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Technological Trends in Tracing Corona Virus

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ABSTRACT :*The novel corona virus is not only a new disease which has taken many lives but left a permanent scar on socio-economic reforms. The disease has started showing its prominence in the year 2019 and has not come to an end although reached the end of the year 2021. Hence forth the year 2020 can be called as the dark year with first wave of corona virus outbreak. World Health Organization declared this disease as pandemic. Many old people have lost hopes in life while many young people are jobless. Huge research is going on worldwide to find vaccine for covid-19. Its true fact that no one can predict the path of corona virus spread outbreak. Year 2021 remained as culprit with second wave of corona virus attack, more dangerous than 2020. During second wave targets were senior citizens, who lost lives with shortage of oxygen cylinders and ventilators. Experts are warning with third wave of attack, mainly targeting the kids. But a small ray of hope is existing in science and technology. This article mainly focuses on available latest technology and tools like Artificial Intelligence, machine learning and data science in handling the covid-19 pandemic.*

KEYWORDS –*Artificial Intelligence, Corona Virus, Covid-19, Machine Learning, Statistics*

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I. INTRODUCTION

Corona virus belongs to group of virus that cause fatal conditions like cold, pneumonia, kidney failure etc. Its main target is breaking the respiratory system. Virus can last long for 24 hours but gets killed easily with household detergents. Bacteria existed long back than virus. However virus causes more damage to living cells than bacteria. So it's important to know the differences between virus and bacteria. Figure1 shows the pictorial difference between the two.

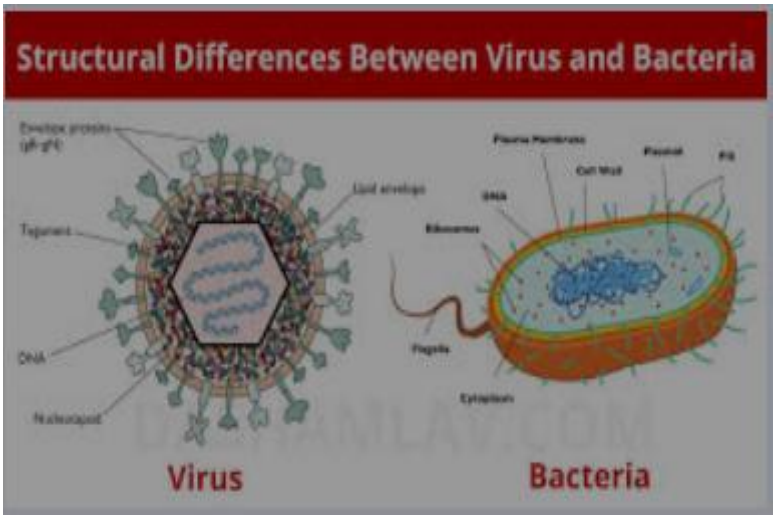

Fig1: Structural difference between virus and bacteria.

- What is corona virus?

COVID is a new illness that is caused by a large family of virus known as corona virus. Since it was detected in the year 2019, it was named as COVID-19. Let's begin with the understanding the commonality and difference between bacteria and virus. The common thing in both is that they are harmful in living organisms because they cause disease. Also contain DNA and enzymes but does not contain nuclei. The differences among them are summarized in table1.

Table1: Differences between bacteria and virus

BACTERIA	VIRUS
Contains Cell type structure	Contains helical type to complex structure
Can survive on their own	Take the help of host cells to survive
Sometimes Contagious	Highly contagious
Antibiotics works well	Antibiotics does not work
Does not spread throughout the body	Spreads throughout the body
Larger in size(1000 nm)	Smaller in size(20-200 nm)

- Types of corona virus?

Corona virus are of two types known as MERS and SARS. MERS is called Middle East Respiratory Syndrome as it was detected in twelve middle-east countries. SARS is called Severe Acute Respiratory Syndrome and it was detected in china and other four countries. Both lead to severe respiratory ailments. MERS is caused by unpasteurized animal food products while SARS occurs because of saliva droplets.

Corona virus has a deep impact on global economy and health [1]. The spread of SARS is modelled [2] featuring the interventions and lockdown. The transmission modes and preventions [3] were explained clearly. Author [4] explains pandemic disease with epidemiological studies including the study of prediction of covid-19 outbreaks. Research is going on worldwide to detect corona virus and its impact on human body. Trials are still going on to find correct vaccine that can boost immunity. However the science and research with latest technological trends like Artificial Intelligence, Machine Learning and Data Science is aiding the government and the society across many countries. These tools not only help in predicting and detecting corona virus but also in terms of treatment and drug development in the coming years. Next session discusses about these tools in detail.

II. MATERIALS

In recent days scientific research is on full fledge on the following aspects:

- Treatment and clinical trials with new methods
- Virus prediction and prevention
- Testing and screening effective drugs

New technological domains like AI, ML, DL, Big data and data science are playing major role and helping the government in detection and control of corona virus. These domains are inter related to each other and shown in figure2.This analysis mainly highlights the significant role of each domain that can help mankind to fight against covid-19 pandemic. Amongst these Artificial Intelligence, machine learning and deep learning fall in the same cadre. However big data and data science are equally important domains. The brief introduction about each domain is as listed below:

- Artificial Intelligence

Its well-known fact that human beings are intelligent, because the ability to analyze and solve problems. AI aims to create intelligent machines that are capable of learning and take appropriate decisions. Best example for it is a ROBOT. AI is much more beyond the scope of computer science. To study AI one should have intellectual skills like reasoning, problem solving and understanding the language. Also should have fair knowledge of mathematics and statistics, biology and neurons.

- Machine Learning

Machine learning is a part of Artificial Intelligence. It allows computer systems to learn without human intervention. Machine learning refers to set of tools for understanding the data and can be done without explicit programming. To learn Machine learning one should have fair knowledge of Basic calculus and linear algebra. In Machine learning there are four kinds of algorithms namely: supervised algorithms, unsupervised algorithms, semi supervised algorithms and reinforcement algorithms. Supervised algorithms refers to learning from past data, hence called as labelled data. Unsupervised algorithms refers to learning from existing data, hence called as un-labelled data. Semisupervised algorithms falls between labelled and unlabeled data. Reinforcement algorithms refers to learning through trial and error search and choosing the best action.

- Deep Learning

Deep learning is a subset of machine learning and it works like human brain in processing the data and creating patterns during decision making. To study deep learning one should have fair knowledge of neural networks. How our brain senses the data through the eyes, the same mechanism is adapted in deep learning where the algorithm captures CCTV footage and decides on what kind of data it is. Therefore deep learning also referred to as artificial neural network.

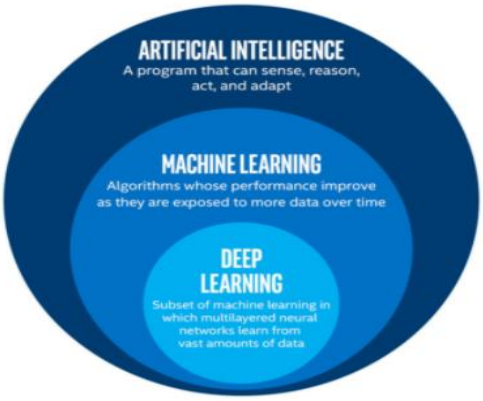

Fig2: Relationships between AI, ML and DL

- Bigdata

As the name itself indicates big data refers to huge collection of high volumes of data that are structured, unstructured, semi structured. All these data cannot be handled by data base management system alone. All of these huge collection of data obtained through various sources like mobile, WhatsApp chat, google chat, twitter etc. will be utilized to serve small size, medium size and large companies by streamlining these data. Big data helps in providing service to small to medium size companies through cloud services. For large companies it requires in-housebig data community software. To study big data one should have fair knowledge of Linux operating system and programming skills. Also well-known tools in this domain are Hadoop, spark, hive etc.

- Data Science

Data science helps in handling unstructured raw data generated via google chat, google meet, WhatsApp, twitter, mobile communication etc. Figure3 shows interconnection of data science with business, programming and statistics. An approximate of 2.9 billion byte of internet data is generated per day. All these data has to be segregated for useful purposes. Data science is a combination of programming, statistics and mathematics.

Data science helps in aligning the data via data manipulation techniques to extract the unstructured raw data. This generally involves designing and running experiments through hypothesis tests. And hypotheses tests are done via publicly available data. The person who understands the data and programs it accordingly is called as data scientist. Almost every company hires a data scientist. At present, data science is essential in almost all fields including banking or financial services, health care, insurance, telecommunication or e-commerce. Essentially data science has a huge scope in the coming years.

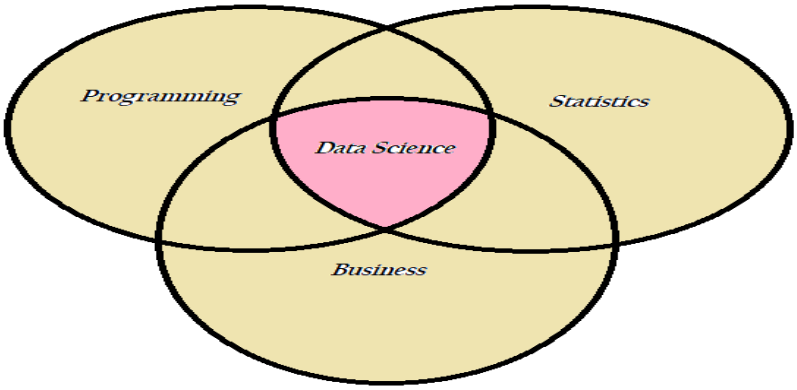

Fig3: Inter-relation of data science with business, statistics and programming.

III. METHODS

The AI technology played a major role in controlling pandemic, either in the form of arogya setu app or using drones for sanitization. Applications related to the above domain areas are of greater importance on our life especially in this pandemic situation to fight against corona virus. These applications help in capturing the data in ingenious way and arrive at useful information in predicting corona virus outbreak. Some of its applications are as listed below:

1. Artificial Intelligence algorithms in combination with other technologies such as block chain help in consolidating the medical information that's helps government for exchange of information.

2. Natural language processing, one of the AI algorithm helps in maintenance of health care reports in different languages all around the world.

3. Machine learning, a branch of AI helps in mobility analysis, by keeping track of public movement. This is an important step in tracing the spread of corona virus. The actual data is gathered via mobile phones, GPS and Wi-Fi networks. This technology is already been implemented in Italy.

4. Deep learning, a sub branch of machine learning helps in surveillance i.e. closely watching people's movements via camera, smartphone or travel data. This is also an important step in detecting corona virus. Surveillance systems can be used in schools, universities, laboratories, gyms, prisons and government buildings.

5. Data science in combination with big data help in analyzing the happening of an event (corona attack) via probability. This combination of technology also has power of prediction, meaning to keep track of how many people are yield to illness.

IV. RESULTS

Statistical analysis of covid-19 data is collected from all states of India as on May 10th 2021. The data is collected from website pertaining to the active cases, recovered cases and death rates. The data collected is purely based on the technological domains as explained above. Based on the statistics as shown in table 2, one can see clear picture of active cases, recovered cases and death rate. The graphical view of active cases is shown in figure 4. The graph shows that the active cases from Maharashtra to Chandigarh is above 60,000. From Tripura to Andaman and Nicobar islands is below 50,000 and the graph is declining slowly. The clear picture of recovered cases can be seen in figure 5. From Maharashtra to Chandigarh the recovered cases are nearing to 60,000. While Tripura to Ladakh is between 50,000 to 20,000. The graph declines from Sikkim to Andaman and Nicobar Islands to almost around 6,000.

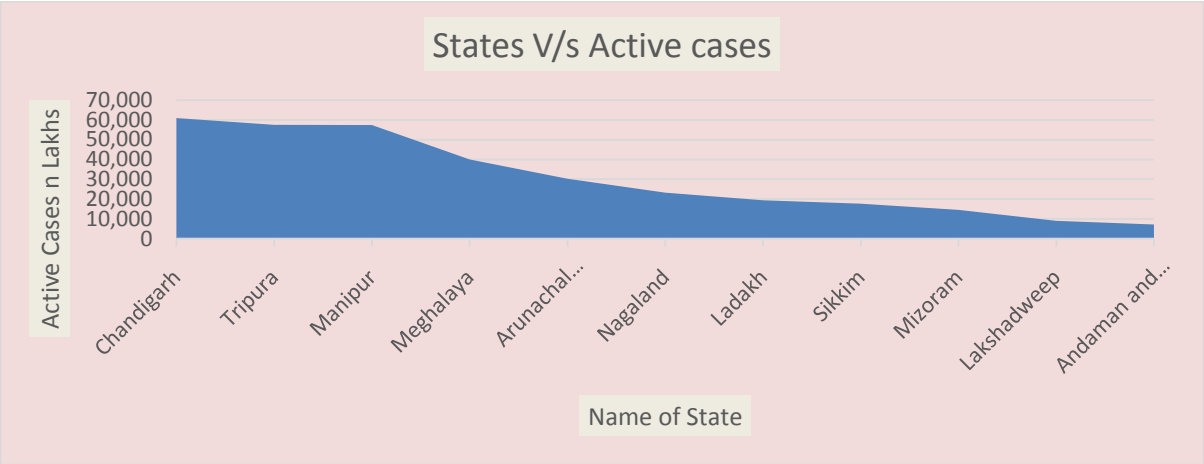

Fig 4: States with active cases of covid-19

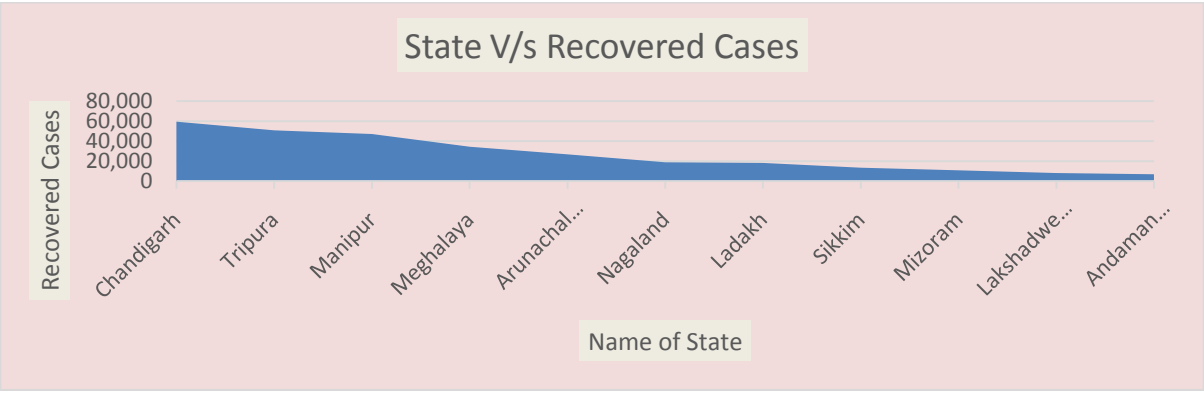

Fig 5: States with recovered cases of covid-19

Table 2: Statistical data of covid-19 in INDIA during May2021

States	Active cases	Recovered cases	Death rate
Maharashtra	58.6L	56L	1.02L
Karnataka	27.3L	24.8L	32,291
Kerala	26.7L	25.2L	10,437
Tamil Nadu	22.9L	20.6L	28,170
Andhra Pradesh	17.8L	16.6L	11,696
Uttar Pradesh	17L	16.7L	21,516
West Bengal	14.4L	14.1L	16,555
Delhi	14.3L	14L	24,704
Chhattisgarh	9.84L	9.53L	13,271
Rajasthan	9.48L	9.27L	8,749
Odisha	8.31L	7.65L	3,123
Gujarat	8.18L	7.95L	9,965
Madhya Pradesh	7.87L	7.71L	8,441
Haryana	7.64L	7.48L	8,829
Bihar	7.15L	7.01L	5,458
Telangana	5.97L	5.69L	3,426
Punjab	5.83L	5.51L	15,293
Assam	4.46L	3.93L	3,793
Jharkhand	3.42L	3.33L	5,076
Uttarakhand	3.35L	3.19L	6,849
Jammu and Kashmir	3.04L	2.8L	4,118
Himachal Pradesh	1.97L	1.87L	3,343
Goa	1.61L	1.52L	2,877
Puducherry	1.11L	1.02L	1,648
Chandigarh	60,862	59,432	781
Tripura	57,452	50,803	591
Manipur	57,351	47,129	915
Meghalaya	39,983	34,440	694
Arunachal Pradesh	30,247	26,848	128
Nagaland	23,237	18,909	435
Ladakh	19,385	18,265	195
Sikkim	17,656	13,511	276
Mizoram	14,534	10,891	58
Lakshadweep	9,002	8,173	42
Andaman and Nicobar Islands	7,168	6,952	125

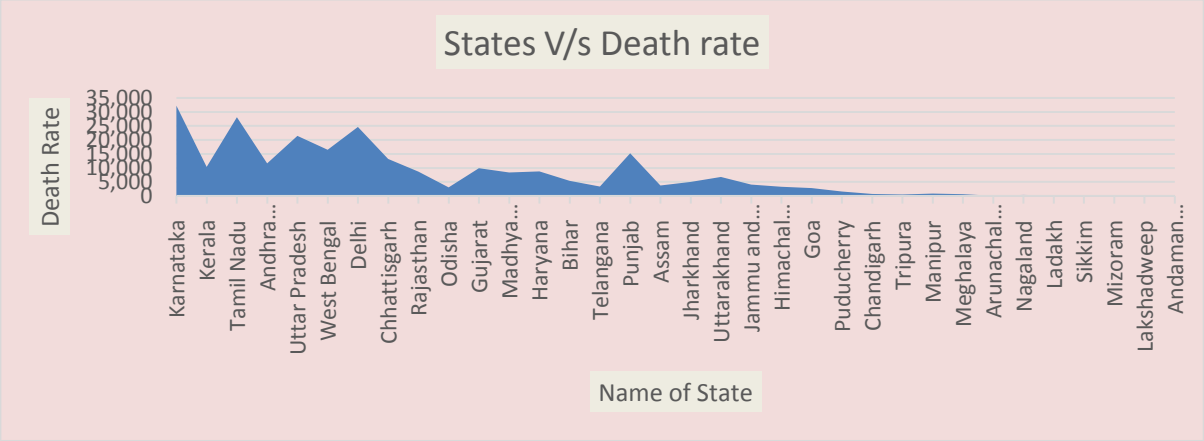

Figure 6: States with death rate of covid-19

The death rates can be noticed in figure 6. The comparison is made between states and death rate. Highest death rates in Maharashtra is highest with 1.2L. Karnataka is around 30,000. Tamilnadu, Uttar Pradesh, Delhi is around 20,000. West Bengal and Punjab is around 16,000. From Assam to Andaman Nicobar islands the death rate is below 5,000. Overall observation from the graph is that the death rates are declining to 50.

V. CONCLUSION

India is still on the battle of covid-19. But the present situation notifies the downfall of its spread tentatively through statistics and graphs. Nobody can predict the changes in environment conditions next wave attack. Corona virus has left enormous impact on unemployment, crimes and economy. AYUSH has given guidelines on some precautionary measures to control the spread of virus. But still everybody's eyes are on the vaccine. Different countries have come up with their vaccine. Although, India has become the prime hub of manufacturing vaccinations, but still there is a shortfall. Currently available vaccines in India are covaxin, covishield and sputnik. Yet all the people have not benefitted due to shortage of stock. The impact of second wave has emerged with new more diseases called black fungus, white fungus and yellow fungus. The fact is that none of the medicines can completely cure the disease. The only way left over is to follow basic guidelines like washing hands frequently, maintain social distancing and wearing masks. It is crucial to maintain right balance in emerging technologies to fight against corona virus pandemic in context with public health. Hence the future depends on harnessing these technical trends in an effective way for the benefit of mankind.

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