AN APPROACH FOR CORONA SPREADS FORECAST AND HERD IMMUNITY PREDICTION WITH THE HELP OF MACHINE LEARNING

A Thesis

Submitted

In Partial Fulfillment of the Requirements

For The Degree of

Master of Technology Advanced Computing and Data Science

Submitted by

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August, 2021

CERTIFICATE

This is to certify that **Ms. Amina Bano** (Enroll. No. 1300100563) ha**s** carried out the research work presented in the dissertation titled **"An Approach for corona spreads forecast and herd Immunity prediction with the help of Machine Learning"** submitted for partial fulfillment for the award of the **Master of Technology Advanced Computing and Data Science** from **Integral University, Lucknow** under my supervision.

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LIST OF ABBREVIATIONS AND SYMBOLS

AI	Artificial Intelligence
UAV	Unmanned Aerial Vehicle
IS-IS	Intermediate system to intermediate system
GA	Genetic Algorithm
GPS	Global positioning system
DP	Dynamic Programming
PPCR	Planning of Coverage region algorithm
PSO	Particle Swarm Optimization
IPSO	Immune Particle Swarm Optimization
GUI	Graphical User Interface
TSP	Travelling salesman problem
ACO	The Ant colony Optimization
MATLAB	Matrix laboratory
TCS	Time - constrained Heuristics search
DoS	Denial of Service
DDoS	Distributed Denial of Service
CPU	Central Processing Unit
ICMP	Internet Control Message Protocol
IaaS	Infrastructure-as-a-Service
PaaS	Platform-as-a-Service
SaaS	Software-as-a-Service

ABSTRACT

Corona-virus is the disease caused by the current Covid-19, which first appeared in China in December 2019. Coronaviruses are a big family of different viruses. Some of these cause people to catch a cold. Others infect animals, including bats, camels, and cattle However, this SARS-Cov2 induced difficult for the infection to transmit via human to human. The corona virus has become a worldwide epidemic in recent years. And, at the moment, every government is debating how to address this issue, yet the sickness is evolving on a daily basis. However, no country has been able to eradicate this disease considering the lack of a precise treatment or vaccine on the market. That is why all scientists are working on developing a model that will assist us all to predict the corona's expansion velocity. Today, computer science has progressed to the point where we can anticipate what will happen given a large dataset. All of this is possible because to machine learning. Using the available data, we can forecast what the corona's speed will be in the future.

As a consequence, for those that are resistant aren't the first ones whom is protected. Covid-19, which was first observed in Wuhan, China in 2019, has now been declared a pandemic globally. We can delay the spread of this (COVID-19) disease by using Herd Immunity. Herd immunity occurs when a large portion of a population (the herd) develops immunity to a disease, making it more So, in an effort to develop a training dataset capable of predicting whether or not someone has herd immunity and forecasting regular positive cases of C-19 dependent upon certain medical attributes such Python-based Machine learning and data analytics resources were used.

We can forecast the death rate, the number of corona active patients, and the recovery rate so that we may plan appropriately. And can prevent loss, allowing many people to save their lives and property.

CHAPTER - 1

INTRODUCTION

1.1 WHY CORONA SPREAD PREDICTION ANALYSIS:

When an infected person blows out virus-containing droplets and very minute particles, COVID-19 spreads. Other people may inhale these droplets and particles, or they may settle on their eyes, noses, or mouths. They may contaminate surfaces they come into contact with in some cases. People who are within 6 feet of an infected person are most likely to contract the disease.

COVID-19 is transmitted in three ways:

- When near an infected individual who's really breathing minute droplets and particles containing the virus, inhaling air.
- Having virus-carrying droplets and particles land in the eyes, nose, or mouth, particularly through splashes and sprays such as a cough or sneeze.
- Touching their eyes, nose, or mouth with virus-infected hands

The coronavirus (Covid-19) transition elements in China in 2019, then again in December 2019, implying that it spread widely, and many people were tainted by the virus. As of now, coronavirus has infected more than 150 countries (such as the United States, Brazil, India, and others), and the number of cases is steadily increasing throughout them, with an estimated 15.3 million cases worldwide.

Several countries have used expectation research to prevent the spread of the coronavirus, while many others are continually forecasting the current state of the virus. Due to its high widespread nature, everyone's health and well-being is now in grave jeopardy.

COVID-19 expectation examination is critical at the network layer because of that same issue. Currently, a number of professional societies are investigating the Covid-19's preventative measures using a scientific insights model, with a number of significant findings.

These models are based on the current situation of cases in a certain zone, as well as the situation one day later. The anticipated examination of a week or longer can be estimated, as indicated by elevating the cases. These models assist us in breaking down the situation of growing cases. Take India for example: Maharashtra has 3.3 lakh instances, Tamil Nadu has 1.8 lakh cases, and India's capital, Delhi, has 1.2 lakh. Many people from all over India have been infected with the coronavirus, and the total number of cases in India seems predicted to hit 12 lakh by July 22, 2020.

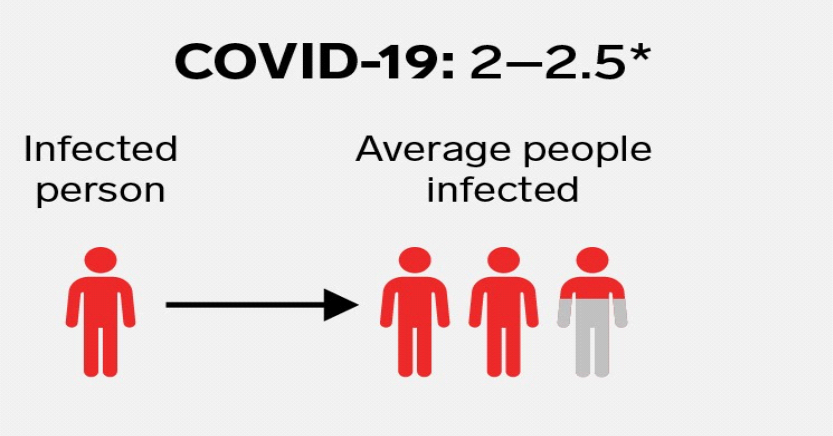


Figure 1.1: Coronavirus Spreading

1.2 CORONAVIRUS SPREADING PREDICTION ANALYSIS

The research is predicting coronavirus spread based on the following factors: - The population thickness of the region or states, which is a population estimate for each unit region.

Normal people are contaminated to a range of 1 to 2-2.5.

- Hospital Facility (on-site ventilator, PPE packs, number of beds, number of specialists and medical attendants, and other factors, as well as environmental circumstances).
- Testing: - The group is outfitted with protective gear in order to obtain Covid-19 instances. Positive cases are identified through testing. According to data available on covid19 India, India's test energy rate stayed at 24.3 percent for July 22. This is a typically high TPR, indicating that India's trying guideline has been effective by international standards thus far. There is, however, a significant distinction between states. On the one hand, there are states with low TPRs, like as Himanchal Pradesh (1.1%) and Goa (2.4%).

  On the one hand, there are states with low TPRs, such as Himanchal Pradesh (1.1%) and Goa (2.4%). However, a number of states have high TPRs, including Maharashtra (22.3%), Tamil Nadu (15.4%), and Delhi (12.3 percent). Fever, hacking coughs, restlessness and tiredness, throbbing painful throat, loose stools, conjunctivitis, severe frontal head aches, loss of ability to smell or taste, breathlessness or windedness, and a

variety of other symptoms, some of which have yet to be discovered, are all signs of coronavirus.

Simultaneously, a number of countries outside of India have reported 4.1 million (USA) total cases, with 1.9 million recovered and 1.4 lakh passings. 2.2 million (Brazil), with 1.5 million dollars recovered and 0.82 lakh people passed. According to the World Health Organization, many countries are veering off course in their fight against the crown infection. The director-general of the World Health Organization (WHO) has stated that various messages from pioneers are eroding open confidence.

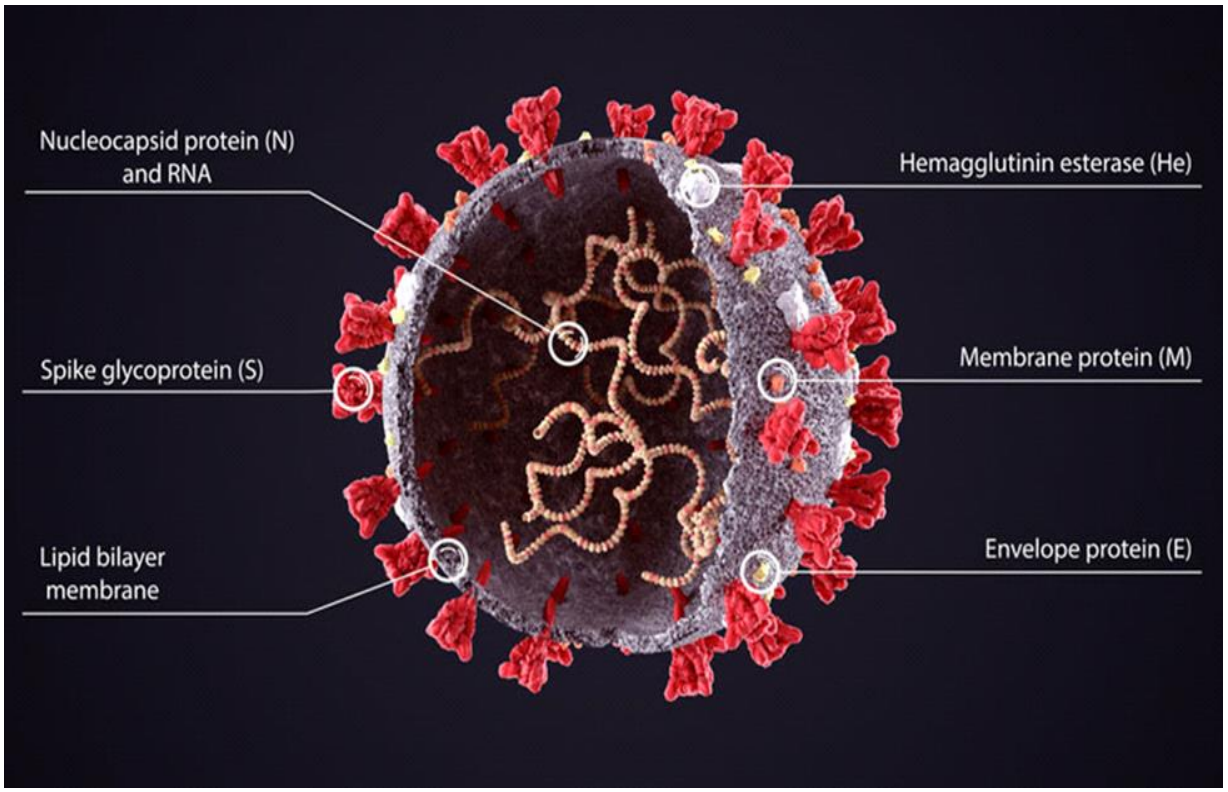


Figure 1.2: Coronavirus

1.3 - REQUIREMNETS OF CORONA VIRUS SPREAD PREDICTION ANALYSIS:

Corona virus is a very well statistic since, at 900 percent the size of an average hair, it is a tiny yet potent virus. Also as consequence, it is a very dangerous and rapidly spreading virus all over the world. The number of people who have died as a result of the corona virus has risen to 69,160.

Corona virus infection has now infected 1,276,571 persons in 200 nations around the world. Corona continues to wreak havoc in China, and countries such as the United States, Iran, Italy, and Spain are increasingly grappling with the corona virus's expanding menace.

If we have a system in place which permits us to predict the development of the corona in the future days. Our medical facilities will be good in this manner. And, over time, we will be able to raise awareness so that individuals do not become carriers of the disease. If we can predict how much damage will occur ahead of time, we may take all necessary precautions to protect it.

1.3 TECHNOLOGIES USED IN THE RESEARCH

The sole reason being the analysis of this wide spreading disease, it is important to use a system which is entirely based on mathematical model. That is why we have used machine learning technology in our analysis framework.

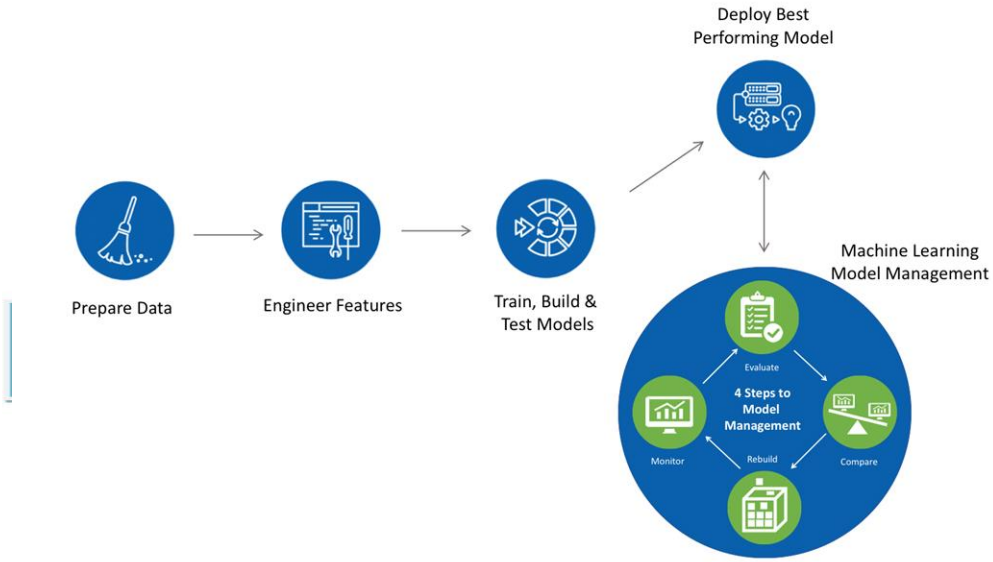


Figure 1.4 Technologies Used

1.4.1 Machine Learning

Today, we live in a technological era in which new inventions make human job easier and more efficient. One of these topics is Machine Learning, which you may be familiar with.

A machine's ability to do tasks based on its knowledge, comprehension, and experience. Machine learning is being used to direct a large number of applications online. These machines are able to recognize our habits, likes, and dislikes in the same way that humans do.

First and foremost, it is critical to understand that machine learning is a type of artificial intelligence. The duties of these two, however, are vastly different.

When it comes to machine learning, we contribute knowledge about objects to a machine or computer system based on our previous experiences. So that the machine's performance and thinking abilities can be improved.

Machine learning is based on a machine's algorithm, and it only works to grasp a specific item or subject. That machine increases its performance by becoming an expertise in that domain as a result of frequent experience with that object.

Advantage of Machine Learning

Machine learning is currently applied in a variety of fields. This covers the financial sector, health care, retail, social networking, robots, automation, and gaming applications, among other things.

- Do you have any idea? In our daily lives, we use social media on a regular basis. Machine learning is employed in this case. Machine learning is used by Facebook and Google to display people Relevant Ads based on their previous search activity. It would have an impact on technical analysis on YouTube as well. This method provides superior results in terms of conserving time and resources.
- Many Sources programmes use machine learning to improve the efficiency of algorithms in various applications.

Disadvantages of Machine Learning

- It is vital to be familiar with a variety of machine learning approaches in order to determine when and under what conditions to perform which action.
- Interpreting the outcomes of machine learning is a complex issue while testing or determining its performance.

- Machine learning necessitates extra work and updates on a regular basis. It's also not straightforward to apply it to every field.
- Scientists are finding greater levels of machine learning.

Machine Learning Types:

1. Supervised Learning

   This is the most prevalent aspect of machine learning, because it determines the program's output. It operates entirely under the direction of the programmer, just like a teacher instructs a student. This was first used to generate an Algorithm model, and then it is used to create a Dataset.

   The machine then generates a forecast or makes the call based on just this data collection. For instance, we created a software in which Mohan is five years old, Sohan is ten years old, and Ramesh is fifteen years old. So, if we ask this machine how old it really is, it will tell us right away depending on its dataset that it is 15 years old. As a result, the output is precise.

2. Unsupervised Learning

The Dataset isn't entirely annotated in this machine learning technique, hence the output isn't completely guaranteed. The primary function of this calculation is to extract hidden data from the given major component of the dataset.

In Unsupervised Learning, the computer looks for new patterns and relationships in the data on its own. And it's still changing the data in its database. In this case, the machine is given hardly any knowledge to learn with, and it continues to learn a lot from the same input.

1. Reinforcement Learning

These algorithms are quite distinct, yet they are the ones that are most commonly utilized in today's advanced technologies. These are Self-Dependent Algorithms in the sense that they can make completely new types of decisions on their own. Such programmed make several errors and continue to improve their programmed as a result of their blunders and expertise.

Reinforcement Learning is a complicated technique that can be used to modify software as needed. Auto Driving Cars, for instance, is a good example of this because it is always going to new places and seeing and understanding new things.

As a result, its database is constantly evolving. For instance, if there is a machine learning-based machine fighting a board on it. As a result, its database is constantly evolving. For example, if a machine based on machine learning is fighting a board on the road while running, its algorithm will give feedback that the board must be saved. In all the other words, the machine learns things unique and applies it to the situation.

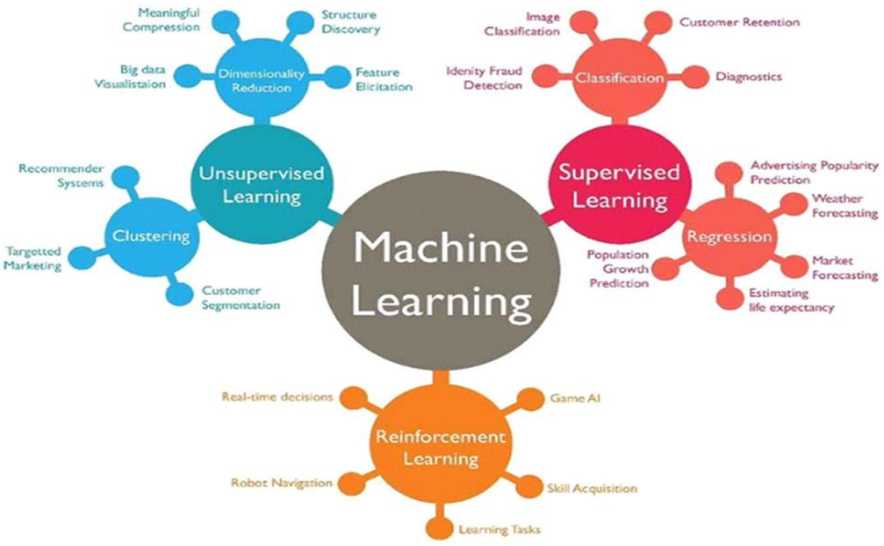


Figure 1.4.1 Machine Learning

1.4.2 Data Science

Data science is a type of expertise in which we collect data in order to use it in our business and IT plans. We then appropriately collect this information and turn it into a valuable resource.

This improves the company's ability to compete because we aren't looking for data indications, and it also boosts the company's revenue.

Data science is a field that employs mathematicians, statisticians, and computer scientists. Machine learning, cluster analysis, and data mining are one of the technologies they employ.

Advantages of Data Science

Data science is quite beneficial when it comes to making decisions. It makes excellent the use of data for making it useful for us to use.

We gain a lot of benefits from data-driven decisions, and they also improve our ability to work. Data signals are also important in the recruitment of people, such as in the internal work of people who have been picked for the next stage, where data signs are used to sort them.

Aptitude tests based on statistics and games, coding, and other topics are very valuable for human resource professionals who hire new employees.

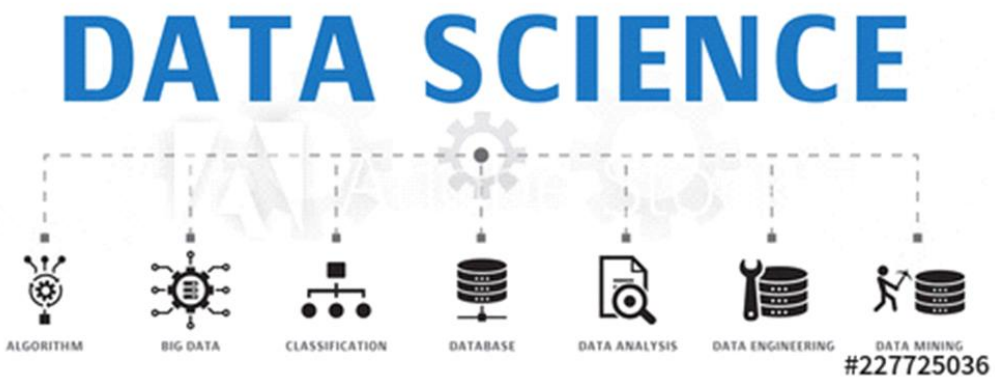


Figure 1.4.2 Data Science

1.4.3 Big Data

According to the year 2012, big data's "size" ranges from a few terabytes (TB) to several petabytes (PB) and is constantly growing. Big data datasets are diverse and complicated, necessitating a set of technologies with advanced form and integration, as well as a large size, to reveal insights.

The following characteristics can be used to describe big data:

• Volume: The estimation that determines the information's potential and estimation, allowing it to be perceived as vast data.

• Variety: This demonstrates the many types and natures of the data, which can aid in the development of more effective results.

• Velocity: This parameter influences the rate at which data is generated and processed, allowing it to meet demands and problems.

• Variability: The ability to deal with data set irregularities that can affect management procedures.

• Truth: Affects data quality by determining the correctness of analysis

Figure 1.4.3 Big Data

The advancement in travelling technologies has drastically reduced a man's effort for path planning. The fast pacing economical world and rapidly changing working conditions has reduced the time on people's hand, thus, wasting it on activities like effective path planning and transportation is futile.

Also, in factories due to increase in production in order to meet the requirements of customers, the manual efforts of the employees is not sufficient to fulfill the needs. Thus, here also the need of computational devices arises, that can navigate through a factory and perform various tasks in place of man.

Similarly, there are various other areas where the need of finding the feasible path for the movement of a computational device is necessary.

Thus, path planning and optimization plays the major role in various other domains such as vehicle routing, which is movement of the vehicle within a city, Artificial intelligence, which is mostly used in gaming for the movement of various characters, logistics movement, for the movement of automated vehicles, emergency evacuation,it is important during the time of disaster or an accident, delivery drones or autonomous drone, for finding a correct path to reach the final point safely and

many others .

All these problems have encouraged many researchers to focus on effective path planning and optimization techniques.

1.5 What is Covid-19

Corona virus is a Noval-Virus that emerged in December in China and affected dozens of people in Wuhan, China. This infection can cause a variety of difficulties, including a severe cold and shortness of breath. Although it is an asymtomatic disease, fever, cough, and dyspnea are some of the usual symptoms, according to one of WHO publications. There is yet to be developed a vaccination capable of preventing the spread of this virus.

Scientists Tyrell and Byno found the first corona virus that affected people in 1965. Then it was assigned the label B814 strain, but the term Corona virus was approved in 1968. Humans saw a lot of changes in the last two decades, according to the Indian Express article.

Corona RNAs, in real life, are a vast family of viruses that have been observed to infect both animals and humans. In pigs and cows, these viruses induce diarrhoea, and in poultry, they cause respiratory illnesses. In 1937, the first corona virus was found. It was dubbed the Infectious Bronchitis Virus as it caused respiratory sickness in chickens.

1.5.1 What is 7 corona-virus?

The corona virus is divided into three classes by experts. Corona viruses found in mammals are categorized into the first and second groups, whereas those found in birds are classified into the third category. Humans are infected by 7 corona viruses worldwide, including 229E, HKU1, NL63, and OC43 viruses. Mars, SARS, and SARS Cove 2 viruses are all part of the corona virus, which infects animals and is a sort of human infection.

7 Corona-Virus identified Specifically:

- In 1966, Hamre and Procknau released a study report on Comparative Biology and Medicine that was the first to mention 229 AD in corona viruses.
- 1967: According to a study published in the letter of virology, the first human corona virus was found in 1965 and given the designation B814 by Tyrell and Byno.
- SARS is first reported in China in 2003. It is unknown which animal this virus infected, however it is thought to even have spread to humans via bats from cats.
- The very first respiratory virus-causing virus was first discovered in the Netherlands in 2004. The study of coron virus infection in humans became more intense after that, and NL63 and HKU1 were found in Hong Kong in 2004.
- Corona virus was discovered in camels in Saudi Arabia in 2012, causing a severe outbreak in humans.
- SARS-Cove-2, also known as Kovid 19, began in Wuhan, China, in 2019. It is still uncertain which animal has spread it, although hypotheses point to bats as a possible source.

1.5.2 Possible side-effects of Covid-19

High fever:

If the body's internal temperature rises to 100 degrees Fahrenheit (37.7 degrees Celsius) and there is a dry cough, it becomes a corona risk.

Phlegm and dry cough:

Phlegm and coughing dry cough are among additional frequent

corona virus symptoms.

Breathing problems: Five days after becoming infected, the person begins to feel short of breath and tightness in the chest, indicating a lung problem.

Influenza's main manifestations:

According to the World Health Organization (WHO), an infected person may exhibit symptoms similar to a cold.

Retching and bowel movement problems:

Thirty percent of those infected have also had diarrhoea and vomiting.

Lack of odour and taste:

Patients who have complained have showed a loss of ability to smell and taste in some situations.

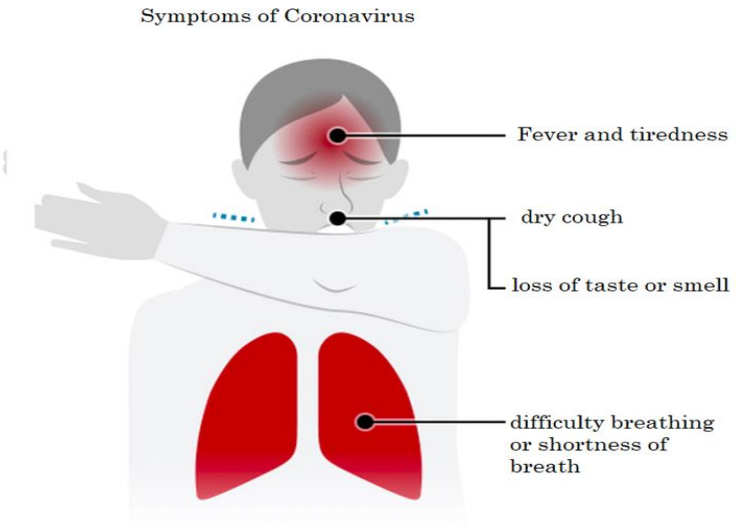


Figure 1.5.2 Symptoms of Coronavirus

Table 1.5.3 Covid-19 Death Rate according to age group:

Age Group	Death Rate in percent
Up to 9 years	0 %
10 to 39 years	0.2 %
40-49 years	0.4%
50-59 years	1.3 %
60 to 69 years	3.6 %
70-79	8 %
Above 80 years	14.8%

The World Health Organization (WHO) has explained the distinct phases of the corona virus and illustrated how well the disease's spread can be fatal to the entire world.

These are the four steps you should be aware of –

Step 1: Cases from abroad

The patient is afflicted in another country at this point. This disease also began in India. A student from Kerala studying at Wuhan University in China was the very first person to test positive for the corona virus. The cases that are still coming out are from individuals who have repatriated from Italy, China, or Iran, and the sickness is spreading because of them.

Step 2: Spreading infection in local people

The Corona virus has reached India's Phase 2 stage. The infection is being shared by patients outside the hospital. This drill is being carried

out by the state and federal governments to avoid a situation like this. This is being established the trip history of those who are found positive, that really is, where they flew and who came into touch with them.

Step 3: Transition between communities

Because the sickness spreads throughout the throng, this stage is lethal. This is what happened in China and Italy, where the illness has now spread out of control. The Indian government is also aware that if we enter Phase 3, the situation will deteriorate. It's becoming hard to tell which in the crowd has been infected at this point.

Step 4: Epidemic

In this stage, the infection has spread to the point where it has become an epidemic. In China, this has occurred. This threshold has been reached by Italy, Iran, and the United States of America. This is why attempts are being undertaken to bring the problem under control by declaring an emergency.

1.6 Herd Immunity

Herd immunity is a reduction in the risk of infection with a specific communicable disease (such as measles or influenza) that occurs when a large proportion of the population has become immune to infection (as a result of previous exposure or vaccination), making susceptible individuals much less likely to come into contact with infected individuals.

“In simple terms, herd immunity is a form of protection that occurs when people in a community become immune to a disease,” Dr. Evans says. “Individuals and the rest of

the community are protected by herd immunity.

The underlying notion is that if enough people in a single community, or "herd," have the antibodies needed to protect against a specific disease, the sickness will be difficult to spread from person - to - person. This is critical because certain members of the community, such as babies and young children, the elderly, and those with impaired immune systems, are particularly vulnerable to disease.

16.1 How we achieve herd immunity

Herd immunity as a concept is simple, but in practice, it gets complicated. “Herd immunity depends on the contagiousness of the disease. Diseases that spread easily, such as measles, require a higher number of immune individuals in a community to reach herd immunity,” according to the Association for Professionals in Infection Control and Epidemiology (APIC).

A population can achieve herd immunity in one of 2 directions: via the spontaneous production of antibodies or by vaccination. Since being infected, the immune system normally develops resilience towards the disease, however “immunity” varies depending on individual and the condition. For centuries, this was how humans fought disease until vaccinations were created reliably in the 1800s and widely given in the 1900s.

1.7 Multi-Layer Perceptron

Machine learning includes the use of a multilayer artificial neuron network. In addition, this session will give you an understanding of multilayer ANN as well as overfitting and underfitting. Not only that, but by the end of the class, you'll know:

- Examine how a neural network's cost function can be regularized and minimized.
- Backpropagation is used to change the weights of a neural network.
- Convergence in a multilayer ANN is examined.
- Investigate ANN with several layers.
- In a multilayer perceptron, implement forward propagation (MLP)
- Understand how underfitting and overfitting affect a model's capability.

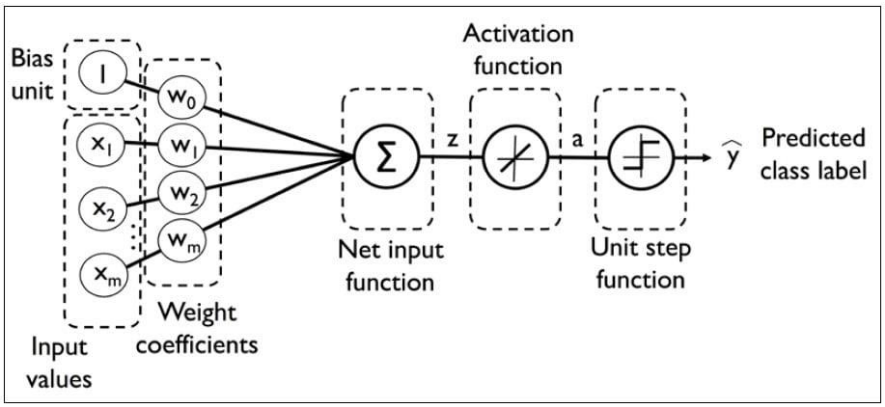


Figure 1.7 Single-Layer ANN

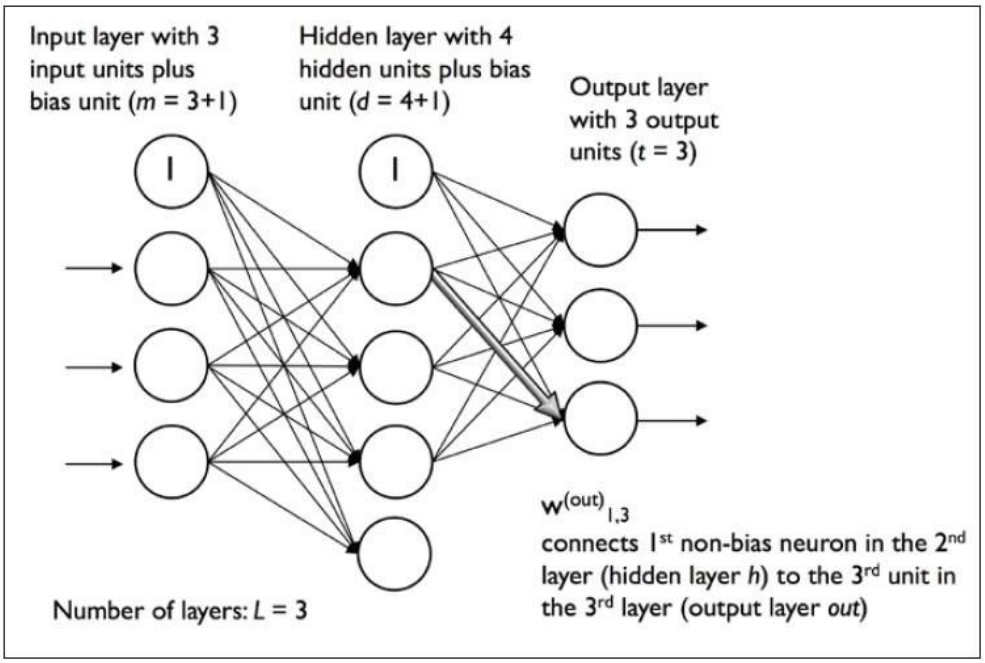


Figure 1.7 Multi-Layer ANN

It contains three levels, one of which is buried. A deep ANN has more than one hidden layer. A feedforward artificial neural network, such as an MLP, is a common example. The ith activation component in the lth layer is represented by ai in this diagram (l).

The number of layers and neurons in a neural network are referred to as hyperparameters, and they must be tuned. To determine appropriate solutions for these, cross-validation techniques should be implemented.

Backpropagation is used in the weight-adjustment training. Data processing is

improved by using deeper neural networks. Deeper layers, on the other hand, can cause vanishing gradient issues. To tackle this problem, special algorithms are necessary.

NOTATION: It represent like this:

- ai(in) refers to the ith value in the input layer
- ai(h) refers to the ith unit in the hidden layer
- ai(out) refers to the ith unit in the output layer
- ao(in) is simply the bias unit and is equal to 1; it will have the corresponding weight w0
- The weight coefficient from layer l to layer l+1 is represented by wk,j(l)

This is a schematic version of the multilayer. A fully linked three-layer neural network with triple input layer and triple output nodes is shown in this figure. The input vector is given a bias term.

The following is the MLP training process:

- Perpetuate data forward into the input layer to the output layer, starting with the input layer. Forward propagation is the next phase.
- Calculate the error from the output (the difference between the predicted and known outcome). The mistake must be kept to a minimum.
- Return the error to the source. Update the model by finding the derivative from each weight in the network.
- To learn ideal weights, repeat the three stages previously along a number of epochs.
- Finally, a threshold function is used to extract the anticipated class labels from the output.

$$a^{(in)} = \begin{bmatrix} a_0^{(in)} \\ a_1^{(in)} \\ \vdots \\ a_m^{(in)} \end{bmatrix} = \begin{bmatrix} 1 \\ x_1^{(in)} \\ \vdots \\ x_m^{(in)} \end{bmatrix}$$

.

CHAPTER – 2

SECURITY BACKGROUD

2.1 What is Data Security

Data security is the process of safeguarding data from unwanted access and corruption throughout one's life.

The employment of physical security, administrative, control, logical control, as well as other security precautions to limit access leads to data security, which reduces concerns about data security from unauthorised modification, deletion, or disclosure, whether unintentional or purposeful.

Most security processes are "user-centric" in nature, focusing on issues such as:

- Is this user allowed to see this information?
- Is this individual allowed to use this network?
- Is this individual misusing the system's resources?

Which is fantastic and vital, but it struggles with many real-world challenges like allowing hundreds or thousands of servers in large businesses on a casual basis, as well as old-fashioned user groups and determining who is accessing them.

A data-centric security model is a practical technique to take a different approach.

2.2 What include in Data Security?

1. Data Interpretation

   Data encryption creates a code for each piece of data and prevents access to encrypted data unless an authorised key is entered.

2. Data Masking

   Masking specific sections of data can secure it from external hostile sources as well as internal workers who use the information. The initial 12 digits of a credit card number, for example, can be disguised into a database.

3. Data Erasur

   There are times when data must be deleted from all systems because it is no

longer active. If a consumer has requested that their name be removed from a mailing list, the information should be permanently erased.

4. Data Resilience

   Data that was mistakenly destroyed, corrupted, or stolen during a data breach can be retrieved by generating a back - up copy of the data.

5. Data Backup

   Making duplicates of the data it so it can be recovered if the original is lost. Common good practice, on the other hand, extends beyond these approaches. Strict protocols should be implemented in all areas, including password policies.

2.3 Security issues with Big data

Large data isn't really new to large organisations, but it is becoming increasingly popular with small and medium-sized businesses due to cost savings and the ease with which it can be managed.

Information mining and filing have increased as a result of cloud-based capacity. Regardless, this massive data and distributed storage fusion is a test for protection and security threats.

It's also possible that certain infringement is due to the fact that security apps designed to hold specific types of information may not include as much data as the datasets mentioned above. Furthermore, many security technologies squander resources by overseeing dynamic data when they can only control static data. In this vein, a conventional security check will not reveal a security remedy for persistently leaking data.

2.2.1 Securing Transaction Logs and Data

The information stored in the capacity medium, such as exchange logs and other sensitive data, may alter, but this is insufficient. The flow of information across these levels, for example, provides data to the IT supervisor on the information that is being transported. Because the number of data is always growing, and because of its adaptability and accessibility, auto-tearing is essential for managing large amounts of data. However, because the auto-tearing technique does not cope with the information spare room, additional challenges for large data storage are introduced.

Gateway input validation and filtering

End-point devices are the most important components for storing large amounts of data. Capacity, handling, and other basic errands are carried out with the help of information provided by end-points. As a result, an organization should make it a point to use genuine end-point devices.

Assuring that Distributed Framework Calculations and Other Processes are in order

Computational security and other computerized resources in a distributed system, such as Hadoop's MapReduce function, require security assurance in the most part. Making sure about the mapper and safeguarding the information within the sight of an unapproved mapper are two key preventative measures.

Keeping track of and safeguarding data in real time

Most organizations are unable to keep up with standard inspections due to the massive amount of data generation. In any case, leading security checks and perceptions gradually or almost continuously is often beneficial.

Method for Securing Access Control Encryption and Communication

A smart strategy to secure information is to choose a safe information storage device. In view of the fact that information storage devices are frequently insecure, it is critical to include strategies for access control as well.

Provenance of Information

It is essential to understand the origins of information in order to characterise it. Confirmation, approval, and access control can all be used to effectively determine the source of information.

Inspection at the granular level

Dissecting various types of logs can be beneficial, and this information can be useful in identifying any type of digital assault or malicious conduct. As a result, routine inspections can be beneficial.

Control of data access

A robust validation mechanism and mandatory access control are required for fine-grained access control of massive data repositories via a NoSQL database or Hadoop distributed document framework.

Security Protection for Non-Rational Data Stores

Information repositories, such as NoSQL, contain several security flaws that provide a security risk. It can't obfuscate the information during labelling or logging it, or while dispersing it to multiple gathers, as it streams or is gathered, which is a severe security flaw.

Organizations must ensure that all massive data bases are secure against security threats and flaws. All critical security assurances, such as constant administration, must be completed during data collection. When considering the tremendous scale of massive data, organizations must consider how difficult it might be to manage such data.

Figure 2.2 Challenges in Big Data Analytics

2.4 Data Security

If we consider the terms network and security independently, a network is a collection of two or more networked neurons (Nodes) that can communicate with one another. And, of course, security is security. Network Security is the process of problems In case Users from accessing a network.

Network security is the process of preventing unwanted User Access (unattended access) to a network, such as Phishing, Hacking, Trojan Horse, Spyware, Worm, Malware, and so on. We should monitor the network and employ hardware and software to improve network security.

Data Security

Data authentication is the protection of protecting all of a device's or computer's data from unwanted access. Data compliance is the practice of preserving data from unwanted access and corruption all over the world.

Keeping the data out of the hands of unauthorised people so that it can't be tampered with or destroyed (Destroy or Delete). For data security, an authorization check is performed authorising the user access to the files**.**

2.4 Cyber Security

Cyber security is the process of preventing unauthorised access to any computers, networks, programmes, data, and information. Information technology security and electronic information security are other terms for cyber security. This is a sort of network security that secures all machines linked to the network. Computers, hardware, software, information, and data are all safeguarded from cybercrime in this system. The act of defending computer systems, networks, programmes, and data from digital intrusions is known as cyber security.

Cyber Space

The fictional name of cyberspace refers to a global computer communication network and the storage of data that surrounds it. In 1984, William Gibson, a fantasy science author, coined the word "cyberspace" in his book Neuromancer. The Internet and the World Wide Web (www) are currently referred to as cyberspace, although this is incorrect.

Cyber Warfare

When a citizen enters another country's computer network and steals secret and sensitive data, destroys or damages data, or disrupts network connection, this is referred to as cyber warfare. Cyber warfare has become a significant aspect of military strategy as the Internet has grown in prominence. After Air, Sea, Land, and Space, it is known as the "Fifth Domain of Warfare."

Cyber Crime

Cybercrime refers to any illegal conduct or crime committed using a computer and the internet. The computer and the internet are employed as a tool, a target, or in this scenario. Net crime is the term for crime done over the internet. Damage to a computer, network, or data, as well as the use of a computer, network, or data in any other crime, are all examples of cybercrime.

Cybercrime refers to obtaining or misusing one's confidential info, as well as removing it from a computer or stealing it. Computer crime is another name for cybercrime. A computer crime

is defined as meeting a computer in a criminal setting or committing a crime with a computer. There are many different forms of computer criminals, including those that steal information from computers, erase information, manipulate information, give or destroy someone's information, and so on. Similarly, there are numerous sorts of cyber-crimes, including spam email, hacking, phishing, virus injection, obtaining or stealing information from someone over the internet, network surveillance, and so on.

Examples of cybercrime

- Using the network officially.
- Obtaining personal and private information using network and computer.
- Damage to network and information.
- Sending a large number of emails (e-mail bombing).
- Damage to computer and data by viruses.
- Financial Financial Fraud using the Internet.
- Displaying illegal and anti-social facts and pictures on the Internet.

Measures to avoid cyber crime

- Always keep Login ID and Password safe. And it should be changed from time to time.
- Antivirus Software should be used.
- Using Firewall.
- Maintaining backup copy of data.
- Using Proxy Server.
- Receiving data by sending it in an encrypted form.

2.5 What is Cyber Security?

The protection of data kept on a computer and moved across a network is referred to as information security. In simple terms, computer security is a set of all statistical information saved on a computer as well as data sent across a network. Its functions include preventing

unauthorised access use, safeguarding user identification and personal information, and so on. Computer security is frequently referred to as cyber security or information technology security. The goal of computer security is to keep information and data safe from theft, corruption, and environmental catastrophes while allowing Authorized Users to access it easily. Following a computer security breach, the following tasks can be completed:

- Authorized use of data can be done (Unauthorized Use).
- User identification and personal information such as password etc. can be obtained.
- Data can be changed unnecessarily.
- Data can be destroyed.
- Who can prevent the implementation of software programs.

2.5.1 Spam

Spam is an unwanted and illegal message broadcast to a large number of people via computer and internet. This is referred to as "network abuse." Due to overlapping subscribers in the email account, impulsive distribution of email messages is possible. Spam does not destroy computers, networks, or data in most cases. Spam is, in fact, a little programme that is sent to the Internet in large numbers in order to be displayed frequently on a user's website. Spam consists primarily of adverts that people do not wish to see. As a result, sending it repeatedly draws the user's attention.

As a result, sending it repeatedly draws the user's attention. Because the expense of sending depressive spam is borne by the user or service provider, it is utilised as a low-cost advertising medium. Because of the immensity of the internet, catching a spammer is challenging. Using a Spam Filter or Anti-Spam Software can help you avoid this.

2.5.2 Cookies

When we use a Web Browser to access a website, the website's server transmits a little data file to the user's browser. Cookies are small pieces of software that many websites use to store information on a user's computer. Cookies operate behind the scenes, unnoticed by the user.

The server saves the user's preferences and the specifics of the websites they searched on the web browser this way. When the same user returns to the same page, the server remembers the user's choices and displays them via cookies. Some websites save the user's Username and Password, so they don't have to log in every time. As a result, cookies make using the Internet more convenient.

Like a result, cookies make using the Internet more convenient. Cookies, in most cases, are harmless. However, they are used to send adverts to users based on their interests on the website. Furthermore, some cookies compromise privacy by storing a record of the user's personal information as well as the websites they visit. When utilizing web browser software, we can activate or disable cookies.

Proxy Server

It is a server attached to a local network that evaluates requests to the Internet from its computers connected against predetermined rules and sends them to the facing server only if they are found to be correct. As a result, it functions as a filter between the main server and the user, preventing unauthorised users from accessing the network. Proxy servers might be hardware, software, or a combination of both.

Purposes of proxy server

1. Restricting Unwanted Web Browser or Website.
2. Control of Malware and Virus.
3. Maintaining the privacy of the main server
4. Speed up data transfer
5. Protecting classified information, etc.

Firewall

It's a device that keeps unauthorised users out of a computer's network while letting authorised users to access computers, networks, and data. Firewalls safeguard a computer, its data, or a local network against illegal access. Firewalls can be hardware, software, or a combination of

both. It serves as a barrier between a regular network and a secure network, shielding the computer from network risks including viruses, worms, and hackers. Firewalls shield a local network or local area network (LAN) from the Internet's security issues. It validates incoming data and grants authorised users access to the network via username and password. Also, firewalls maintain LAN privacy over the Internet.

2.6 Computer Virus

It's a device that keeps unauthorised users out of a computer's network while letting authorised users to access computers, networks, and data. Firewalls safeguard a computer, its data, or a local network against illegal access. Firewalls can be hardware, software, or a combination of both. It serves as a barrier between a regular network and a secure network, shielding the computer from network risks including viruses, worms, and hackers. Firewalls shield a local network or local area network (LAN) from the Internet's security issues. It validates incoming data and grants authorised users access to the network via username and password. When an email attachment is opened, the virus that arrived in the email is active. When the virus is triggered, it instals itself in the computer's memory and begins to spread in the memory's empty space. Viruses can attach themselves to the computer's boot section. The infection spreads faster the more the computer wins. Many viruses have the ability to destroy data even after a considerable period of time has passed. Computer viruses are most commonly found on the Internet (email, gaming, downloading files, and so on) or on memory media like CDs, DVDs, Floppy Disks, Pen Drives, Hard Disks, and so on. With the help of, moves from one computer to the other. When a virus is connected to a file and downloaded to the Internet, it might harm the computer. Because a virus is a piece of software, it has no effect on the hardware of the computer. The virus infiltrates memory and instals itself, allowing it to bypass Write Protect Memory and Compressed Data File protection.

Virus effect on computer

Whether or not a computer is affected by a virus can be identified with the following symptoms:

1. Virus slows down the speed of computer functioning.
2. Computer hangs repeatedly.
3. Computer does not reveal the exact position and size of memory.
4. Some programs are unable to run on the computer.
5. Some files in computer memory are affected and their data is corrupted.

Worm

It's a form of computer virus that copies itself and begins filling in the gaps in the computer's memory or hard drive. Without being attached to a programme, the worm virus spreads by network security weaknesses. It makes no changes to the data or files. It spreads quickly by making its own copy and consuming memory. Computers infected with the worm slow down and may even crash.

Malware

It's malicious software that infiltrates a computer system without the user's awareness and tampers with or damages the application. Malware contains include viruses, worms, Trojan horses, spyware, and other similar programmes.

- Trojan Horse - It is a type of virus that presents itself as a useful software such as Game, Utility Program, etc. When that software is run, the Trojan horse performs any other functions in the confirmation. It is used by authorized persons (Unauthorized Persons) to access and use computer information. The Trojan horse does not make its own copy.
- Spyware - It's a malicious software programme that's designed to spy on a computer user. Without the user's knowledge, this malicious programme collects small amounts of information about computer usage, such as email

messages, usernames, passwords, and data of previously visited websites. Some businesses use spyware to track their employees' behaviour on purpose.

- Hacker - A hacker is someone who tampers with a network or system in order to gain knowledge about how it works. A computer hacker is someone who finds security weaknesses in software and networks and exploits them to gain access to the network and make permitted data use. He does this to draw attention to software and network weaknesses, as well as for financial gain. Hacking is the act of infiltrating a network and tampering with data or software. Denial of Service occurs when authorised users are unable to access the network and resources properly as a result of hacking (DoS). Hackers are classified into various groups. White Hat Hacker is a type of software and network security expert who seeks out flaws. It is named Blue Hat Hacker before it is released for usage, and it exposes the software's flaws. A Black Hat Hacker would be someone who employs this method for criminal purposes.
- Patch - Hackers take advantage of several weaknesses in software released for use by software businesses. Software businesses release little software applications from time to time to address these flaws. Patches are what they're called. Only the main programme is compatible with this patch software.
- Phishing - Phishing is a method of obtaining user names, passwords, and other personal information from online users. For this, the user is sent fake e-mails or messages that look to come from a reputable source. The user is prompted to provide his username, login ID or password, and other information in these emails or messages, from which information about the user's confidential data can be discovered.

2.7 Anti-Virus Software

To protect against virus threats, various PC and network antivirus software is

utilised. It is a piece of software that detects and eliminates scholarly dangerous programmes in software, like as viruses and malware, and stops them from infiltrating other software or programmes. Before using any software, email, or internet files, antivirus software's Auto Protect function scans them for viruses and deletes them if any are identified.

Antivirus software performs system scans on the computer's memory on a regular basis to ensure that it is free of viruses. It also provides information about a virus's immediate activation. As new viruses emerge, firms develop antivirus software to combat them.

Internet Security - Internet security refers to keeping information, data, and software on the network and networks out of the hands of unauthorised users and allowing only trustworthy users to use them. This primarily refers to browser security, but network security is the most frequent, and it can also refer to other programmes, software, or operating systems. The goal of internet security is to prevent Internet-based assaults and keep the device safe. The Internet has an insecure method of exchanging information, making it subject to a variety of deceptions, online infections, Trojan horses, and other threats to Internet security.

Authentication - Authentication is a computer access control approach in which a user is permitted access only after successfully presenting all required proofs, such as Login ID, Password, Username, and so on. Authentication can be used to safeguard internet resources such as email, websites, and so on. Login ID, password, and other factors are used to verify the user's identity.

Access Control - Certain information. Access control ensures that this information is only available to selected users. The procedure of registering the data of the accessing user is known as access control. Unauthorized users will be kept out of reach, while authorised users will have easy access. A card, finger print, voice recognition, electronic card, and PIN are all examples of data.

Cryptography - Cryptography is the process of turning information or data into a secret code before delivering it over the Internet and then changing it back to ordinary information by the recipient. Encryption and decryption are the two procedures of cryptography. It is a critical component of Internet data security. Encryption is the process of transforming information or data into a secret message. Decryption is the process of turning encrypted data back to plain text. Cryptography eliminates the risk of Tata theft or data leakage du

CHAPTER – 3

LITERATURE REVIEW

3.1 LITERATURE SUMMARY

Review of Technology we Used:

Some important findings are as follows:

YEAR	AUTHOR	PURPOSE	TECHNIQUES USED	ACCURACY
2017	MIN CHEN et al, [1]	Disease Prediction by Machine Learning Over Big Data from Healthcare Communities	CNN-UDRP algorithm, CNN-MDRP algorithm, Naive Bayes, K-Nearest Neighbor, Decision Tree	94.8%
2018	Sayali Ambekar et al, [2]	Disease Risk Prediction by Using Convolutional Neural Network	CNN-UDRP algorithm, Naive Bayes and KNN algorithm	Highest accuracy of 82% is achieved by Naïve Bayes.
2015	Naganna Chetty et al, [3]	An Improved Method for Disease Prediction using Fuzzy Approach	KNN classifier, Fuzzy c-means clustering and Fuzzy KNN classifier	Diabetes: 97.02%
				Liver disorder: 96.13%
2019	Dhiraj Dahiwade et al, [4]	Designing Disease Prediction Model Using Machine Learning Approach	K-Nearest neighbor (KNN) and Convolutional neural network (CNN)	KNN: 95%
				CNN: 98%
2017	Lambodar Jena et al, [5]	Chronic Disease Risk Prediction using Distributed Machine Learning Classifiers	Naive Bayes	95%
			Multilayer Perceptron	99.7%
2016	Dhomse Kanchan B. et al, [6]	Study of Machine Learning Algorithms for Special Disease Prediction using Principal of Component Analysis	Naive Bayes classification, Decision Tree and Support Vector Machine	Diabetes Disease: 34.89% Heart Disease: 53%

2018	Pahulpreet Singh Kohli et al, [7]	Application of Machine Learning in Disease Prediction	Logistic Regression	Breast Cancer: 95.71% Diabetes: 84.42% Heart Disease: 87.12%
			Decision Tree	Breast Cancer: 94.29% Diabetes: 74.03% Heart Disease: 70.97%
			Random Forest	Breast Cancer: 97.14% Diabetes: 81.82% Heart Disease: 77.42%
			Support Vector Machine	Breast Cancer: 97.14% Diabetes: 85.71% Heart Disease: 83,87%
			Adaptive Boosting	Breast Cancer: 98.57% Diabetes: 80.52% Heart Disease: 83.87%
2017	Deeraj Shetty et al, [8]	Diabetes Disease Prediction Using Data Mining	Naïve Bayes and KNN	KNN gives better accuracy,

				compared to Naïve Bayes.
2017	Rashmi G Saboji et al, [9]	A Scalable Solution for Heart Disease Prediction using Classification Mining Technique	Random Forest Algorithm	98%
2019	Rati Shukla et al, [10]	Machine Learning Techniques for Detecting and Predicting Breast Cancer	Naive Bayes Classifier, Logistic Regression, Support Vector Machines (SVM), Artificial Neural Networks and K-Nearest Neighbor	SVM provides more accurate result compared to others.
2019	Senthilkumar Mohan et al, [11]	Effective Heart Disease Prediction Using Hybrid Machine Learning Techniques	Decision Tree, Support Vector Machine, Random Forest, Naïve Bayes, Neural Network and KNN	88.47%
2019	Anjan Nikhil Repaka et al, [12]	Design And Implementing Heart Disease Prediction Using Naives Bayesian	Naïve Bayes	89.77%
2018	Aakash Chauhan et al, [13]	Heart Disease Prediction using Evolutionary Rule Learning	Association Rule	53%
2018	Aditi Gavhane et al, [14]	Prediction of Heart Disease Using Machine Learning	Multi-Layer Perceptron	91%
2015	Ankita Dewan et al, [15]	Prediction of Heart Disease Using a Hybrid Technique in Data Mining Classification	Neural Network, Decision Tree and Naive Bayes	87%

3.2 CNN- Convolutional Neural Network (CNN) in Machine Learning

we are going to discuss convolutional neural network (CNN) in machine learning in detail

- A CNN, or convolutional neural network, is a deep learning neural network designed to analyse structured arrays of data like representations.
- CNNs are excellent at detecting design elements in input images, such as lines, gradients, circles, and even eyes and faces. It is because of this feature that convolutional neural networks are so effective in computer vision.
- CNN does not require any preprocessing and can run straight on an underdone image. A feed forward neural network is a convolutional neural network, which rarely has more than 20 layers.
- A convolutional neural network's strength stems from a type of layer known as the convolutional layer.
- CNN is made up of multiple convolutional layers stacked on top of each other, each capable of identifying more complex structures.
- Handwritten digits can be classified with 3 or 4 convolutional layers, whereas human faces may be distinguished with 25 layers.
- The goal of this field is to train machines to see and perceive the world in the same way that humans do, and to use that knowledge for a variety of tasks such as image and video recognition, image inspection and classification, media recreation, recommendation systems, natural language processing, and so on.

3.3 Data Mining Technique

The method entails retrieving relevant information from a large dataset. It is critical for intending data scientists to be familiar with data mining techniques. The top data mining techniques utilised by Data Science and Machine Learning experts are listed below.

1-Association Rule - This is an example of an unsupervised data mining method. The classic rule-based ML technique for identifying the relationship among variables in datasets is association rule learning. This comes after if/then statements and consists of two parts: antecedent and consequence. The advantage of employing this strategy is that it may be used to solve problems such as evaluating client behaviour**.**

2- Classification - This is a supervised learning technique in which the structure of the groups is learned using a dataset. Estimating group identifiers is done using this method. Customer target marketing, document categorization, medical disease management, and multimedia data analysis all use classification**.**

3-Co-relation Analysis- This is a widely used data mining technique

For identifying correlations in data that aids in understanding the significance of attributes.

It is a commonly used statistical measure for detecting collinear relationships**.**

4- Decision Tree Induction- The modelling of input and output interactions in an If/Then rules style is the emphasis of this supervised learning technique. Flexibility, efficiency, immunity to outliers, easy extensions, and resistance to irrelevant variables are some of the intuitive features of this.

5-Long-Term Induction

This method is used to scale data stored in memory. It also provides the input in order a higher weight. The strategy is used to memorise long sequences as well as to avoid the degradation problem in the learning model.

3.4 Distributed Real-Time Database

A distributed database is a database that is not restricted to a single system and is dispersed across countless locations, such as multiple computers or a network of computers. A distributed database system is made up of multiple sites with no physical components in common. This may be necessary if a database needs to be viewed by a large number of people all over the world. It must be administered in such a way that it appears to users as a single database.

Types:

Homogenous- In a homogenous database, all sites store the data in the same way. All of the sites have used the same operating system, database management system, including data structures. As a result, they're simple to handle.

Heterogenous - Different locations in a heterogeneous distributed database may utilise different schema and software, which can cause issues with query processing and transactions. Furthermore, a site may be utterly uninformed of the existence of other sites. A different operating system and database programme may be used on various PCs. They may even use separate database data models. As a result, translations are required for communication across different sites.

Distributed Data Storage:

There are 2 ways in which data can be stored on different sites. These are:

1. Replication — In this method, the complete relationship is duplicated across two or more sites. It is a fully redundant database if the entire database is available at all sites. As a result, in replication, systems keep duplicates of data.

This is useful since it increases data availability across several places. Query queries can now be executed in parallel as well.

It does, however, have some downsides. Data must be updated on a regular basis. Any

modification made at one site must be recorded at every site where that relationship is saved, or else inconsistency would result. This is a significant amount of overhead.

2. Fragmentation — In this technique, the relationships are fractured (i.e., separated into smaller bits) and each fragment is stored in the many locations where it is needed. It must be ensured that the fragments can be utilised to match the original relationship (i.e. that no data is lost). Fragmentation is useful since it avoids the creation of duplicate data, and consistency is not an issue.

Relationships can be fragmented in two ways:

Horizontal fragmentation – Splitting by rows – The relation is broken down into groups of tuples, with each tuple allocated to at least one fragment.

Vertical fragmentation – Column splitting – The relation's schema is split into smaller schemas. To ensure a lossless join, each fragment must have a common identifier.

3.5 CNN THROUGH GPU (Pytorch) –

PyTorch is a Python machine learning package that is free source. It's utilised in a variety of applications, including natural language processing. It was created by the Facebook artificial-intelligence research department, and Uber's Pyro probabilistic programming engine is based on it.

Hugh Perkins originally developed PyTorch as a Python wrapper for the Torch-based LusJIT framework. PyTorch comes in two flavours.

PyTorch is a Python implementation of Torch that uses the same basic C libraries for the backend work. The PyTorch team optimised the back-end code to run Python quickly. They also preserved the GPU-based hardware acceleration and extensible characteristics that made Torch-based Lua so popular.

Features - The most important features of PyTorch are listed below.

PyTorch has an easy-to-use API, therefore it's considered to be very simple to use and operates on Python. This framework makes it simple to execute code.

Python use This library is Pythonic, allowing it to seamlessly interact with the Python data science stack. As a result, it can take advantage of all of the Python environment's functions and solutions.

The three layers of abstraction in PyTorch are listed below.

A. Tensor is a GPU-based implicit n-dimensional array.

B. In a computation network, a variable node. This holds the data as well as the gradient.

C. Module for storing data or trainable weights in a neural network layer.

PyTorch's Benefits- The following are some of PyTorch's benefits:

a) The code is basic to debug and comprehend.

b) As with Torch, it has a lot of layers.

c) It contains a large number of loss functions.

d) It can be thought of as a NumPy GPU extension.

e) It enables the creation of networks whose structure is determined by computing.

3.6 SVM Support Vector Machine- The Support Vector Machine, or SVM, is a popular Supervised Learning technique that may be used to solve both classification and regression issues. However, it is mostly utilised in Machine Learning for Classifier difficulties.

The SVM algorithm's purpose is to find the optimum line or decision boundary for categorising n-dimensional space into classes so that additional data points can be readily placed in the correct category in the future. A hyperplane is the name for the optimal choice boundary.

The extreme points/vectors that assist create the hyperplane are chosen via SVM. Support vectors are the ultimate instances, and the algorithm is called a Support Vector Machine. Consider the diagram below, which shows how a decision boundary or hyperplane is used to classify two different categories:

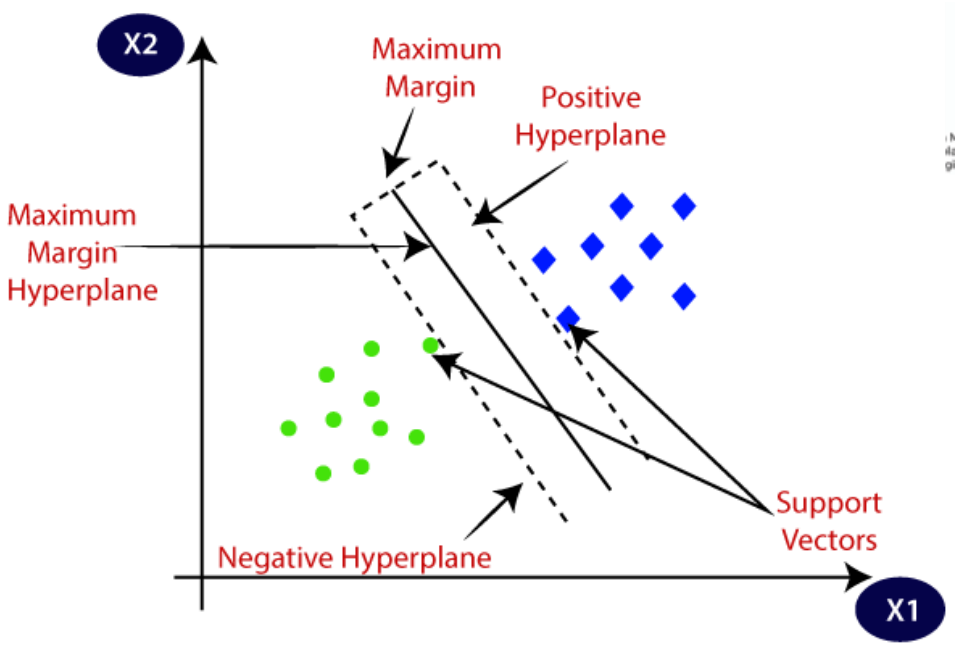


Figure 3.6 Support Vector Machine Algorithm

Types Of SVM-support vector Machine:

- **Linear SVM:** Linear SVM is used for linearly separable data, which means if a dataset can be classified into two classes by using a single straight line, then such data is termed as linearly separable data, and classifier is used called as Linear SVM classifier.
- **Non-linear SVM:** Non-Linear SVM is used for non-linearly separated data, which means if a dataset cannot be classified by using a straight line, then such data is termed as non-linear data and classifier used is called as Non-linear SVM classifier.

3.7 **KNN - K-Nearest Neighbor** KNN is a classifier that stores all the evaluations of the variable that are records and surveys the unclear estimation of the variable based on the possibility of these records. The variable's closeness is used to estimate the mysterious worth. KNN could be considered a non-parametric grouping method. The KNN is divided into two types, the first of which is a structure-less NN approach and the second of which is a structure-based NN strategy. In that information is surveyed into producing and testing information, the organised based NN is surveyed.

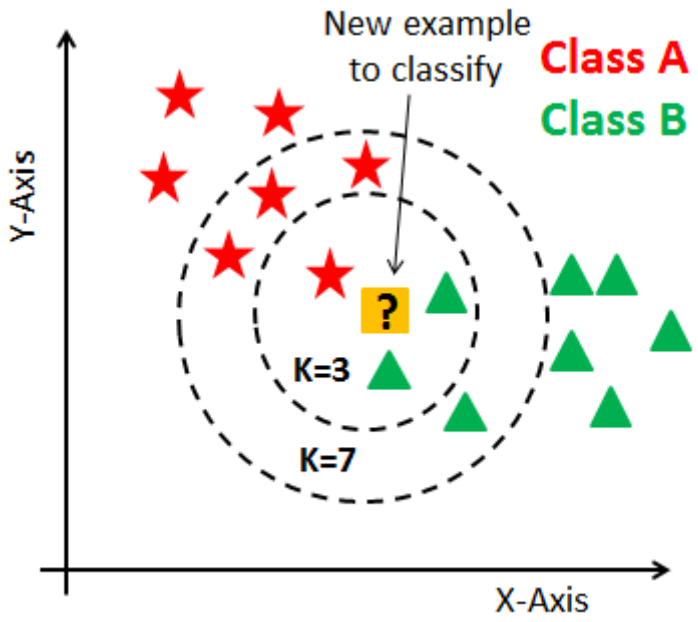


Figure 3.7 KNN Algorithm

Here, we have two categories: **Class A:** Represented with a star.

Class B: Represented with a Triangle.

The **question mark at the center** is the new data point(query point)to be classified into A or B.

As said earlier, this algorithm takes a certain number of points in its neighborhood and predicts the query point as the points with a majority in the neighborhood.

For example, In the figure when we take k=3 i.e. consider three nearest points to the query point, we see that there are two triangles and 1 star. Hence, the query point will be predicted as Triangle which is basically Class B.

Further, when we take k=7, we see that we have 4 stars and 3 triangles in its neighborhood. Hence, query point will be predicted as Star which is basically Class A.

3.8 Naïve Bayes

The Naive Bayes classifier uses supervised learning and is based on a probabilistic model as well as the Bayes theorm. The characteristics described in a class that are unrelated to other characteristics.

To handle categorisation tasks, we employ the Naive Bayes machine learning technique. The Bayes Theorem underpins it. It is one of the most basic yet powerful machine learning algorithms in use, with applications in a variety of industries.

- The Nave Bayes method is a supervised learning algorithm for addressing classification issues that is based on the Bayes theorem.
- It is mostly utilised in text classification tasks that require a large training dataset.
- The Nave Bayes Classifier is a simple and effective classification method that aids in the development of powerful machine learning models capable of making quick predictions.
- It's a probabilistic classifier, which means it makes predictions based on an object's probability.
- Spam filtration, sentiment analysis, and article classification are all common uses of the Nave Bayes Algorithm.

CHAPTER – 4

PROPOSED WORK

4.1 PROPOSED WORK

The thesis' goal is to create an algorithm that will assist the health-care department and ministry in fully comprehending the propagation of a novel coronavirus, COVID-19. The number of positive cases of covid-19 has risen dramatically as a consequence of the lack of a competent mechanism for analysing data and predicting the actual number of cases. Furthermore, a lack of competent testing methods in India is aiding the virus's spread.

The algorithm will interpret a variety of facts, including the number of positive cases, negative cases, persons recovered, and people admitted to the hospital, and will store this information in the data set. The algorithm will then take the data into account and calculate average corona spread accuracy by evaluating the COVID-19 test accuracy. Finally, the algorithm will tell us how many more people are infected with the virus and how many more cases are likely to occur in the future. This manner, we can inform individuals about the need of staying safe and taking extra precautions against the influenza.

The system's advantages are based on this algorithm:

- It will assist the health-care department in estimating how many cases are likely to arrive in the following week. So that they can provide correct treatment for COVID-19 patients.
- The system will keep everyone up to date on the spread. Anyone who has come into touch with a suspected covid-19 sufferer can self-quarantine to prevent the disease from spreading
- It will save time while also increasing awareness.
- Forecasting of daily cases will helpful to analyze the future possibility of covid-19 i.e how this disease will act in upcoming year
- The combine formula of forecast and herd immunity is the ability to identify how vaccine helpful in development segment of Immunity

- When a significant mass portion of the population has survived from an illness and acquired protective antibodies against future infection, herd immunity is achieved.
- Vaccines instruct our immune systems to produce disease-fighting proteins called antibodies, exactly as they would if we were exposed to a disease.

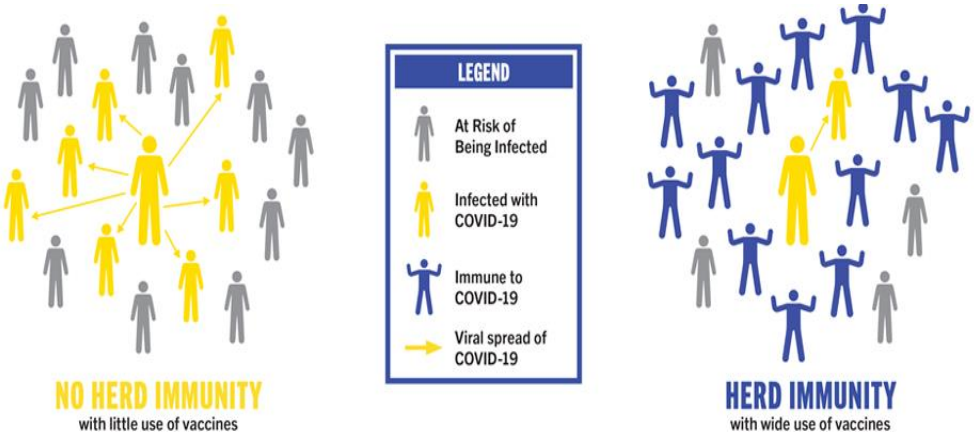


Figure 4.1 Herd Immunity

- Through this approach we are going to depict the death rates and daily positive cases by covid-19

  Following the process in steps:

  Step – 1 We'd start by creating a Dataset of wise corona patients and recovering patients from the data.

  Step – 2 Furthermore, A dataset of medicine and healthcare organizations would be created, as well as a data collection of patients who have been diagnosed as having immunity without treatment.

  Step – 3 After that, we'd filter the entire dataset and remove any redundant information (Invalid).

  Step – 4 During the next section, we'll use polynomial regression and even a neural network model to collect data features and arrange datasets for training and study.

  Step – 5 We'd next use the run algorithm to estimate the propagation of the corona virus and hearing immunity based on data sets for qualified and test subjects.

So, for both the optimum quality, we chose two main approaches: first is the polynomial regression methodology, that also aids in data analysis, and the second is the forecasting of herd immunity daily positive cases and daily deaths.

The function of methodology is described below;

- **Polynomial Regression** - Polynomial regression is a type of linear regression in which a polynomial equation with a given (n) degree is fitted to non-linear data, resulting in a curved relationship between the dependent and independent variables.

y= b0+b1x1+ b2x12+ b3x13+…… bnx1n

y □ Output variable (dependent)

x1 □ Predictors variable (independent)

b0 □ is bias

b1, b2, are the weights of regression analysis

- **Multi- Layer Neural models** – A multi- layer Neural network models also known as Multilayer perceptron (MLP) is a feed-forward artificial neural network model that translates input data sets into appropriate output data sets. An MLP is a directed graph with multiple layers of nodes, each fully connected to the next. More than one layer of artificial neurons or nodes makes up a multi-layer neural network.

Neurons on Multi- Layer perceptron- A discontinuous function is calculated by standard perceptrons: x 7→ fstep (w 0 + h ~w,~x i)

MLP neurons calculate a smoother version of this: x 7→ flog (w 0 + h ~w,~x i)

Overview of the Methodology Presented

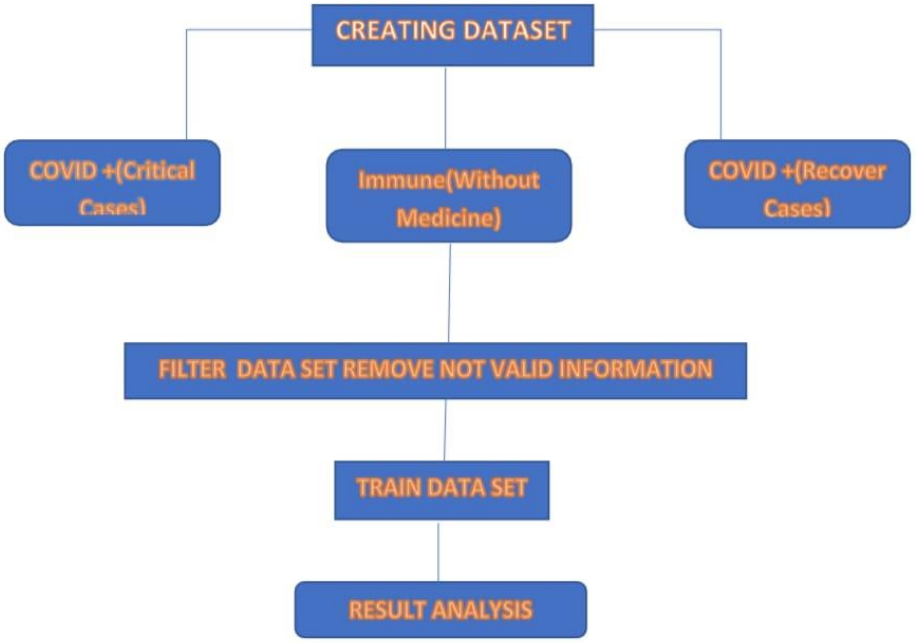


Figure 4.1 Overview

4.2 Aim of Research

In simple words, herd immunity works by reaching a population-level threshold immunity that can theoretically terminate the transmission chain of a specific infectious disease, whether acquired naturally or by vaccination. 1 This does not necessarily imply that a person is entirely protected at all times or in all situations. It is the level of immunity that, when reached, can protect the majority, if not all, of a community in a certain geographical area for a set period of time. However, the latter hypothesis would undoubtedly be dependent on the longevity of individual-level natural or vaccine-induced immunity**.**

Do we really need a vaccination to acquire herd immunity against COVID-19 in a population? Yes, but we must keep in mind that even with the vaccination, we will almost certainly never achieve herd immunity. Here's how to explain it:

COVID-19 has a basic reproduction number (R0) of 2.5 to 3.5. When an infected (and infectious) individual enters a population that is immunologically naive to the infectious agent in question, R0 is defined as the expected or estimated number of infected individuals, whereas the effective reproduction number (R) is defined as the expected or estimated number of infected individuals when an infected (and infectious) individual enters a population that is immunologically naive to the infectious agent in question When an infected (and infectious) individual enters a population that is not immunologically naive to the infectious agent in question, the effective reproduction number (R) is the expected or estimated number of infected individuals, whereas the effective reproduction number (R) is the expected or estimated number of infected individuals when an infected (and infectious) individual enters a population that is not immunologically naive to the infectious agent in question, and the population is indeed a mix of immunological naïve to the infections

The latter is determined by the following formula, which is directly influenced by the moving percentage of sensitive individuals: R = sR0, where s represents the population's proportion of "sensitive" people. R decreases as more persons become infected with SARS-CoV-2 and survive. To inhibit transmission, one would need to lower R below 1. We'll need at least 60% to 72 percent herd immunity to "simply" sever the transmission chain, even if the R is as low as 0.99. All of this is predicated on the hopeful assumptions that (1) vaccine efficacy is 100 percent and (2) immunity is lifelong or long-term. The required herd immunity level for a vaccination with a claimed 95 percent efficacy would be 63 percent to 76 percent.

4.3 Objective

The primary purpose of this thesis to show how herd immunity is achievable in more way The threshold for achieving herd immunity differs depending on the type of illness. R0, which is pronounced "r-naught," is the standard metric of infectiousness. In the absence of special countermeasures, it refers to the average number of other people to whom an infected individual would spread the infection. A higher R0 value indicates greater infectiousness.

In general, health officials prefer to utilise policies like social distancing to lower the R0 figure below 1, as this will result in a lower number of new cases over time. If R0 goes far enough below 1, the virus will eventually run out of new targets to infect, and the epidemic will end.

Measles has an estimated R0 of 15, making it one of the commonest illnesses to spread from person - to - person. Though the coronavirus is very new and needs more research, estimations show that its R0 is approximately 3. So, while the coronavirus isn't as contagious as measles, it's still contagious enough to spread quickly if proper countermeasures aren't implemented.

Measles requires vaccination rates of at least 93 percent to maintain herd immunity since it is so contagious. Even persons who are unable to get vaccinated due to medical reasons, such as allergies, will be protected if the vaccination rate is kept high.

The herd immunity threshold for the coronavirus is predicted to be around 67 percent, while most scientists believe it is more likely to be between 60 and 70 percent due to uncertainty.

Natalie Dean, an assistant professor of biostatistics at the University of Florida, stated, "I haven't seen anything feasible that would get it below maybe 50 percent."

4.4 Explanation of Flow-Chart

- These data will include number of positive cases, number of negative cases, the current rate at which the virus is spreading, recovery rate and death rate.
- Once the data set is imported the next step is to clean the data set and start from the initial phase.
- The algorithm will operate using for loop; for i=0; and the value of i will be checked every time.
- Check for i=10. If i =10 then calculate then calculate average corona spread accuracy and the output will be the result of rate at which the virus is going to spread.
- The process gets terminated.
- Now, if i is not equal to 10 then increase i by 1. And, repeat the above loop.
- Now if i=0, split the data set and train the data set.
- The traverse data set will contain spread speed, death rate, recover rate, and trained set..
- We will be computing the above traverse data set and then we have to clean the data set.
- The train model or data set will be processed by SVM algorithm
- Check for i=10. If i =10 then calculate then calculate average corona spread accuracy and the output will be the result of rate at which the virus is going to spread.
- The process gets terminated.

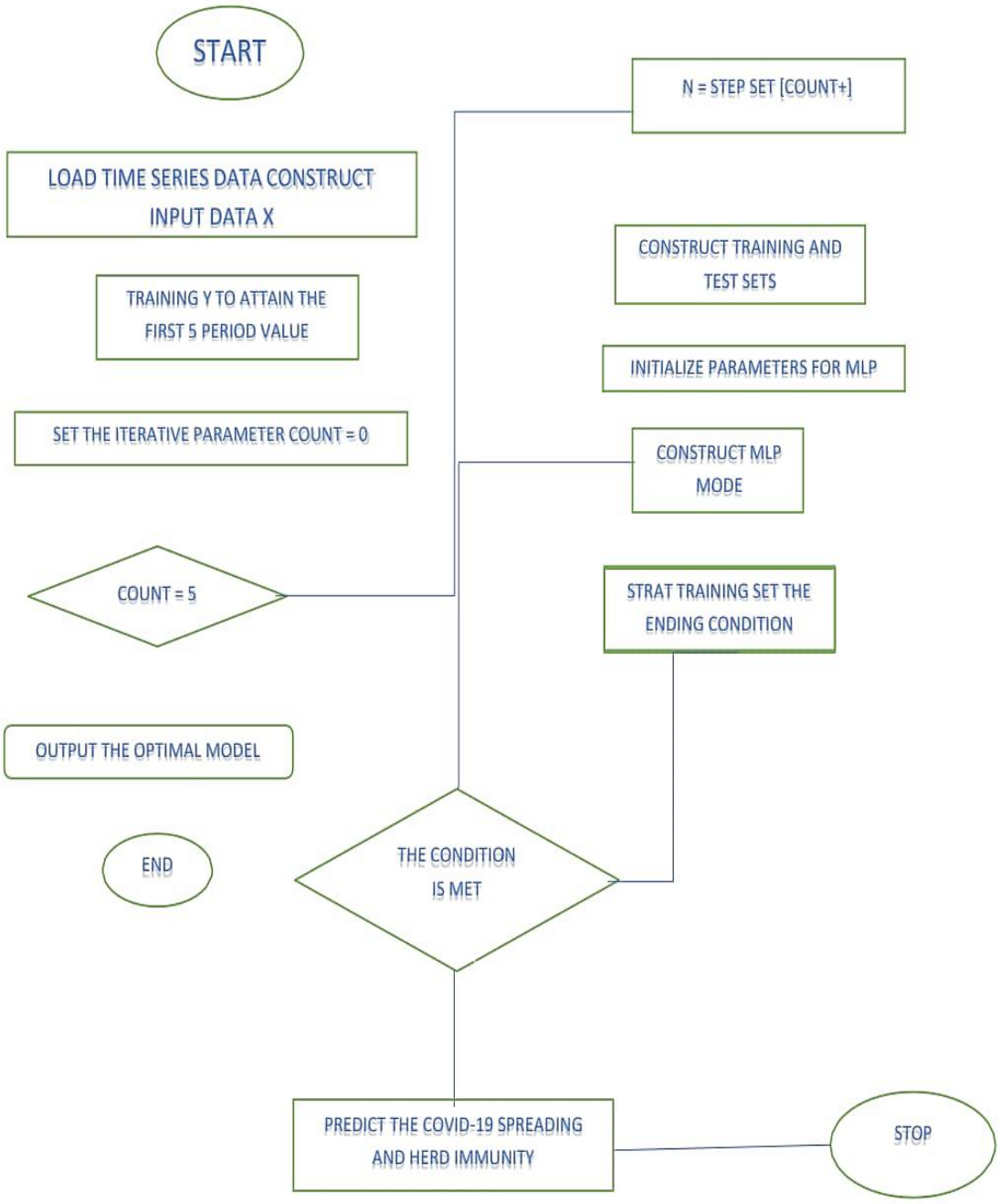


Figure 4.4 Flow-Charts

4.5 Algorithm used

Input – The data set from COVID-19 website.

Site – (HTTPS://WWW.WORLDOMETERS.INFO)

Output- Model M

1 – Step set () □ iteration (data D.y)

2 – Count □ 0

3 – Dataset □ data_transform(DataD.stepset [count])

4 – n □ infinite

5 – While count < 5 do

6 – M □ Neural Model (data T)

7 – if n > count - then

8 – n □ count

9 – Mf □ M

10 – end if

11 – count □ count + 1

12 – end_while

13 – return Mf

4.5.1 Polynomial Algorithm – This algorithm is used for forecasting to depict the daily positive cases and death rate i.e. forecasting of covid-19. The Polynomial Algorithm produces a mathematically rigorous yet simplest superstructure, i.e. the maximal structure, based on the five axioms. All combinatorially viable structures capable of providing the specified products from the specified raw materials are included in the maximal structure of synthesis problem. Certainly, the best network or structure is one of these viable options. These flowsheets range in complexity from the most basic to the most complicated, or complete, as

represented by the maximal structure. The optimal structure in terms of a certain objective function, such as cost, is obviously contained in the maximal structure; nevertheless, the simplest is not always the best.

The algorithm allows all solution structures to be generated, i.e. it creates the computational technique for generating the solution structures. In other words, the SSG algorithm presents every possible flowsheet for the process in question. From the maximal structure, the SSG algorithm generates all of the solution structures that reflect combinatorially possible flowsheets. Furthermore, these flowsheets are considered practical if they can be optimised in terms of profit or any other suitable objective function. As a result, they can be sorted by the magnitude of the goal function.

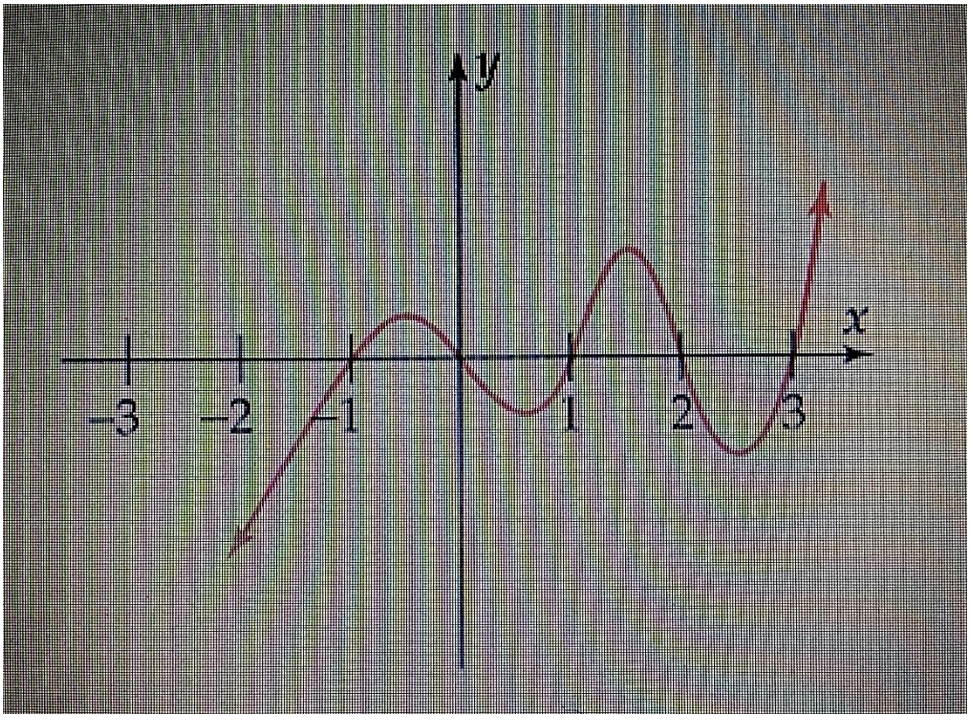


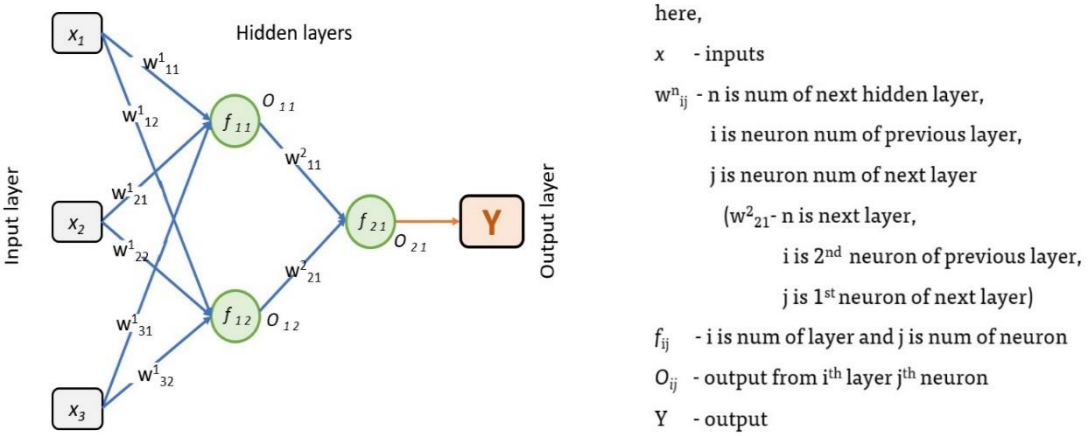
Figure 4.4.1 Polynomial Algorithm

4.5.2 Multi-Layer Perceptron (MLP) a.k.a .Neural Net Model

Only a linear relationship between inputs and outputs is provided by the perceptron. When we need to address more complicated problems, we need a more complicated model that can provide us with non-linear relationships. Multi-

Layered Perceptron NN is used to overcome this problem.

Between the input and output layers of a Multi-Layed Perceptron NN, there can be an n-number of hidden layers. These hidden layers can have an n-number of neurons, with the first hidden layer collecting information from the input layer and processing it using the activation function before passing it on to the successive hidden levels until it reaches the output layer. A non-linear activation function is used by every neuron in a buried layer. Backpropagation is a supervised learning technique used by MLP during training.



4.4.2 Multi-Layerd Perceptron Neural Networks

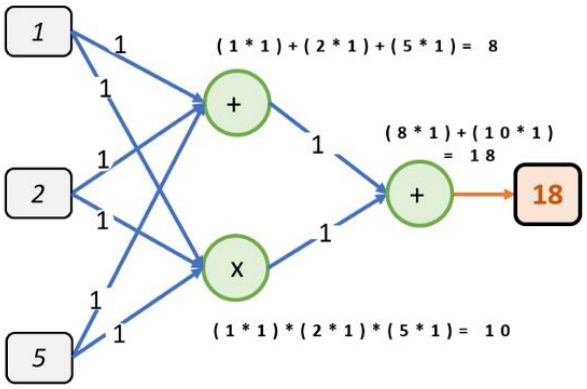


Figure 4.4.2 Example of Solved MLP

1- **Data Processing -** Any type of data cannot be directly fed into a Neural Network. We should feed numerical data into a NN (real values). If you have categorical data, one-hot encoding techniques can be used to convert it to numeric data. If a column has real values but wide ranges, it should be scaled down using normalisation and standardisation approaches.

2- **Training MLP Model -** By training with given data, a deep MLP neural network attempts to discover the underlying pattern or map inputs and outputs using weights. To do this, we employ a technique known as Stochastic Gradient Descent. During backpropagation, we calculate loss using a loss function, calculate the derivate, and update the weights. The major goal is to keep the difference (loss) between expected and actual production to a minimum.

Backpropagation using SGD: Initialize weights

for each Xi ,

i)— pass Xi forward through the network

ii)— calculate loss

iii)— compute derivative and update weights.

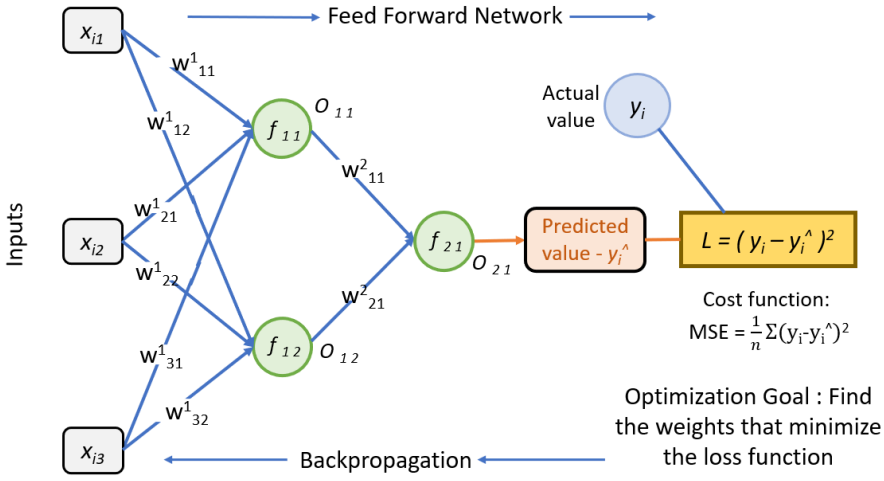


Figure 4.4.2 Back Propagation

MLP Procedure for Learning - The following is the MLP learning methodology:

Propagate data forward from the input layer to the output layer, starting with the input layer. Forward propagation is the next phase.

Calculate the error based on the output (the difference between the predicted and known outcome). The mistake must be kept to a minimum.

Return the error to the source. Update the model by finding its derivative with respect to each weight in the network.

To learn optimum weights, repeat the three procedures above for numerous epochs.

Finally, a threshold function is used to extract the anticipated class labels from the output.

CHAPTER – 5

RESULT ANALYSIS

AND

DISCUSSION

5.1 RESULT ANALYSIS:

- In the initial step, we'll read the corona virus's data collection. Total testing done, positive cases, negative cases, current rate of virus transmission, recovery rate, and mortality rate will all be part of the data collection. All of this information will be saved in a data set.
- The dataset will be processed in the second stage, and then it will be cleaned.
- Now we'll process the dataset, and this time we'll use the trained data set to filter it.
- The values of the filtered and original data sets will be saved in an array, and we'll observe that after filtering the data from the training data set, the filter dataset [] dataset[] will be created.
- Now we'll look at how the Polynomial Algorithm is used to classify data and forecasting of death cases and positive cases.
- We will choose the train data set to avoid null values in this stage.
- The trained dataset must then be optimised.
- We'll use the Mult-layer perceptron Neural net model after we've finished optimising. This technique is used to forecast the speed at which the corona spreads.
- Also find out the Herd Immunity developed through vaccination or exposure.
- As an output, we also have the projected spreading rate and how we going to achive the herd immunity in the entire processs. We can make the health-care department and the broader public aware of this rate, and then take appropriate action. This is where the procedure will come to an end.

5.1.1 Result analysis depicting the cases of each day

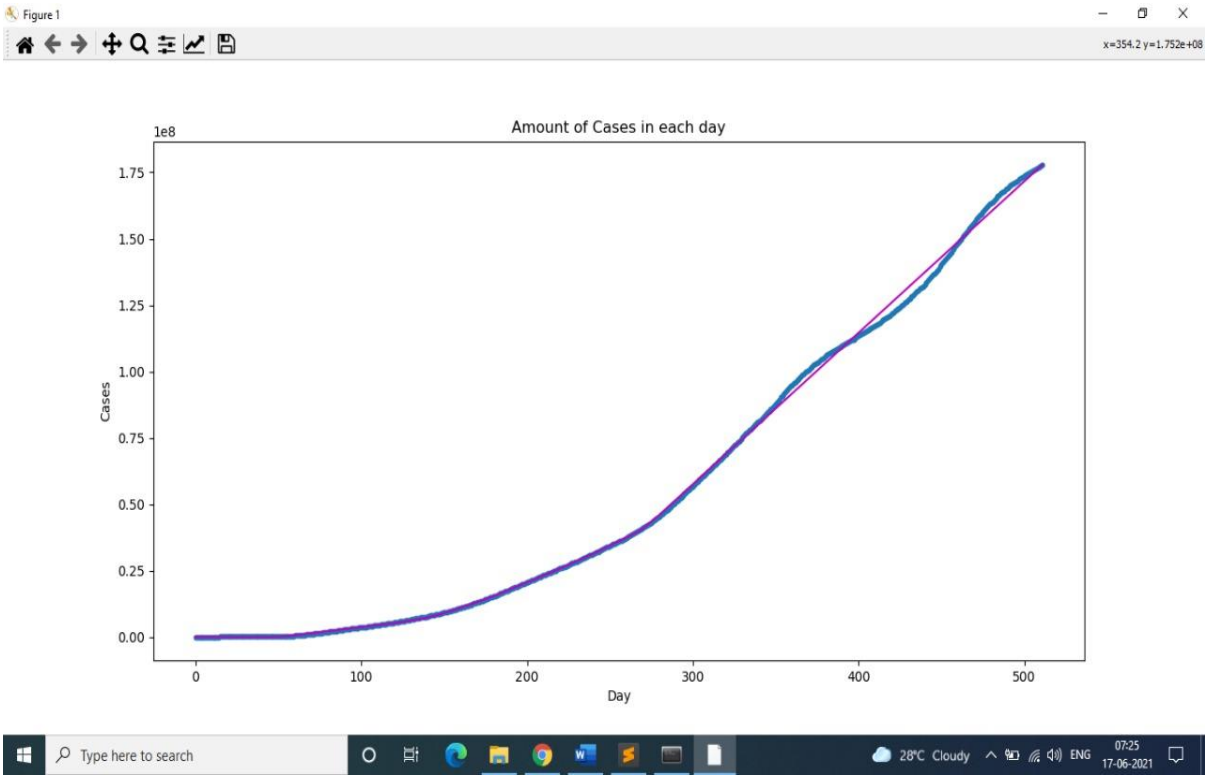


Figure 5.1.1 Amount of each cases

Here is the representation of each cases x-axis represent the cases and y -axis depict each case in a day. This analysis is done by the polynomial regression method to forecast spreading capacity of covid-19. From the graph we can clearly see that there is constant increase in cases across India. Using this data as our base data we have worked on further results.

This analysis is helpful to depict the early rise of each day in India

In the above graph, we realize the past trend of the total number of active cases.

5.1.2 Result analysis of deceased

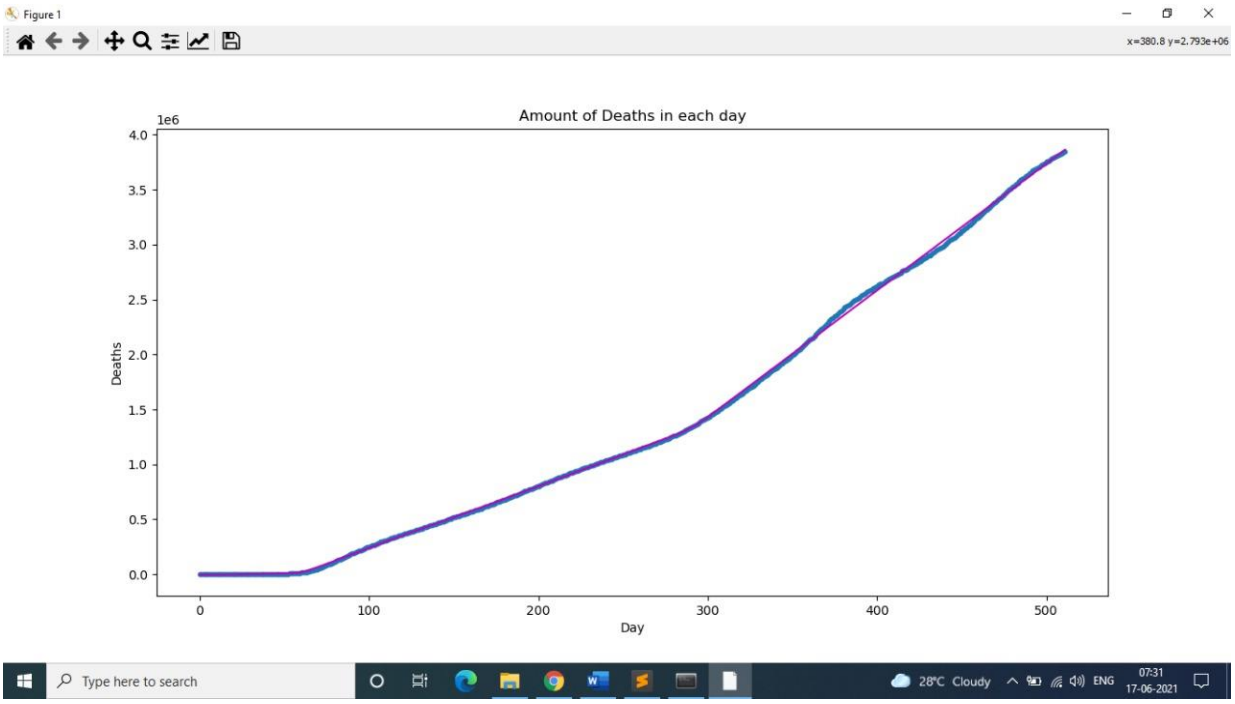


Figure 5.1.2 Death Cases

This graph is the representation of death which is increasing in India as well as the daily death rate. Due to that the covid-19 is not decreasing and its still risk at so many life in India.

The death is clearly the indication of how badly its required herd immunity for each one of us because the survival is at risk.

Using polynomial regression, we can depict the daily deaths and total death are higher in the graph.

This algorithm is affecting to identify the forecasting via daily deaths and daily positive cases.

5.1.3 Depicting the Herd Immunity

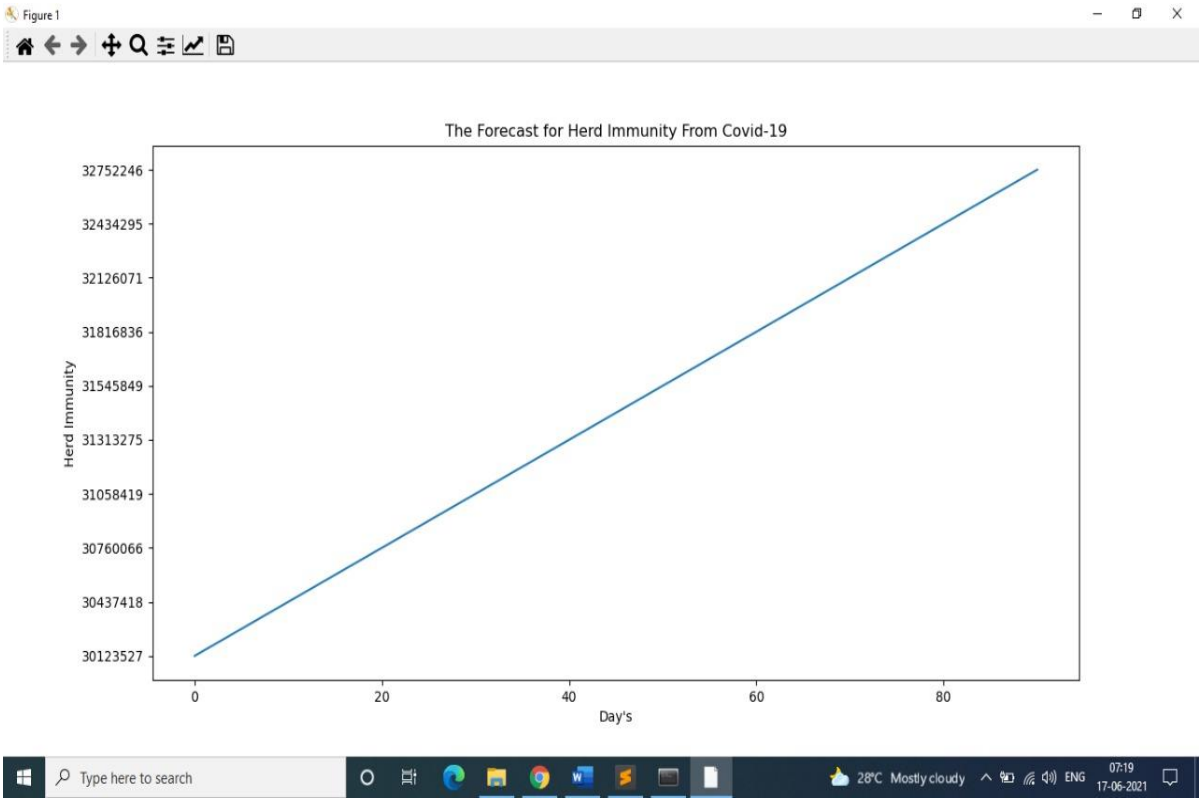


Figure 5.1.3 Herd Immunity

As per as the analysis of We can clearly see that each day od daily cases and deaths also people are developing the herd immunity via vaccination or exposure in affected people. This is also done by the before lockdown analysis or post lockdown analysis.

This approach is done with the help of polynomial regression and multi-layer perceptron neural net model to identify the accurate results in both ways.

As a result, herd immunity is the preferred method of achieving the goal of serving the community, and immunisation is the greatest way to achieve this today.

5.2 Outputs of Herd Immunity, Daily deaths, And positive cases.

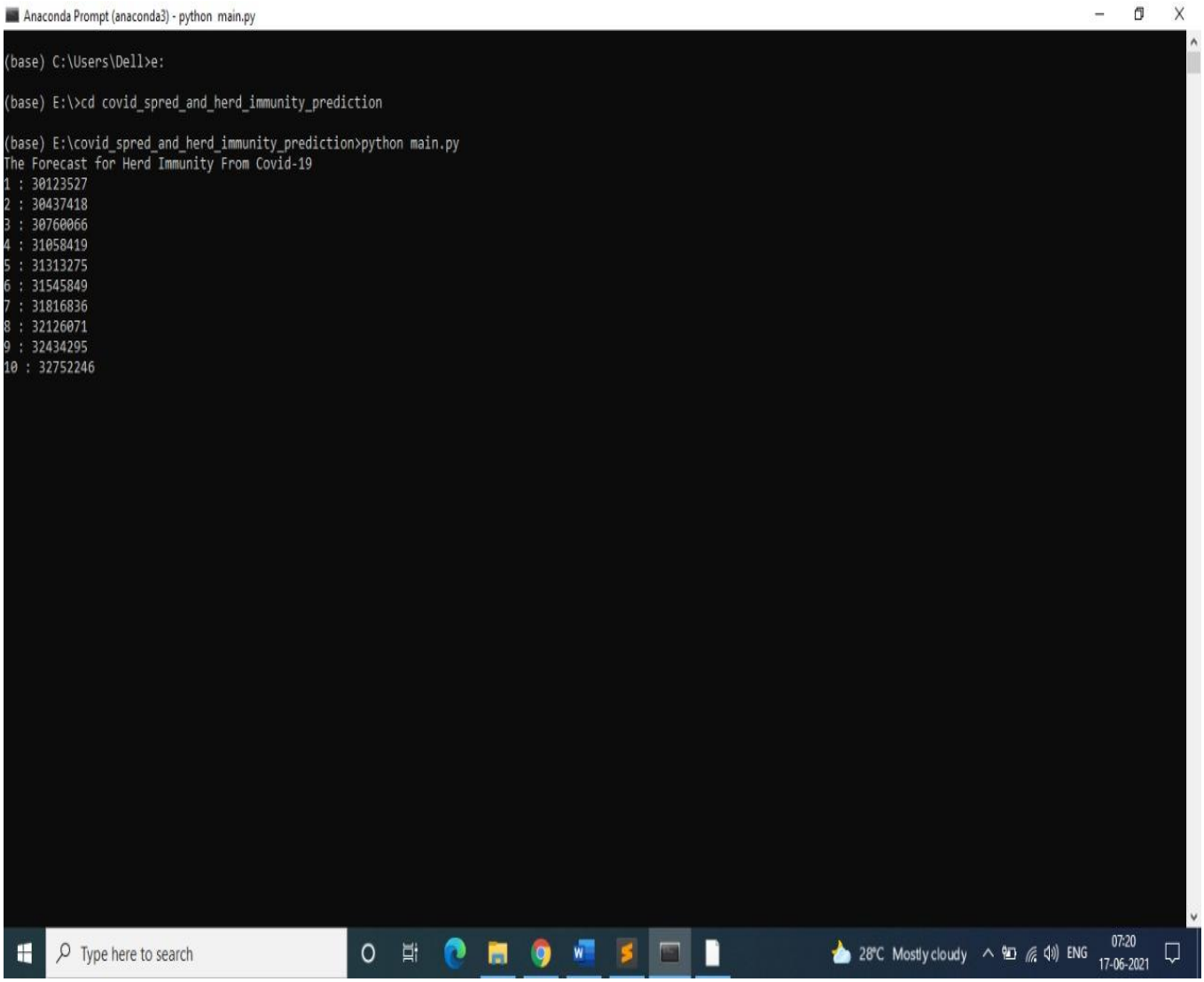


Figure 5.2.1 Herd Immunity Achieved

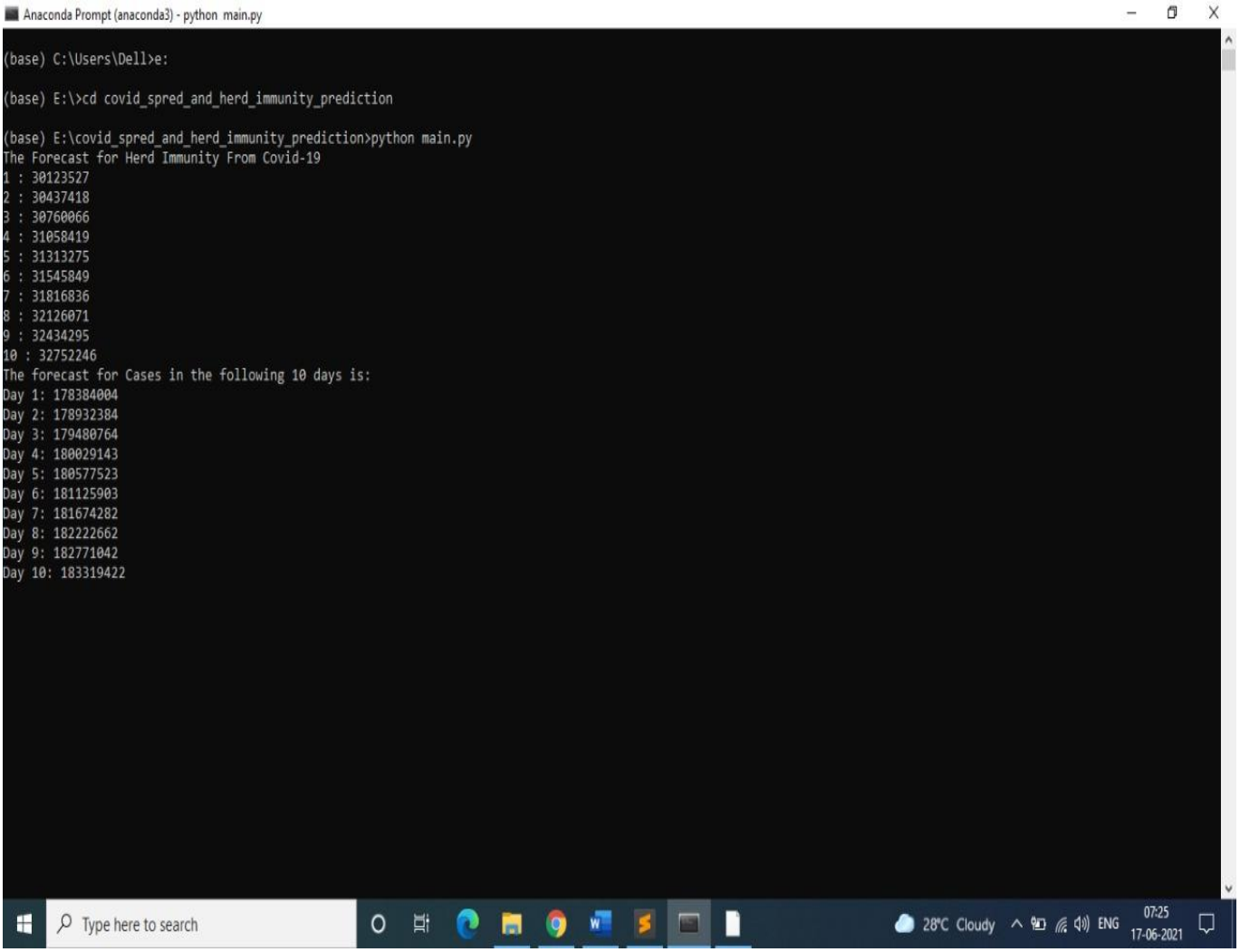


Figure 5.2.2 Herd Immunity with Daily cases

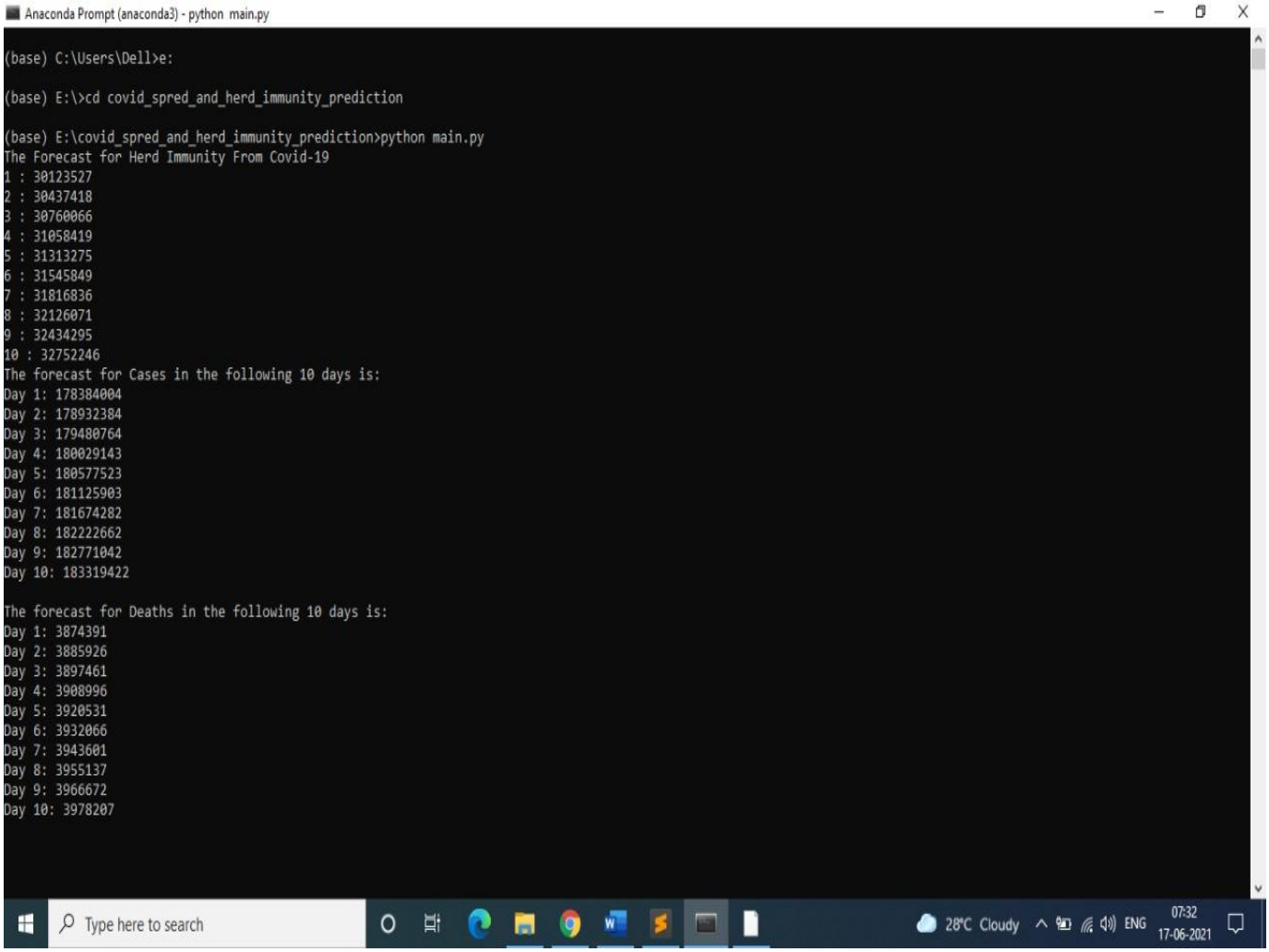


Figure 5.2.3 Herd Immunity and death with positives cases

5.2 Comparative Study

A case study is a research method for formulating or evaluating generalisations that apply to a number of situations. The junction of comparative with descriptive research methodologies can be used to identify the nature of comparative case studies.

One of the most effective strategies for explaining or exploiting tacit knowledge or implicit attitudes is comparison. This can be done by showing two slides of two somewhat different things or scenarios in tandem and asking individuals to explain their differences vocally.

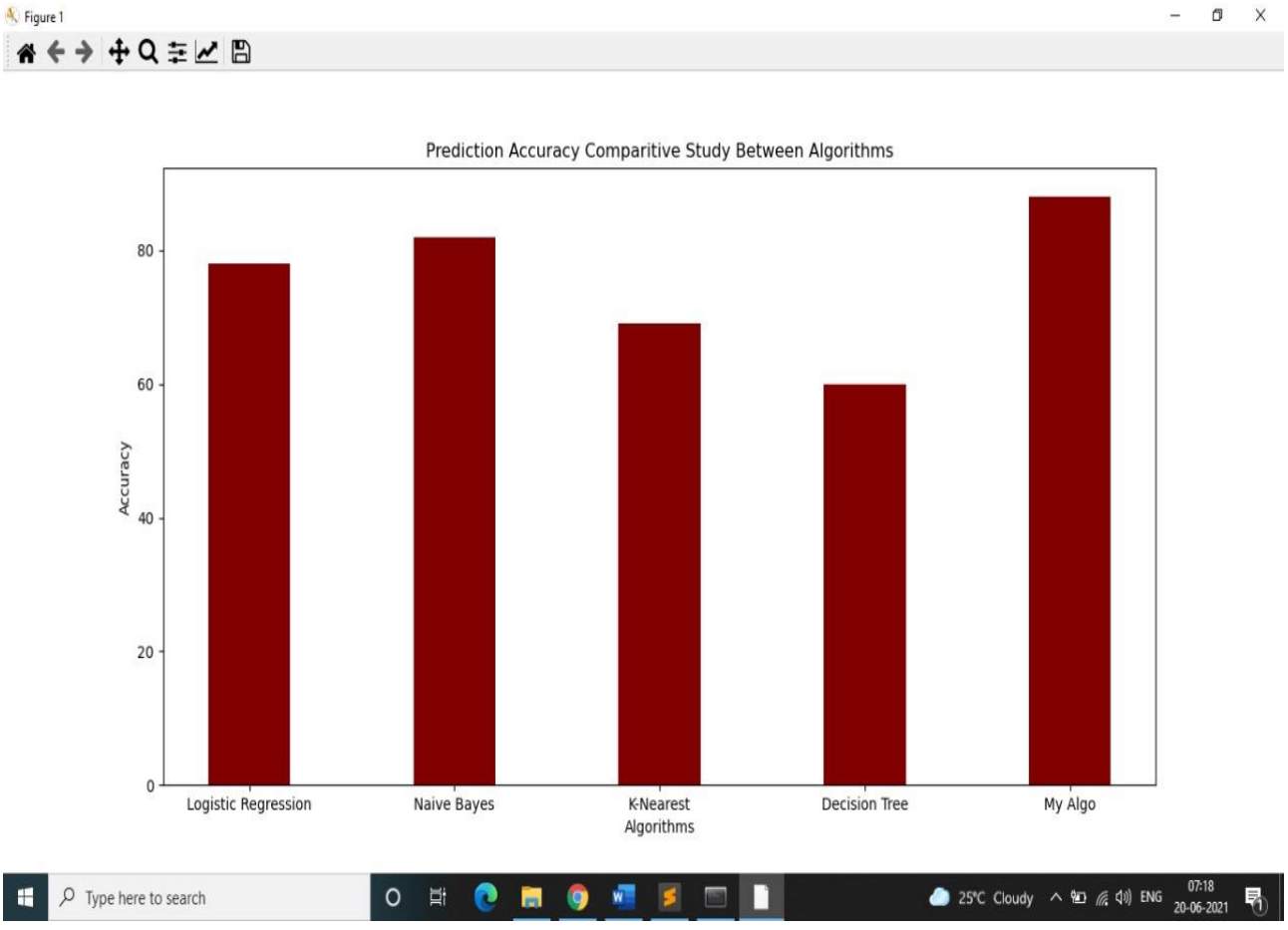


Figure 5.2 Comparative Study

The above graph is Shown the accuracy of My algorithm with 85=% accuracy

The Polynomial regression and MLP models aboard stock price dataset perform better individually without the addition of external parameters like petroleum and gold price. this is often resulting of |thanks to attributable to"> due to the noise present as a result of the merging of the info without adequate preprocessing and smoothing by moving averages.

Overall, MLP performs better than Polynomial regression altogether the scenarios. this is often due to its ability to recollect or forget the info in an efficient manner than Polynomial regression with moving averages, the Polynomial regression and MLP models both perform significantly better on the combined dataset over the quality base dataset. this is often due to the smoothing effect of the moving averages on the info which helps in learning the influence of the external parameters on the bottom stock price during a far better manner.

Overall, the MLP model with moving averages applied over the combined dataset was evaluated to be the foremost efficient model in predicting the stock prices for the longer term. it's also confirmed that there's a statistically significant change in predicting the stock prices by using MLP advanced model with moving averages. Therefore, it's concluded that the MLP advanced model with moving averages has the simplest result for predicting stock prices.

The implementation of Polynomial regression and MLP using moving averages are done separately. For future works, intraday prices also can be wont to compare the values and to know the volatility of the stock, petroleum and gold prices during a better manner. The stock sell and buy data also can be wont to understand how the stock price and external factors surge and dip have influenced the buying and selling pattern. this may help in developing a more accurate prediction. The models also can be extended to supply live interactive predictions supported the user given data and subsequently are often used for other forecasting problems like meteorology, disease forecasting and house price forecasting etc.

5.3 Table of comparative study & Accuracy

Algorithm	Logistic Regression	Naïve Bayes	k- Nearest	Decision Tree	My Algo
Accuracy	72	82	69	60	88

5.4 Discussion

The method is intended for those who have obtained herd immunity as a result of the corona disease and have taken vaccine to protect themselves; this was the only criterion used in its implementation.

Even though many people have developed protection as a result of earlier sickness, illnesses can still spread among children and infect those with compromised immune systems, whether or not they have been vaccinated. This was noticed before to the development of immunizations for several of the diseases described above. The examination of data based on immune system people who are vaccinated after recovering from COVID-19 and developing herd immunity

In a rational world, we would vaccinate people as quickly as possible while maintaining distance and other infection-prevention measures. This will demand a concerted effort on everyone's behalf. However, if we continue to vaccinate the population at the current rate, by the end of 2021, we may see a significant reduction in transmission in India.

Machin Learning technology has played a vital role in the prevention and management of COVID-19 in China, including personal tracking, surveillance and early warning, tracing of the virus's sources, drug screening, medical treatment, resource allocation, and production recovery. Location and travel data, medical and health data, news media data, government data, online consumption data, data acquired by intelligent equipment, and epidemic prevention data were among the data sets utilised. China has deployed machine learning

technologies to effectively prevent and regulate COVID-19. Countries must collect, clean, and integrate data from a variety of sources to mitigate infectious diseases; use predictive analytics techniques to identify a variety of data; create platforms for data analysis and sharing; and address privacy concerns in the collection and use of machine learning algorithms.

CHAPTER – 6

CONCLUSION

AND

FUTURE SCOPE

6.1 Conclusion and Future work

The goal of this proposed topic is to limit access to something that induces immunity without significantly incapacitating them. If there is no herd immunity, individuals will band together and spread diseases, and people will continue to die as a result. These articles evaluates herd immunity as a circumstance in which a significant fraction of a community is immune to a highly contagious disease. In this paper, polynomial regression and neural net model techniques are employed to predict the results utilising the provided dataset by identifying Herd immunity, forecasting daily instances, and categorising deaths.

The goal of the study and algorithm is to track instances and the different factors that affect them in order to create a solution that can be utilised on a broad scale to avoid virus spread and to construct facilities before a patient is admitted.

The algorithm developed in this study is based on Polynomial regression methodology and Multi-Layer Perceptron Neural net models techniques. In order to comprehend the COVID-19's growth rate, many data sets are considered. Because the virus is about to spread throughout the population, we need a system that can anticipate the number of cases that will occur.

The algorithm I proposed in my research would get the same result. It will make predictions based on the data available. The algorithm's test results indicate that it is in good working order, with an accuracy rate of 88 percent.

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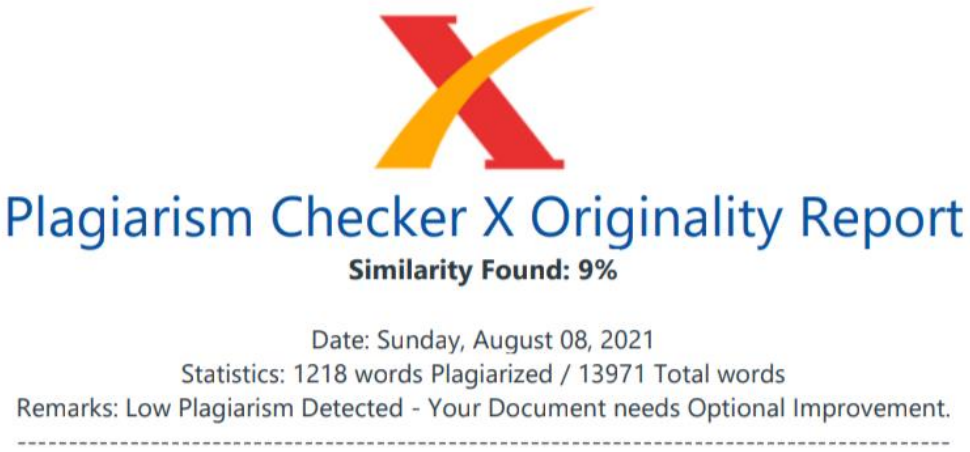

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An Approach for Corona Spreads Forecast and Herd Immunity Prediction with the Help of Machine Learning

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ABSTRACT

Corona-virus is the disease caused by the current Covid-19 that emerged in December 2019 in China. A coronavirus is a common virus that causes your nose, sinuses, or upper throat to get infected. Most coronaviruses are not harmful, SARS-CoV-2 disease that causes what physicians term a respiratory tract infection. Using Herd Immunity, we can slow the spread of this (COVID-19) disease Herd immunity occurs when a large part of a population (the herd) becomes immune to this disease, which makes it unlikely that the infection will spread from person to person. As a result, the whole population is not only covered by those who are immune. We can check a person has herd immunity or not to see the spread of this disease with the aid of predictive models. The goal of predictive modeling is to create a way for individuals to be efficient, accurate, and profitable.

Keywords-- Coronavirus spread, covid-19, herd immunity, predictive models, respiratory disease

INTRODUCTION

COVID-19 is a condition that can cause an inflammation of the respiratory tract that doctors name. This might harm your respiratory tract (sinuses, nose, and throat) or your lower respiratory tract (windpipe and lungs). It spreads the same way other coronaviruses do, mainly through person-to-person contact. Infections range between mild and fatal. The main symptoms are fever, coughing, shortness of breath, difficulty breathing, tiredness, chills, sometimes trembling, body aches, headache, sore throat, congestion/runny nose, and loss of smell or taste. This same infection could lead to pneumonia, respiratory failure, heart attacks, liver problems, septic shock, and death. With a great number of unique individuals, herd immunity can also be achieved. Recovering from a disease and developing antibodies against suspected pathogens with in population. The herd immunity threshold, exposure to an infectious disease, could transmit the bacteria quickly. The power of predictive modelling is predictive analytics. It is more of an approach than a process. Since, predictive models usually have an optimization through machine learning, predictive data modeling going hand in hand.

LITERATURE SURVEY

The following papers, along with their merits and demerits, are discussed in the following section:

Author- Richard O. Sinnott _Publish year- 2018, In this paper, "A Mobile Application for Dog Breed Detection and Recognition based on Deep Learning" proposed The Deep Learning proposal provides the ability to train algorithms that can solve issues related to data classification and data classification [1]. Prediction on the basis through raw data formulation (learning). The Deep Convolutional Neural Networks have one. Approach to commonly utilized image classification and recognition. All through this research, we developed a CNN-based basis for defining dogs. In potentially complex images, and then consider the acknowledgement of dogs by type/breed. Approximately 85% accuracy with breed classification for 120 other less common dogs, groups of dogs, and

64% accuracy for breed classification for 120 other less common dogs, groups of dogs.

Author- Ms. Deone Jyoti Bhanudas _Publish year- 2019, In this paper, "Prediction of Soil Accuracy Using Data Mining Techniques" explains the most efficient techniques and methods of optimization [2]. Effective crop preparation by the use of minimum capacity. The nation's view through layout counts on the economy's overall growth. Agronomy and agronomy, respectively, rely on soil and water. We provide the description within the same document of certain agricultural technologies. Through this, minimal water is used, and the greatest yield is increased. The farmer is indeed not aware of many guidelines and strategies issued by the government. We ignore research also on choice of crops to farmers with this one, irrigation. Paper seems to be the most precursors of any kind to calculate the accuracy of the surface with the help of various data mining cognitive style.

Author -Md Tanvir Islam Publish year- 2020, In this paper, "Diabetes Mellitus Prediction using Different Ensemble Machine Learning" This approach is a categorical approach to metabolic disorders accompanied by chronic hyperglycemia for a prolonged period. Unless diabetes is controlled [3]. The amount of glucose rises and can cause slight damage to the human vessels in the human body, heart, including kidneys that arise mostly prominently throughout the nerves. It is important to predict diabetes at an advanced phase to either get rid of these issues. Therefore, we have decided to do diabetes prediction research using Machine Learning Algorithms. In this study, we also collected real-time data from both diabetic and non-diabetic entities to train and evaluate our algorithms and common machine learning algorithms.

Author- Bolivar Chacua Publish year- 2019, In this paper, "People Identification through Facial Recognition using Deep Learning" The goal of this research is to identify individuals inside university buildings who have encountered vulnerability issues in mediated and untreated circumstance [4]. To this end, the architecture of a neural network (CNN) that was implemented on a GPU is being used by a fully convolutional one. The method consists of three phases: I training; (ii) learning; and (iii) classification. The preparation stage for CNN was carried out using VGGFace2's dataset. The research and learning of the sweeping generalisation of highly unequal facial business entities by shared control of the lack of feature vectors and core error signal of 512 bytes per face. In several experiments with different experiments, computers (SVM), including comparable levels and categories, a support vector will be used in the classification. A group of 128 students examined this same effectiveness of this technique in real-time using quantitative methods. Confusion Based statistics of its matrix.

Author- Deepa Bura, publish year- 2019, In this paper "Predicting Secure and Safe Route for Women using Google Maps" Google Maps is used for internet users [5]. In particular, to discover the routes between the destination and its corresponding origins. Although it provides users with various options here between desired destination node, many users need data in addition to pathway in terms of security, risk, nature of the route, and so on. Roughly 70 percent of women operate in today's world, so they need some security. Mechanism of safe and protected path. The paper proposes a method that predicts secure areas of plots only with help of Google.

Author- Andrew Bell, publish year- 2019, In this paper, "Proactive advising: a machine learning-driven approach to vaccine hesitancy" A useful case of the technique is this provision of individualised advice on the data that may often become reluctant to vaccine or are still hesitant [6]. Hesitant families can be identified with a higher accuracy (0.72) using a 44,000 pediatric electronic health data (EHRs) eligible fuzzy inference system versus estimating vaccine absorption based on a child's infant vaccination record alone (0.63). The model uses a small number of features of both the child and his or her home and social in way to produce a prediction. Making it easily interpretable by healthcare experts. The EWS would encourage a broad variety of proactive, anticipatory, and thereby potentially more effective public health initiatives compared to reactive approaches taken after vaccine rejection.

Author-Muhammad Azeem Sarwar, publish year- 2018, In this paper, "Prediction of Diabetes Using Machine Learning Algorithms in Healthcare" The aim of this

paper is to use machine learning to help practitioners and premature insulin prediction [7]. There are many machine learning applications and in structures, techniques being used predictive analytics implementation over big data in different fields. Health care is a difficult challenge through Advanced Analytics but will ultimately help clinicians make timely decisions on big data-informed decisions about just the patient's well-being and care. This paper discusses the subject of six different computers, predictive healthcare analytics, learning algorithms are used throughout the tenured position. A patient's medical record dataset is collected for the experiment and six different algorithms for machine learning are applied on the dataset. It addresses and compares applied algorithms in terms of consistency and accuracy.

Author- Shamsuddin S. Khan, publish year- 2018, In this paper, "Proposed model on Prediction and Analysis using an application of Health care" Trying to evaluate Regression contains scheme assessments and predictions [8]. Conceptually, a concept is information. Mix for Technology and Processing (i.e., Cloud Computing, Virtualization, and Machine Learning Ecc. etc.). One of the fastest days of machine learning (ML) is now one of Computer Sciences' rising computer engineering in medical services segments. ML's aim is to construct algorithms that can learn and also evolve as they grow older and can be used for the Prediction algorithm, which can communicate with the agent and can use those interactions to refine their learning actions. The purpose of ML is to create algorithms that can learn and also develop as they grow older and can be used for the Prediction algorithm that can interact with the agent and can use those interactions to automate one's cognitive development in which every person might be the agent proposed in this chapter Functional Implementation of Pseudo Intelligence via the Use of Well-being Care.

Author- Sonali Vyas, publish year-2019, In this paper, "Review of Predictive Analysis Techniques for Analysis Diabetes Risk" Continuous diseases in almost all countries that continue to boom in terms of resources and sense, whereas sustained growth, population growth tends to evolving practices that are marked by reduced physical activity and increased weight problems [9]. From either sample, we evaluated numerous cases of diabetes. In predictive analytics, Mellitus is based on a different algorithm, and we find that a single simulation forecast algorithm is not satisfactory in analytics.

Author- Xin Jia, publish year-2017, In this paper, "Image Recognition Method Based on Deep Learning" explains Deep learning algorithms are a subset of machine learning algorithms that aim to detect multiple algorithms [10]. Levels of renderings distributed. Recently, various deep learning algorithms have been proposed to solve this study to analyse the state-of-the-art deep learning algorithms in linear artificial intelligence issues. Computer vision by illustrating the contributions and concerns from recent study papers. Second, it provides an overview of different deep learning methods and their recent developments, and then briefly explains their implementations in various vision functions.

Author- Wenqian Chen, publish year-2017, In this paper, "A Hybrid Prediction Model for Type 2 Diabetes using K-means and Decision Tree" provides a very high prevalence of type 2 diabetes is observed all over the world [11]. The treatment and therapy of type 2 diabetes needs diagnosis at an early stage. Today, the techniques of data mining are gaining increasing significance in the practise of medical diagnosis through their ability to classify. In this article, a hybrid model of forecasting indicates that the diagnosis of type 2 diabetes helps. The suggested model is used within the K-means for data reduction with J488 as a classifier, decision tree, for classification. We used Puma Indians Diabetes Dataset, an experimental outcome from the UCI Machine Learning Archive, just for getting them.

Author- Ayush Varma, publish year-2018, In this paper, "House Price Prediction Using Machine Learning and Neural Networks" describes real estate is the least accessible market from your habitat [12]. Day after day and day out, housing prices continue to change instead of being hyped rarely instead of hyped occasionally. This is dependent on valuation. Predicting accommodation, with real variables, is a research plan, the main crux of our costs. We are working on making our own here. Assessments depend on some key

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parameter that is taken into consideration when the price is determined. We use multiple regression methods in this pathway, and our results are not the sole determination of a single one. Rather, the formula is the weighted average of similar methods to generate the most accurate outcome.

Author- Nitin Singh, publish year- 2019, In this paper, "Weather forecasting Using Machine Learning Algorithm" explains the activities of many primary sectors, such as agriculture, rely on the weather for development [13]. Nowadays, the climate is changing at a dramatic pace, which makes the old methods of climate modeling less accurate and more hectic. Improved and accurate methods of weather prediction were required to resolve these difficulties. The infrastructure of just a government and people's livelihoods are influenced by these forecasts. The key reason for this study is always to establish a weather forecasting system that can be used in remote areas. To forecast wind conditions, information analytics and machine learning algorithms, including certain random forest classification, are used. In this paper, a low-cost and portable weather prediction approach.
Author- Amsy Denny, publish year-2019, In this paper, "i-HOPE: Detection and Prediction System for Polycystic Ovary Syndrome (PCOS) Using Machine Learning Techniques" explains the current world population of women is widespread, Affected by preterm abortions, ovulation, infertility, etc. [14]. That is the Polycystic ovary syndrome (PCOS), a disorder, was found to be A large number of women of reproductive age have been shown to have Effect on the cause of infertility. In excess of five million women PCOS in their reproductive age world-wide. It is an endocrine that is A disease marked by changes in the levels of female hormones and abnormal male hormone development. This situation, this state. The risk of miscarriage is increased, resulting in failure of the ovaries. For infertility and. During a physician patient study of 541 women medical exams and consultations, the data sets required for such a process creation are obtained. Eight potential attributes of the 23 characteristics are derived from clinical and metabolic test results. Detected using SPSS V 22.0 on the basis of its importance. PCOS category with the characteristic set transformed with Principal Component Analysis (PCA) is conducted using different components Machine learning methods such as the classifier Naïve Bayes Approach, logistical regression, K-Closest neighbour (KNN), Trees for Classification and Regression (CART), Random Forest Classifier, Support Machine Support (SVM) in Spyder Python Edge. Results showed that the most effective and precise The PCOS prediction system is RFC with an accuracy of 89.02%.

MACHINE LEARNING

Machine learning (ML) is the study of computer algorithms that, via experience, improve automatically. It is seen as an artificial intelligence component. In making predictions or conclusions instead of being specifically programmed, machine learning techniques create a set population based on a sample, known as "learning algorithm".
There are two distinct methods that are: Supervised Learning and Unsupervised Learning.

Supervised Learning

Through its context with uncertainty, supervised machine learning constructs a model that makes predictions based on proof. A supervised learning algorithm takes a known set of data inputs and known data (outcome) responds and trains a model to make accurate predictions for the response to new data. Supervised learning builds forecasting analytics using classification, regression techniques and Support vector machine (SVM).

Classification Techniques

Numerical type labels are predicted by classifiers and continuous-valued functions are anticipated by predictions. Suppose we can build a classification model to identify bank loan applications as either safe or risky or a predicted method to estimate the $ spend of potential customers on computer equipment because of their income and occupation.

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Regression Technique

In regression analysis, parameters used as the factor or causal input and dependent variables used as response variables may be independent. In experimental experiments, the independent variable X is the variable that can be standardised, and the variable Y is the variable which represents the changes in the independent variable X. The amount of advertising expenditure in a business, for example, is subject to the demand for a particular product.

Support Vector Machine (SVM)

In regression analysis, parameters used as the factor or causal input and dependent variables used as response variables may be independent. In experimental experiments, the independent variable X is the variable that can be standardised, and the variable Y is the variable which represents the changes in the independent variable X. The amount of advertising expenditure in a business, for example, is subject to the demand for a particular product.

Unsupervised Learning

Unsupervised learning discovers in the data latent correlations even fundamental structures. It is used to draw looking at expanding inferences consisting of input data without labelled answers. The most prevalent unsupervised learning strategy is clustering.

Clustering

Clustering approaches accept data points of data as entities. Objects were grouped into classes or clusters, such that objects within a cluster are “similar” to one another and “different” from objects in other clusters. Imposed on either a distance function, proximity would be generally framed in terms of how “close” the entities are in space.

HERD IMMUNITY

Herd immunity, or mutual immunity, is when a significant majority of the population of a country remains vulnerable to a certain disease. If enough individuals are immune to the origin of a disease, as in a strain of bacteria, they have nowhere to go. While not every single individual can be excluded, there is protection for the entire society. This is because there are less high-risk people overall. Rates of infection drop, and the outbreak peters out. Herd immunity protects at-risk populations. This includes kids and others whose immune systems cannot resist themselves and are weak.

HOW IT WORKS

If a virus or bacteria is injected into the body, it causes the virus to ward away antibodies. While people heal, the body to maintain certain antibodies. Your body will defend itself against an infection that is different. That is what stopped the Infectious Disease outbreak in Brazil. Two years after epidemic began, 63% of its community reported sensitivity to a virus. Researchers believe that the right level of immunity for herds is already reached by the population. Vaccinations can create resistance as well. They make the body believe it is been infected by a strain of bacteria. You may not get sick, but protective antibody often forms in the immune system.

CHALLENGES OF DEVELOPING “HERD IMMUNITY”

The greatest obstacle to herd immunity to COVID-19 right now is that the virus infects the disorder is “novel”, nor new. This suggests that people have not been poisoned. Everyone else is at risk of infection once anywhere and. There is no current immunity for building this. Another potential problem is that we do not know how much better immune suppression is and how far it should last persons who have had COVID-19. Early monkey experiments showed that perhaps a year after, those who evolved immune to a virus who rescued themselves from a second infection. If the coronavirus is kind of like the flu, they can predict several weeks of safety.

CONCLUSION

This paper was written with the purpose of highlighting the researchers does in the past in field of “An approach of corona spreads

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forecast and Herd immunity prediction with the Help of Machine Learning" We addressed the different instruments and techniques used by the researchers for this reason. We also addressed the adoption of strategies, including object-based and holistic approaches. Prediction-based model that required the accuracy of forecasting to see assertively in which area it spread was large and small, whether a person has and has not and also shares it. From this study we can define herd immunity as situation which can protect the enough proportion of a population is immune to this highly contagious disease.

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AN APPROACH FOR CORONA SPREADS FORECAST AND HERD IMMUNITY PREDICTION WITH THE HELP OF MACHINE LEARNING

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Dr Jameel Ahmad Assistant professor –Dept. of Computer science &Engineering, University- Integral University, Lucknow (UP)

Abstract
Corona-virus is the disease caused by the current Covid-19, which first appeared in China in December 2019. Coronaviruses are a big family of different viruses. Some of these cause people to catch a cold. Others infect animals, including bats, camels, and cattle However, this SARS-Cov2 induced difficult for the infection to transmit via human to human. As a consequence, for those that are resistant aren't the first ones whom is protected. Covid-19, which was first observed in Wuhan, China in 2019, has now been declared a pandemic globally. We can delay the spread of this (COVID-19) disease by using Herd Immunity. Herd immunity occurs when a large portion of a population (the herd) develops immunity to a disease, making it more So, in an effort to develop a training dataset capable of predicting whether or not someone has herd immunity and forecasting regular positive cases of C-19 dependent upon certain medical attributes such Python-based Machine learning and data analytics resources were used.
Keywords: Covid-19, Herd Immunity, predictive models, respiratory disease, and coronavirus spread

1. Introduction

To identify the factors affecting online shopping in Thanjavur District The disease coronvirus is caused by SARS-CoV-2, a coronavirus that first appeared in December 2019 in China - Wuhan. Around 1965, researchers found first human coronavirus. It was the source of a common cold. Researchers discovered a group of related animals and humans viruses late that decade and named them after their crown-like appearance. SARS was first discovered in 2002, in south Asia, and it quickly spread to 28 other countries. At July 2003, over 8,000 individuals had been poisoned, with 774 of them dying. In 2004, there were just four more cases in a minor outbreak but in 2019. Through December 2019, first epidemic began at Wuhan, Hubei, China. Many early instances of COVID-19 were linked to visitors to Wuhan's Huanan Seafood Wholesale Market, but it's probable that human-to-human transmission was already occurring.

The World Health Organization (WHO) dubbed the disease "COVID-19" on February 11, 2020, which stands for coronavirus disease 2019. SARS-CoV-2, a newly found virus closely linked to bat coronaviruses, pangolin coronaviruses, and SARS-CoV, is the culprit that triggered the outbreak.

COVID-19 is a dangerous virus that has killed millions of people around the world and left others with long-term health problems.

The coronavirus is infectious and can spread from one individual to another. A laboratory test is used to diagnose it. The coronavirus is disseminated through droplets and virus particles released into the air when an infected person breathes, talks, laughs, sings, coughs, or sneezes, according to researchers. Larger droplets may fall to the ground in a matter of seconds, but tiny infectious particles can persist in the air and concentrate in enclosed spaces, particularly when there are a significant number of individuals and poor ventilation. COVID-19 prevention necessitates the use of masks, hand cleanliness, and physical separation. the COVID-19 incubation time Symptoms appear two to fourteen days after a person has been exposed to the virus. A person infected with the coronavirus can be communicable to others for up to two days before symptoms develop, and for 10 to 20 days after symptoms begin, depending on their immune system and the severity of their sickness. During recent samples, the National Institute of Virology (NIV) discovered a coronavirus subtype (Strain) by a double mutation named as B.1.617. Coronavirus's double mutant strain has been given the moniker. However, just a few days after its discovery in India, the mutant strain was detected in the UK in large numbers. These results demonstrate how quickly different strains can

spread and underline the need of preventing them. In parallel, several regions inside India having reported the Brazilian strain (P.1 Variant) and the U.K strain (B.1.1.7 Variant). Numerous governments totally dismissed the policy of pursuing herd immunity, and lockdowns became the dominant method of preventing the spread of Covid as vaccinations were rapidly developed. Human beings now have extremely effective vaccines, and global immunisation campaigns are in full swing.

This has inspired hopes that herd immunity may also be acquired after enough individuals inside a region were vaccinated — such that, after enough people were already vaccinated, this virus would have nowhere to go and die out. Herd immunity, often known as "population immunity," is the indirect protection from an infectious illness that occurs when a community is immune either through vaccination or immunity gained through previous infection, according to the World Health Organization. A World Health Organization (WHO) supports for establishing “herd immunity” via vaccine instead than enabling a disease to spread across any segment of the population, as this would result in unnecessary cases and deaths.

So, with this, we'll draw some conclusions based on machine learning algorithms to see if a person has herd immunity, as well as a forecast of daily cases and deaths. This would be quite beneficial, as it is critical to reduce death rates and to emphasis much more on those who've been vaccinated with herd immunity. Our primary goal in just doing accurate inspections would be to improve the lives of people in the herd while reducing the number of daily cases.

2. Literature Review

Author- Richard O. Sinnott _Publish year- 2018 [1] In this paper “A Mobile Application for Dog Breed Detection and Recognition based on Deep Learning” stated The Deep Learning proposal allows for the training of algorithms that can tackle data classification and data classification challenges. Prediction based on the structuring of raw data (learning). One must be found in Deep Convolutional Neural Networks. A method for image categorization and recognition that is widely used. We created a CNN-based basis for defining dogs during this research. Consider the acknowledgment of dogs by type/breed in possibly complex photos. Breed recognition rate was approximately 85 percent for 120 other less common dogs, groups of dogs, and 64 percent for breed classification accuracy for 120 other less common dogs, groups of dogs.

Author- Ms. Deone Jyoti Bhanudas _Publish year- 2019 [2] In this paper “Prediction of Soil Accuracy Using Data Mining Techniques” elaborate the most effective optimization approaches and strategies by using the smallest amount of capacity, effective crop preparation can be achieved. The entity ’s financial research to focus also on nation's outlook via layout. Soil and water are essential in agronomy and agronomy, respectively. Various agricultural technologies be discussed in a same document. Many of the government's guidelines and strategies are unknown to the farmer. With this one, irrigation, we essentially overlook studies on crop selection for farmers. Paper appears to be the most common predecessor for calculating the correctness of the surface using various data mining cognitive styles.

Author -Md Tanvir Islam Publish year- 2020 [3] In this paper “Diabetes Mellitus Prediction using DifferentEnsemble Machine Learning” This is indeed a systematic method to metabolic problems that are accompanied by long-term persistent hyperglycemia. Unless diabetes is managed properly. The amount of visceral fat elevates, triggering little damage to human body's blood vessels, heart, and kidneys, which appear most notably in the nerves. It is critical to predict diabetes at an advanced stage in order to either prevent or eliminate these problems. As a result, we've optedto use Machine Learning Algorithms to accomplish diabetes prediction study. We also used real-time data from diabetic and non-diabetic entities to train and evaluate our algorithms as well as other machine learning algorithms throughout this work.

Author- Deepa Bura, publish year- 2019 [5] In this paper “Predicting Secure and Safe Route for Women using Google Maps” Discovering the pathways between the goal and its relevant origins, in particular. Although it gives users a variety of possibilities between desired target nodes, many users require data related to the pathway, such as security, risk, route nature, and so on. At today's society, almost 70% of woman work, thus they require some protection. Mechanism for creating a

safe and secure path. The research presents a method for predicting map secure zones using simply Google.

3. Proposed Methodology

Step – 1 We'd start by creating a Dataset of wise corona patients and recovering patients from the data.
Step – 2 Furthermore, A dataset of medicine and healthcare organizations would be created, as well as a data collection of patients who have been diagnosed as having immunity without treatment.
Step – 3 After that, we'd filter the entire dataset and remove any redundant information (Invalid).
Step – 4 During the next section, we'll use polynomial regression and even a neural network model to collect data features and arrange datasets for training and study.
Step – 5 We'd next use the run algorithm to estimate the propagation of the corona virus and hearing immunity based on data sets for qualified and test subjects.
So, for both the optimum quality, we chose two main approaches: first is the polynomial regression methodology, that also aids in data analysis, and the second is the forecasting of herd immunity daily positive cases and daily deaths.

The function of methodology is described below;

- Polynomial Regression - Polynomial regression is a type of linear regression in which a polynomial equation with a given (n) degree is fitted to non-linear data, resulting in a when correlation values have a curved relationship

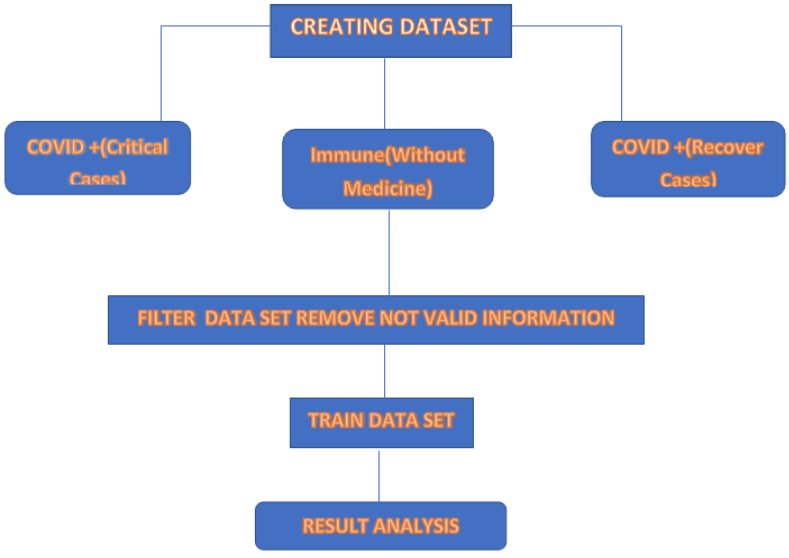
y= b0+b1x1+ b2x12+ b3x13+…… bnx1n

y □ Output variable (dependent)
x1 □ Predictors variable (independent) b0 □ is bias
b1, b2, are the weights of regression analysis

- Multi- Layer Neural models – A multi- layer Neural network models also known as Multilayer perceptron (MLP) is a feed-forward artificial neural network model that translates input data sets into appropriate output data sets. An MLP is a directed graph with multiple layers of nodes, each fully connected to the next. More than one layer of artificial neurons or nodes makes up a multi-layer neural network.

Neurons on Multi- Layer perceptron- A discontinuous function is calculated by standard perceptrons: x 7→ fstep (w 0 + h ~w,~x i)
MLP neurons calculate a smoother version of this: x 7→ flog (w 0 + h ~w,~x i)

Overview of the Methodology Presented



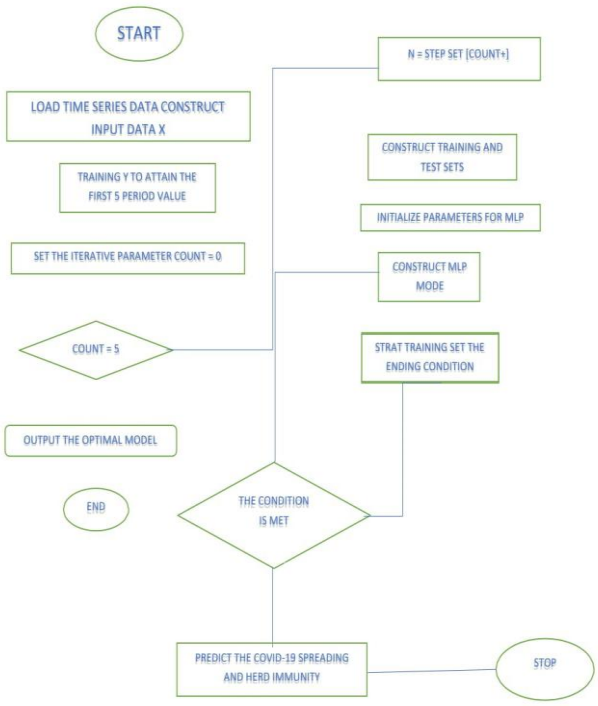
3.1 Algorithmic Approach

Input – The data set from COVID-19 website.
Site – *(HTTPS://WWW.WORLDOMETERS.INFO)*

Output - Model M
1 – Step set () □ iteration (data D.y)
2 – Count □ 0
3 – Dataset □ data_transform(DataD.stepset [count])
4 – n □ infinite
5– While count < 5 do
6– M □ Neural Model (data T)
7 – if n > count - then
8 – n □ count
9 – Mf □ M 10 – end if
11 – count □ count + 1
12 – end_while
13 – return Mf

This is the above description of pseudo code and the overall methodology that we will use to processing everything. So far, plenty of the data I've used could come exclusively from of the COVID-19 database, allow us to analyse the precise outcome of herd immunity, as well as forecast daily instances and deaths.
For a deeper analysis, use polynomial regression as well as the Neural Networks Model Also knowns as Multi-layer Perceptron (MLP) is a machine learning algorithm that predicts death & daily positive cases in COVID-19.

3.2 Complete Structural Outline

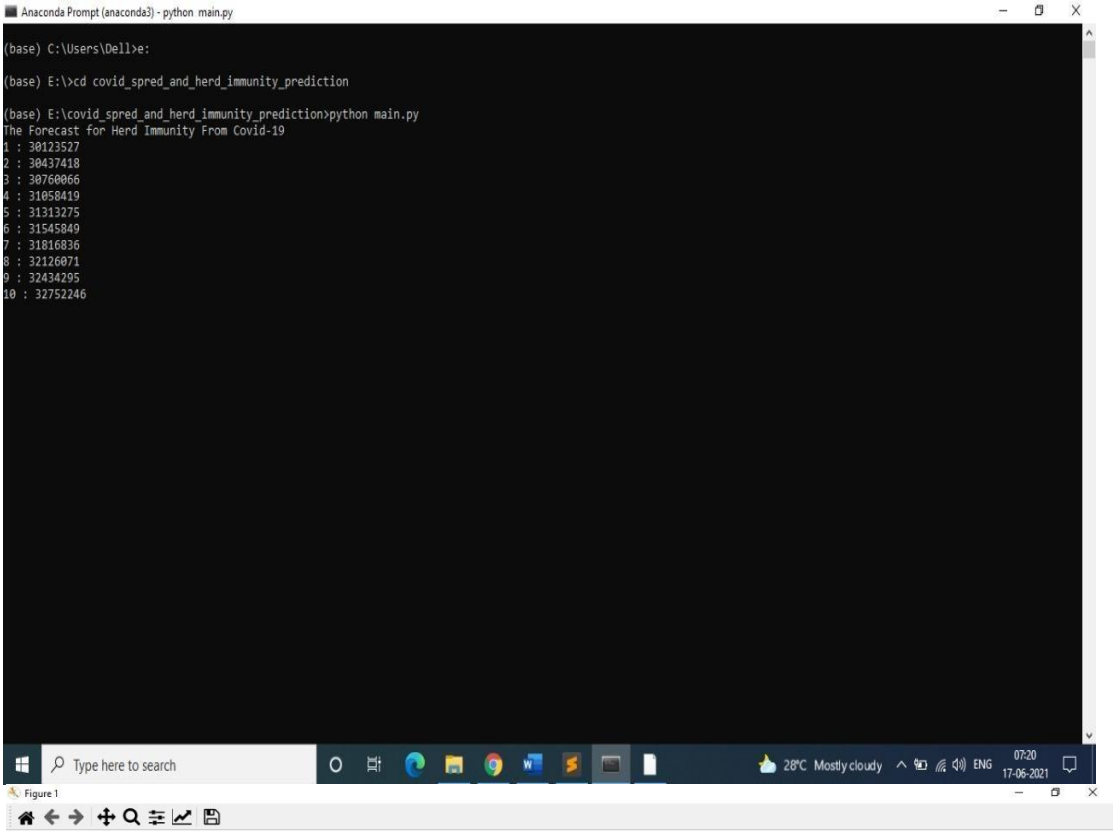


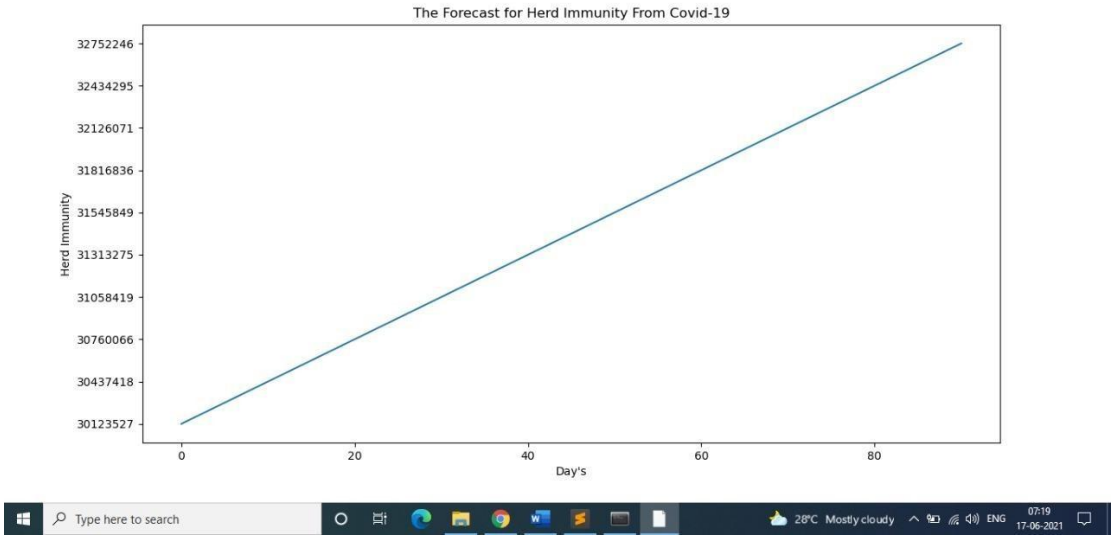
4. Experiment and results analysis

The research study demonstrates powerful analysis capacity and significance of polynomial and neural net models. Experiments are carried out using real-world data from the COVID-19 Website. The MLP would be used to process a data gathered by a web in order to properly determine the parameters affecting the prediction of Herd immunity and the forecast of daily positive and death

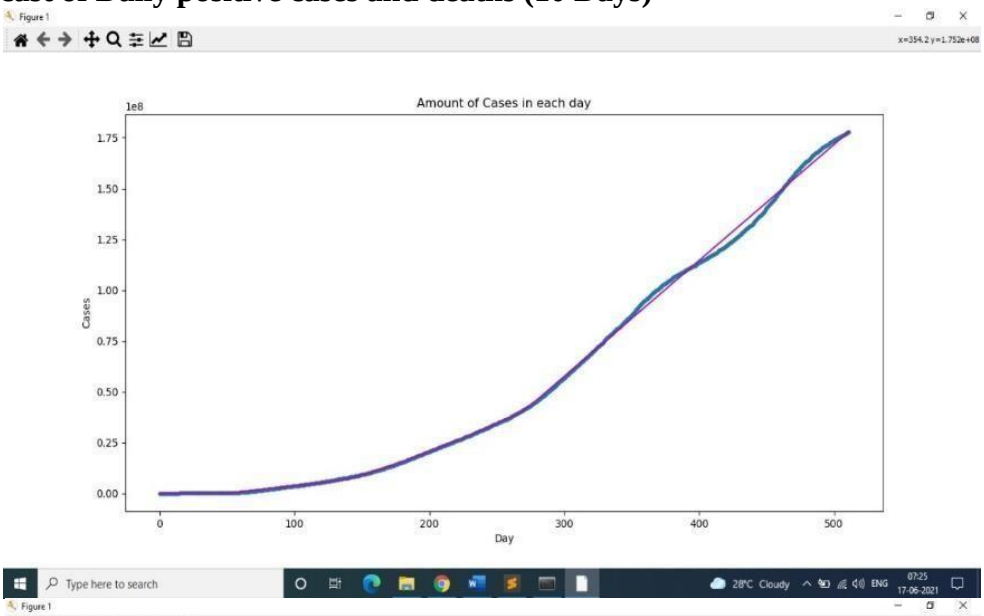
cases. This COVID-19 disease, as well as the pre-processing and analysis of datasets, as a result, in order to select the optimal categorization algorithm, A comparison including its method and MLP algorithms in high accuracy, precision, and model creation time has also been undertaken for generating the prediction model**.**

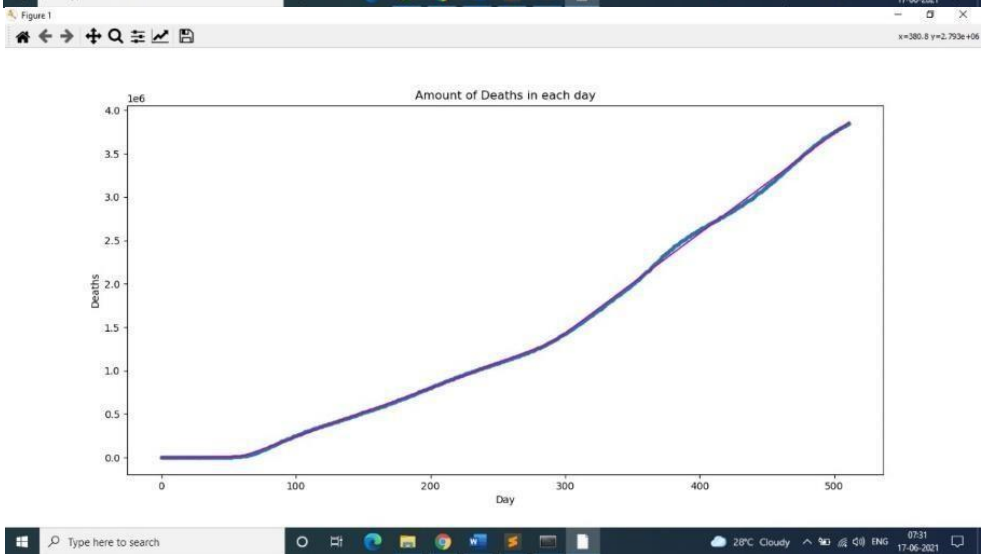
4.1 Herd Immunity achieved

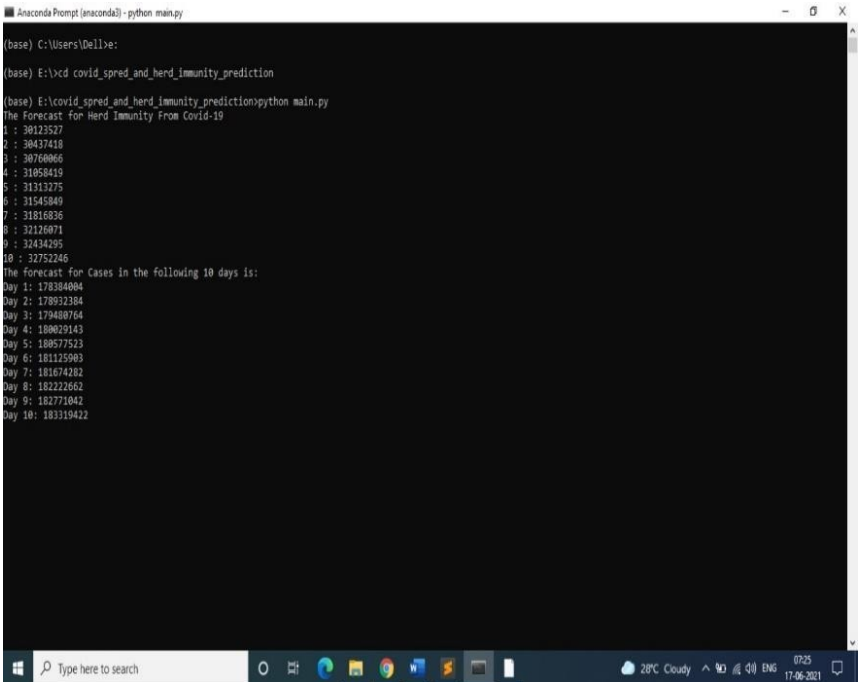


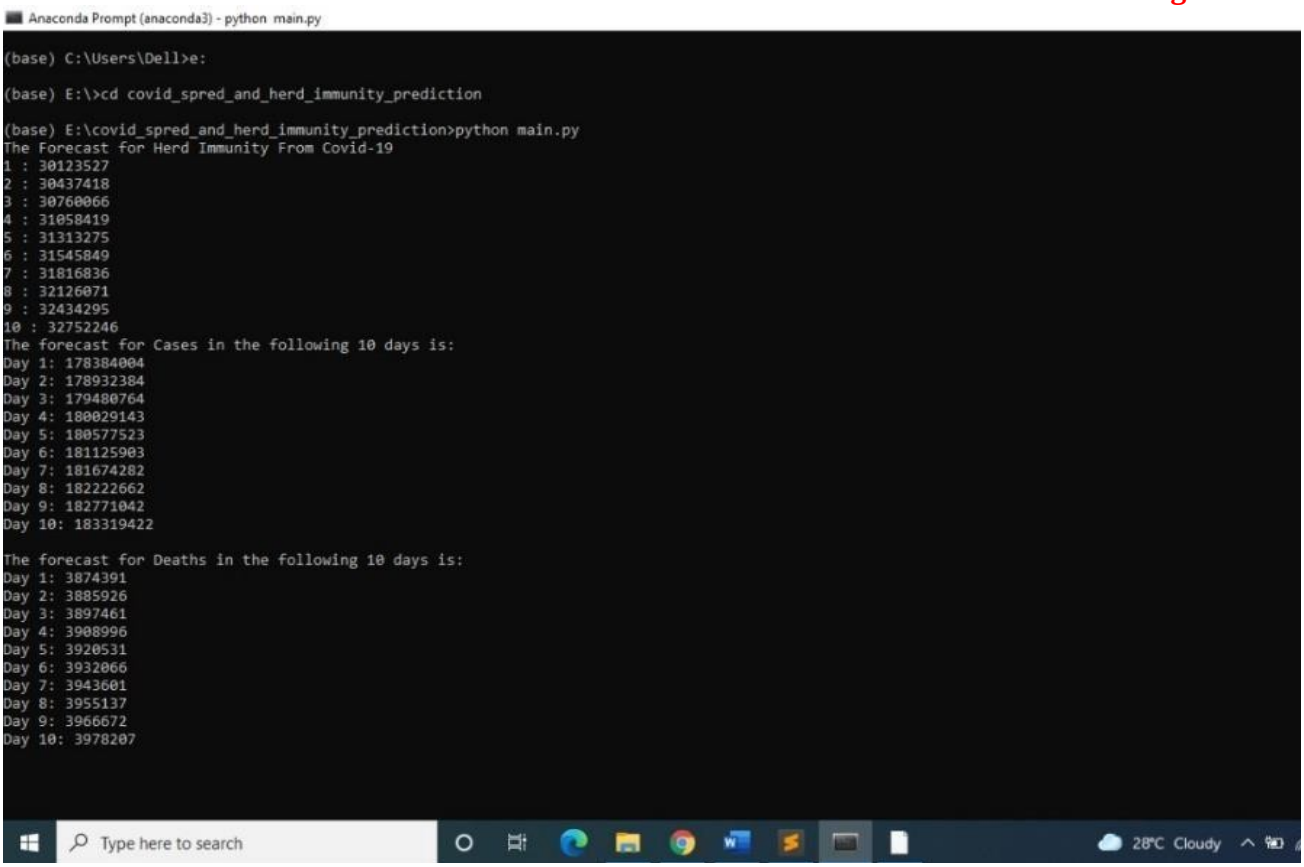


4.2 Forecast of Daily positive cases and deaths (10 Days)









So this is the entire process of how we obtained the analysis and forecast of this deadly disease, using neural net models to highly predict the evaluation of how we are going to immunise using this analysis approach, and this is the best methodology so far for this specific dedicated datasets used in this pre- processing system. Our approach is really useful in this analysis system since it allows us to obtain the result at earliest.

4.3 Comparison between the good predictive algorithm

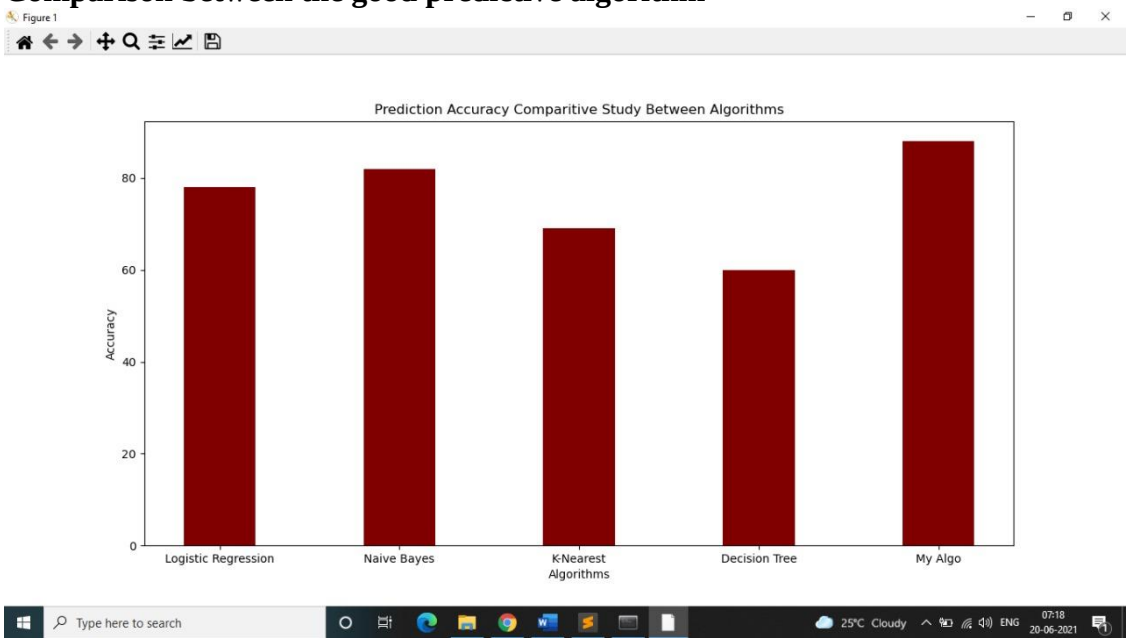


Table No.4.3: Comparison between the good predictive algorithm

Algorithm	Logistic Regression	Naive Bayes	K-Nearest	Decision Tree	My Algorithm
Accuracy	78	82	69	60	88

5. Parameter Used

The strategy is aimed at persons who have developed herd immunity as a result of the corona disease and have taken vaccine to protect themselves; this was the only criterion employed in the implementation. Even if many people have obtained immunity as a result of prior illness, diseases with or without a vaccine can still spread among youngsters and infect those with compromised immune systems. This was observed for many of the diseases mentioned above before to the development of vaccinations. The analysis of results based on immune system people who get vaccinated after the COVID-19 recovery with the development of herd immunity

In the best-case scenario, we vaccinate people as soon as feasible while preserving distance and other infection-prevention measures. This will necessitate a deliberate effort on the part of everyone. However, if we continue to vaccinate the population at the current rate, we might see dramatic decrease in transmitting in India by the end of 2021.

6. Conclusion and Future work

This proposed topic is all about exposing people to something that induces immunity without incapacitating them severely. Individuals will band together and spread diseases if there is no herd immunity, and regrettably, people will continue to die from this sickness. Herd immunity, as defined by this research, is a situation wherein a sufficient proportion of a community is immune to a highly contagious disease. In this paper, polynomial regression and neural net model techniques are used to identify Herd immunity, forecast daily cases, and category deaths in order to predict the results using the available dataset.

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Authored By

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Research Scholar –Dept. of Computer science &Engineering, University- Integral University, Lucknow (UP)

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