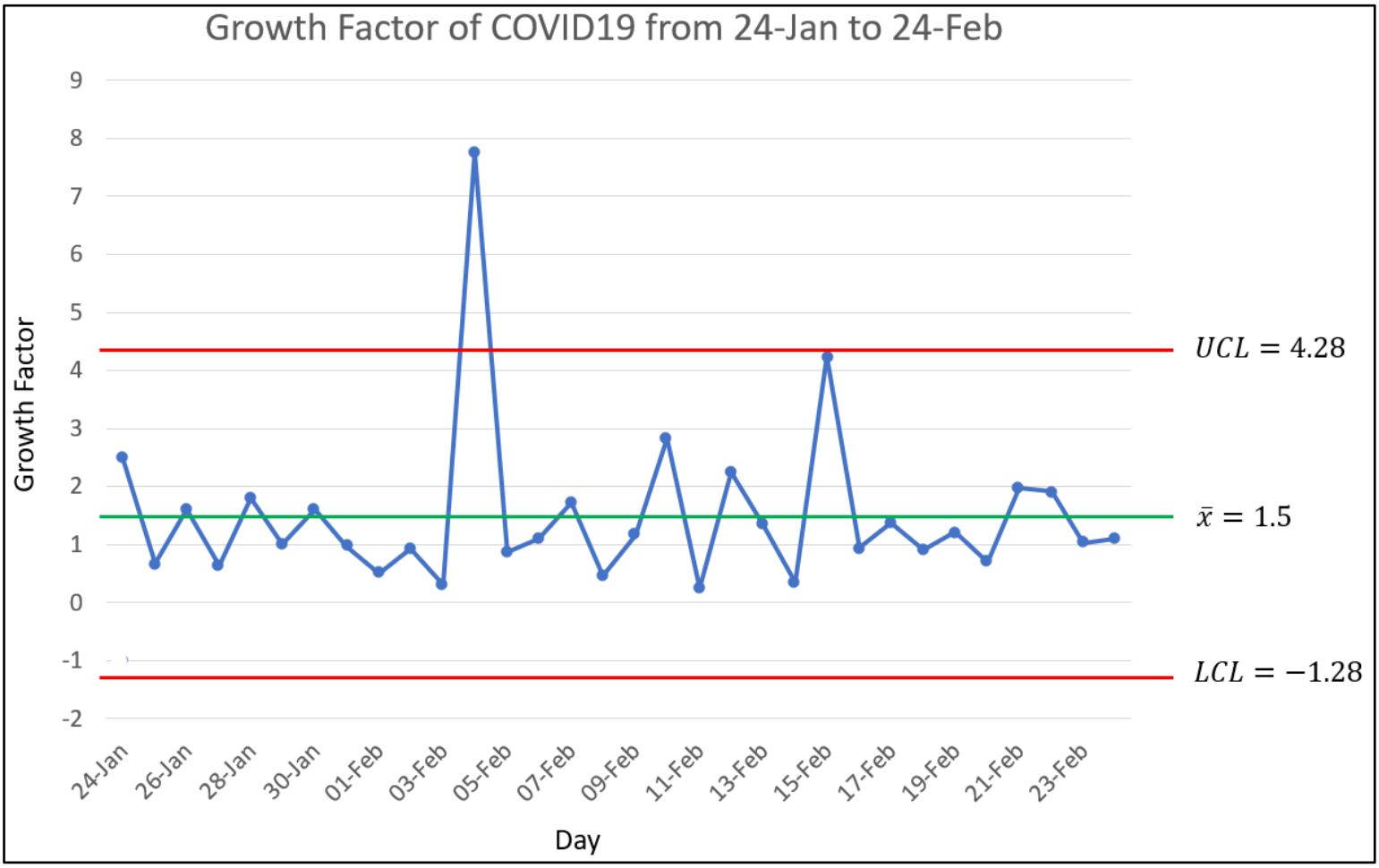
$= \frac{(2.5 - 1.5)^2 + \ldots + (1.10 - 1.5)^2}{32}$

$= \frac{61.6094}{32}$

$= 1.9$

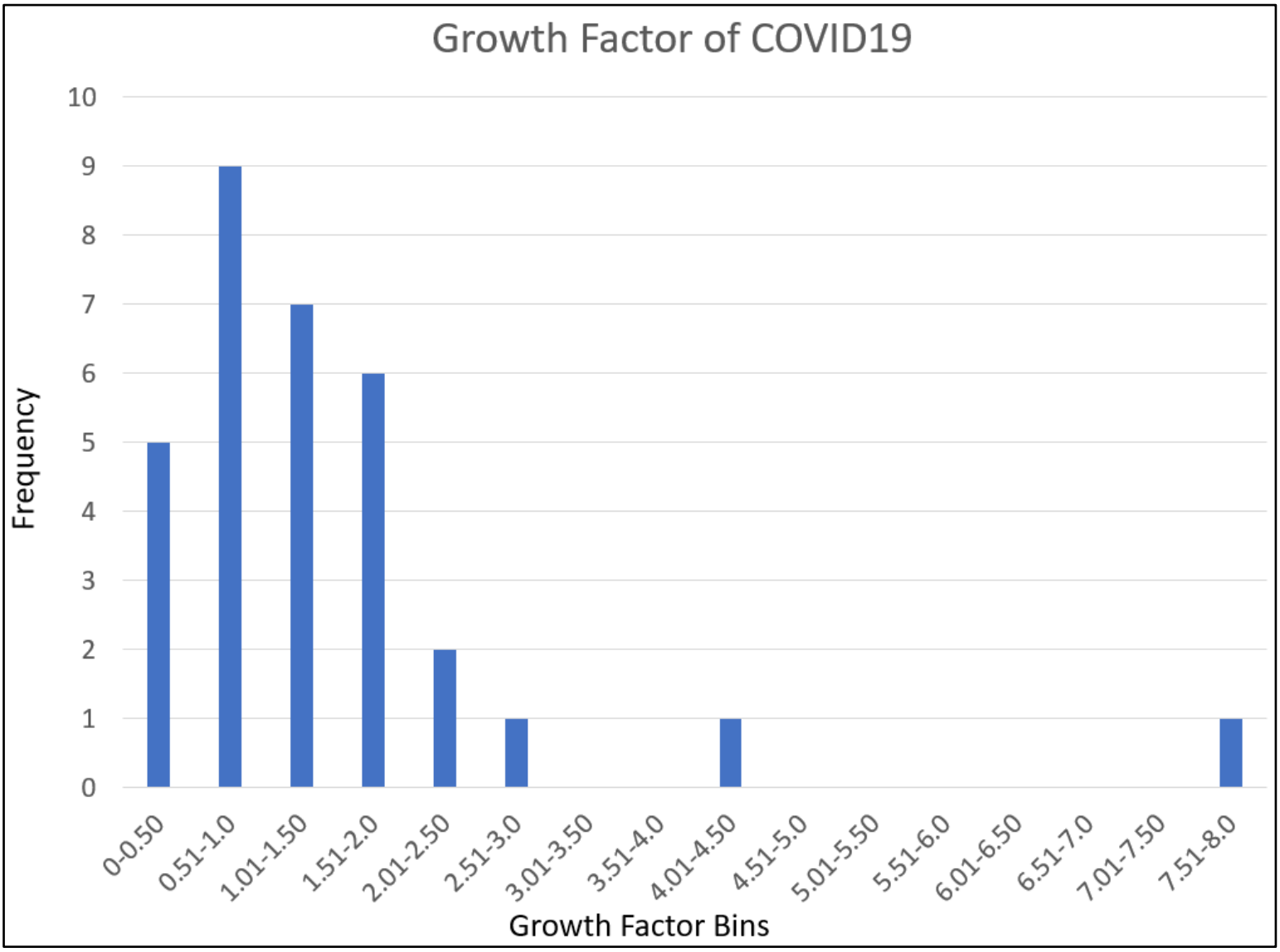
$\sigma = \sqrt{1.92529375}$

$= 1.39$



From the observations, we can infer that a random event must have taken place for the growth factor to have increased by 7.75 which represents an outlier across the board.

The outlier in itself draws our interest as it presents an opportunity to gather more information and data about that particular day so that we can narrow down on the cause of such an anomaly taking place.



From the **Histogram** above, we can conclude that the COVID19 data for the Growth Factor from 24-Jan-20 to 24-Feb-20 represents **Non-Centered Distributions** which in turn drastically increases the probability of a bad result.

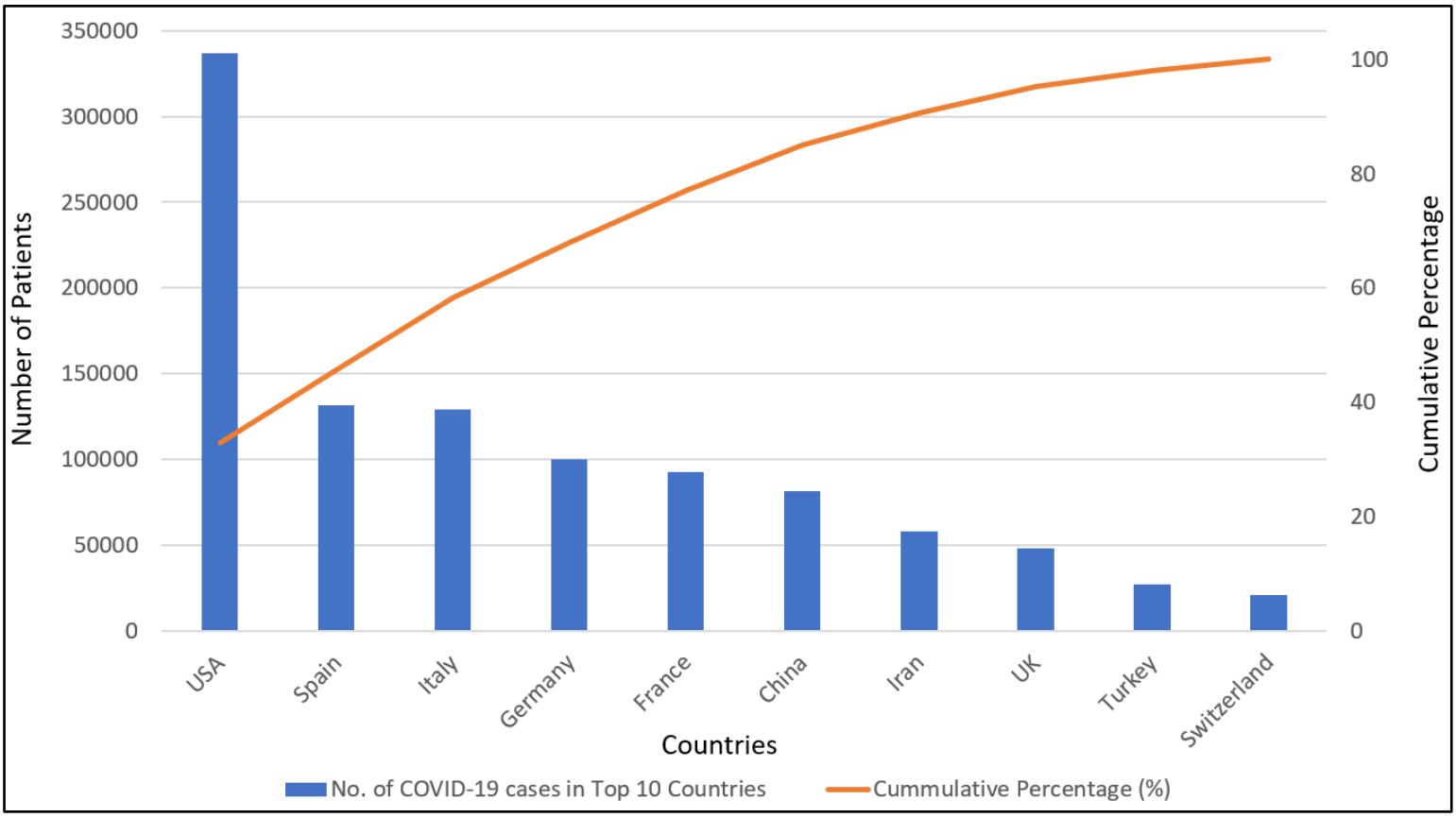
Here, we are representing the data of COVID19 in terms of no.of cases of the top 10 countries across the world through **Pareto Chart**.

We have incorporated the data from COVID19's inception till 05-Mar-20.

For the analysis, we have used the data from:

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

Countries	No. of COVID-19 cases	Cumulative Percentage (%)
USA	336830	32.81
Spain	131646	45.64
Italy	128948	58.21
Germany	100123	67.97
France	92839	77.01
China	81708	84.97
Iran	58226	90.65
UK	47806	95.31
Turkey	27069	97.94
Switzerland	21100	100
Total	**1026295**	



From the Pareto Chart, we can conclude that countries like USA, Spain, Italy, and so on needs to abide by the guidelines and take measures to fight the deadly corona virus mentioned in the root cause analysis of COVID19.