

"WHY-RUSH" DURING "VIRUS": POSSIBILITIES TO COMBAT PANDEMICS AND EPIDEMICS

Sparsh Bhimrajka
BHIS Malad
bhimrajkasparsh@gmail.com

Abstract

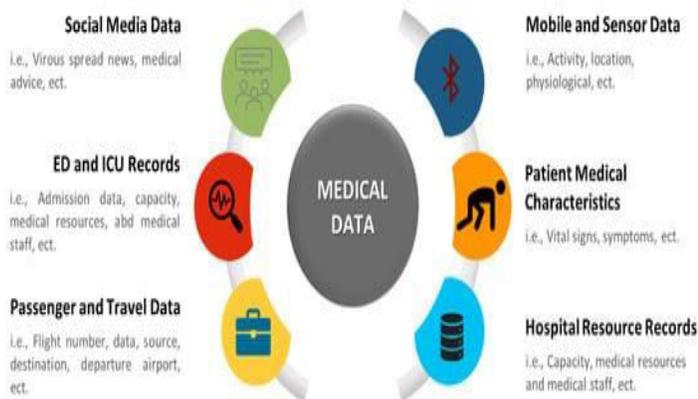
Steve Jobs once said, “The biggest innovation is the intersection of biology and technology.” He never knew that this will be proven by the COVID-19. ‘Data Science Techniques’ include a dynamic approach of data collection, analysis, and forecasting combating techniques. In this paper, I conduct a literature review, presenting a taxonomy application used to control the pandemic. The findings of this paper suggest valuable future directions used to combat COVID-19. Vaccines wastage is a major issue even after the invention of the vaccine. Storage under required temperature using data science and solar technology is the key finding of this paper.

Keywords :Solar technology; vaccine storage; data science techniques; COVID-19 (2019 novel coronavirus disease).

INTRODUCTION

❖ Introducing the topic

Data science is the field of education that merges programming skills, domain expertise, and knowledge of mathematics and statistics to mine significant understandings from certain data given. It can provide necessary information that can fix delays in existing processes. Collecting, reporting, accumulating, analyzing, and then using the data to overcome the problems of the ongoing COVID-19 Pandemic is the forte of data science. Plentiful data can be applied in the therapeutic health sector. As shown in the Figure below (Figure 1), medical data can be pigeonholed into half a dozen categories depending on their type and source. Examining this data will facilitate in foreseeing upcoming procedures, grasping the existing state of affairs, and making numerous decisions. The remedial data can be obtained from several sources, because it can be amassed using sensors of mobile/wearable appliances or medical device, virtual





An International Multidisciplinary Research e-Journal

surveys, websites or cellular apps, infirmary records, local and intercontinental health systems, consultations and case study mockups, and data on open databanks or social media.

❖ Fundamentals of the application

Since the commencement of COVID-19, there has been a plethora of data available. This data is exponentially increasing every single day. The biggest challenge besides fighting COVID-19 has been correctly using this data for estimation, predicting risks score, and decision-making to combat the COVID-19 Pandemic. Using data science, researchers have found alternatives for the COVID-19 tests and cures.

Using AI and data science, 63% of COVID-19 cases can be detected before any symptoms appear. Activity tracking and health monitoring of respiratory infections can be found out in an early stage. Usage of more data analysis techniques has helped the coders and researchers to propose many websites and apps to distinguish the symptoms, find a bed in the hospital, or to combat COVID-19 at home.

Nevertheless, the biggest challenge lies in the storage of the already invented vaccines. Using data science techniques, the wastage can be reduced. The problems underlying will be discussed further in detail- in the next section.

❖ Problems regarding the vaccines

According to the strategies dispensed by the Ministry of Health and Family Welfare (MoHFW), only in January 2021, at least 10 percent of COVID-19 vaccines acquired by the Centre faced "programmatic wastage".

As per MoHFW's guideline, WMF which is an abbreviation of Wastage Multiplication Factor = 1.11 for COVID-19 vaccine, estimating a permissible programmatic wastage of 10% [WMF = $100 / (100 - \text{wastage}) = 100 / (100 - 10) = 100 / 90 = 1.11$].

Vaccine wastage can take place while transportation, during storage, and even at vaccination bases/centers. The COVID-19 vaccines are also given in multi-dose vessels, with each vial containing at least a dozen doses of vaccine. There are even accidents such as vessels shattering into pieces or getting spoiled during its transportation. The COVID-19 vaccine also needs to be stored in a specific temperature extent. There have been numerous failures to preserve the vaccine in the required temperature during its transportation, or its storage, and even at the vaccination points which resulted in it getting wasted. Moreover, pilfering cannot be ignored. The robbery of COVID-19 vaccine ampoules from the larder of an infirmary located in Haryana's Jind district which took place very recently is an example. Adulteration of vaccine after opening it is an additional way in which vaccines are becoming useless and are being thrown away.

❖ Latest Publications

Authorized resources in the literature have examined the usage of data science in reducing vaccine wastage. In this paper, I focus on the challenges that prevail. Publications like the "Economic Times" that supported my paper, claimed fractal analytics and used data modeling to answer vaccine concerns.

The New York Times suggested recommendations and guidelines supporting AI and data analysis techniques to combat the COVID-19 Pandemic.



❖ Objectives

The rest of this paper is organized systematically to summarize the usage of data science techniques, to portray my experiments, emphasize on the result that may lead to the interpretations, and finally to conclude our future predictions in terms of using big data in the health care field.

Theory

➤ How do vaccines help?

A paper published on ORF by Krishnan and her team at CPC compares several data models adopted by the Government, in the past, to come up with parameters that should be considered for a data-driven approach to prioritising the allocation process of the vaccine. But before starting, one needs to know more about vaccines, and how they help. The vaccines have enfeebled parts of a specific living being (antigen) which activates an immune response within the organism's body itself. The latest vaccines carry the blueprint for creating antigens instead of making the antigen itself. Irrespective of whether the vaccine is fabricated of the antigen only or the blueprint so that the organism's body will create the antigen, this debilitated version will not lead to the causing of the disease in the being who is getting the vaccine, but it will accelerate their immune system to reply much as it would have on its primary response to the genuine pathogen. India's vaccine organization is maintained by the electronic Vaccine Intelligence Network (eVIN) executed in 32 states presently. Even though it has upgraded the supply chain, the state-of-the-art accessible inspection of eVIN shows particular blockages. Hence, not just data science, but also IoT can be assistance to eVIN for classifying and resolving tailbacks to guarantee an unceasing vaccine stock. Internet of Technology can even be operated to observe towage temperatures and alert ambiguities, as a growth in temperature can make the serum ineffective and direct to the vaccine's wastage. Furthermore, statistics can even be managed in logistics administration to enhanced is attribution paths and vehicles. The amount of events has oscillated significantly and is reliant on numerous issues other than the compactness. Seeing that its demand is not one-dimensional, request predicting methods can aid in ensuring the necessity for immunization shots in specific parts beforehand.

Experimental

Trying to experiment, I, Sparsh Bhimrajka, thought about combining two ideas- cold storage, and groundfridges. For starters, groundfridge is basically an underground icebox that permits you to pile and preserve food fresh deprived of the necessity for electricity. Prepared with the help of laminated polyester, the underground- refrigerator is calculated to be positioned exactly a hundred centimeters underground, where, using the ground as a cloistering shielding cover and taking the benefit of the natural cooling of groundwater, it manages to maintain, without the need for other sources of energy, an internal temperature between 10°C and 12°C (perfect for stowing food- fruits and vegetables.. Even some types of alcohol like wine, and cheese). The construction —of whose regular volume is two dozen times greater than that of your standard refrigerator— does not necessitate any specific structure license and is even obtainable in a high-tech form (with LED lights, solar panels, and air circulation pump). According to me, after some

tweaks using AI and ML, putting the fridge a little more deep- at 200 centimeters to be exact, can store vaccines.

RESULT

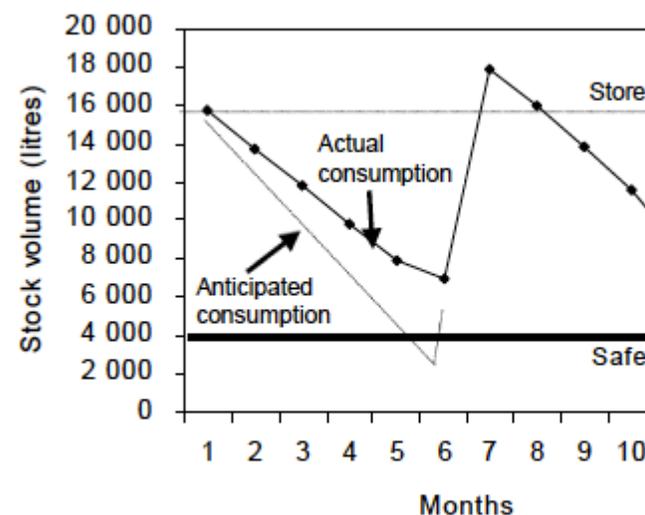
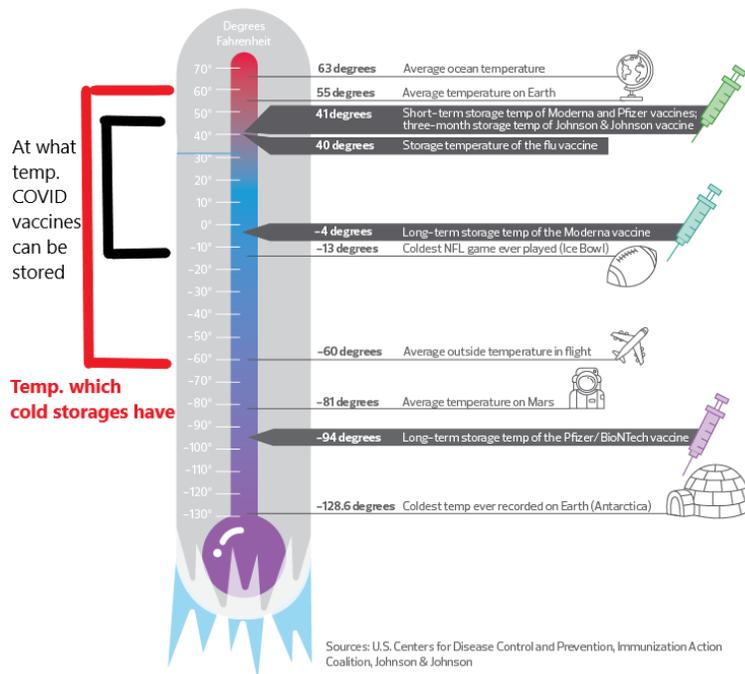
➤ Storage of Vaccines

A groundfridge cold chain is a temperature-regulated supply chain that contains all vaccine-associated apparatuses and processes. The groundfridge cold chain starts with the cold storage component at the manufacturing site, ranges to the transport and conveyance of the serum and precise storage at the distributor provision, and finishes with the administration of the vaccine to the unhealthy being. Just in case the groundfridge cold chain is not appropriately sustained, the vaccine effectiveness will be lost, leading to a useless vaccine distribution. These vaccines shall be bestowed from the hour in which they are made and manufactured to the time they are processed. The vaccine effectiveness is subtracted every single time when a vaccine is exposed to an indecorous place. These unsuitable conditions include overexposure to sunlight or anything that produces heat, freeze, or light at any step in the cold chain. Once the vaccine potency is lost, it just cannot be restored, no matter what is done. Exposure to any unfitting conditions can highly demolish the potency of any refrigerated injection, but even a solitary exposure to cold temperatures (like: 0° C [32° F] or colder) can actually abolish its influence. Some liquid vaccines having a subservient can eternally become ineffective when exposed to freezing temperatures.

DISCUSSION

Some self-explanatory statistical tools have been attached below.

How cold is cold? Putting storage temperatures of COVID-19 vaccines into perspective



This graph tells about how the consumption of vaccines will



increase if ground fridge cold storage is used.

CONCLUSION

The capacity of data upsurges intensely over a period of time, especially data produced on the worldwide contagion triggered by the novel Corona Virus disease 2019. Such bulk of statistic necessitates applying vast data analytics apparatuses along with Artificial Intelligence methods to create sense of the plague and its spread can be controlled in an appropriate method. In this paper presentation, I exhibited an evaluation of numerous data examination claims for the COVID-19, offering a taxonomy construction that categorized the possible claims of the novel COVID-19.

Acknowledgements

I would like to dedicate my study to the pandemic/epidemic survivors, to the patients that have been affected, and also to the homo-sapiens who unfortunately lost their lives to the COVID-19 pandemic. I would even like to devote it to all the frontline workers who have bravely brawled to save individuals and sacrificed great portions of their daily lives for others. I also acknowledge MISA Members of International Schools' Association, as well as Indian Scholar- an International Multidisciplinary Research e-Journal, for providing the topic annexure, and steps. Finally, I would like to thank Billabong High International School, and its teachers, without whom I would not be participating in this wonderful platform.

REFERENCES

- <https://ischoolonline.berkeley.edu/data-science/what-is-data-science/>
- <https://www.groundfridge.com/groundfridge/product/>
- https://apic.org/monthly_alerts/outbreaks-epidemics-and-pandemics-what-you-need-to-know/
- <https://www.sciencedirect.com/science/article/abs/pii/S0925753520300539?via%3Dihub>

-To be left bank-