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5-G HEALTHY SYSTEM DURING CORONAVIRUS (COVID-19)

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Master`s Thesis

Supervisor

Prof. Dr. Galip CANSEVER

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The thesis titled 5-G HEALTHY SYSTEM DURING CORONAVIRUS (COVID-19) prepared by Mohammed MUAYAD MURSHED and submitted on 00/00/2023 has been **accepted unanimously** for the degree Master of Science in Architecture

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	University	_____

I hereby declare that this thesis meets all format and submission requirements of a Master`s Thesis.

Submission date of the thesis to the Institute of Graduate Studies: ____/____/____

I hereby declare that all information/data presented in this graduation project has been obtained in full accordance with academic rules and ethical conduct. I also declare all unoriginal materials and conclusions have been cited in the text and all references mentioned in the Reference List have been cited in the text, and vice versa as required by the abovementioned rules and conduct.

Mohammed Muayad Murshed ALANI

Signature

DEDICATION

This thesis is dedicated to my mother, and my father, without their endless love and encouragement I would never have been able to complete my graduate studies. I love you both and I appreciate everything that you have done for me. This thesis is also dedicated to my brother, who was there for me throughout this process and gave me lots of support.

PREFACE

I also thank and humbly acknowledge my father and brothers who have continued to be my rock in terms of love, support, encouragement, and prayer. I will forever be grateful to them. Thank you for your help, support, and love. I am the luckiest person in the world to have you in my life.

ABSTRACT

5-G HEALTHY SYSTEM DURING CORONAVIRUS (COVID-19)

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This study's primary goal is to identify knowledge gaps and the most often used information mining techniques in the body of current literature. Novel coronavirus pneumonia has become a significant public health concern, particularly COVID-19. In the academic community, information extraction techniques have been used to uncover concealed knowledge as the possibility of a widespread raises open concerns for wellness. A methodical investigation was carried out using the use of the PubMed, Scopus, and Internet of Science databases. There were 515 million COVID-19 cases and about 6 million deaths worldwide as of May 2022. According to estimates from the World Health Organization, 115,000 healthcare workers died from COVID-19 between January 2020 and May 2021. Patients with impaired immune systems and nano-oncology for the Web of Nano Technologies (IoNT).. There are still issues that need to be clarified and addressed in order to plan clinical execution. These cover the following topics: foundation and breadth; health risks; security and comprehension of information security; artificial intelligence; blockchain; IoT and 5G utilization; authorization; ongoing acknowledgement; and final client education on these technologies.

Keywords: 5-G, Corona Virus (Covid-19), DL, ML, Dataset.

TABLE OF CONTENTS

Pages

LIST OF TABLES

Pages

LIST OF FIGURES

Pages

1. INTRODUCTION

MenPas, a tool for psychosocial assessment, was developed by the University of Malaga in 2008. 1. When compared to the same period last time, data transmission surged dramatically during the COVID-19 insulating period (March and April of 2020). Finding out how this platform was used during the two time ages is the main goal of this study. Therefore, we would want to answer the following questions. Therefore, we investigate if Mempace druggies' operational habits were impacted by the COVID-19 pandemic. In order to solve this, we used cluster analysis techniques (data mining) to classify bean repliers into quotient sets (clusters). With the use of this multivariate analysis approach, data is divided into groups that are as diverse as possible both within each set and among themselves. Specifically, the K-Means system is employed to determine the deviation of the data from the mean value of each variable.

Artificial intelligence (AI), a novel medical imaging technology, is assiduously supporting the fight against COVID-19. Artificial Intelligence (AI) enables the creation of image processing methods that are safer, more accurate, and more efficient than conventional methods that primarily rely on human labor. The primary recent AI-powered uses in COVID-19 include specialized imaging platforms, lung and infected region segmentation, clinical assessment and diagnostics, and creative abecedarian and clinical investigation. Additionally, a plethora of commercially viable products that successfully use AI to combat COVID-19 have been developed, pushing the boundaries of technology. The inaugural online conference of Medical Imaging Computing Seminar (MICS), an association of China's leading medical imaging academics and start-ups, had 10,000 attendees on February 18, 2020.

This research aims to investigate in detail the role that medical imaging plays in the fight against the virus, especially in relation to its AI-enhanced aspect, given the broad applicability of AI across the board in the context of COVID-19 image analysis. I'm doing it myself. both rational and useful investigation. Before discussing his COVID-19 intelligent imaging system, the paragraph that follows provides an introduction of machine literacy methods for segmentation, opinion, and prognostication. Additionally, a range of publicly accessible datasets are provided. We'll eventually bandy some unresolved

problems and difficulties. We intend to train radiologists and academics using this design. Examine the most recent COVID-19 studies based on medical pictures up until March 31, 2020.

Chinese officials recorded one casualty and forty-one hospital admissions without a stated reason on December 8 in Wuhan (1). This cluster signaled the beginning of an outbreak of respiratory illnesses caused by the coronavirus, or COVID-19. Prior to the epidemics, the wet request was linked to the infection, but death-to-death transmission caused widespread pandemics throughout the country(2).

An exponential wind was created to read the number of instances during the next two weeks, up until March 30, 2020, using heuristic methods and WHO status data. The 58th script report was used to estimate the model later on. The problems indicated a 1.29 journey. Additionally, they predicted that by March 30, 1 million cases outside of China might have been included in the 70th and 71st WHO reports on progress, provided the current trend continued for the next 17 days. Simply said, country-position statistics on the number of cases, losses, and other coronavirus-specific information are the rates that are utilized to attempt to identify them. Consequently, the threat categorization problem is based solely on prior understanding of the epidemic's class. Classifying epidemic threat and medication based largely on demographic and geographic factors is now a challenge. Our objective is to create a generalizable model that can predict how countries will respond in the future, should a new epidemic crop before exact facts are available. Figure 1.1 provides evidence of the scene textual content discovery and knowledge.

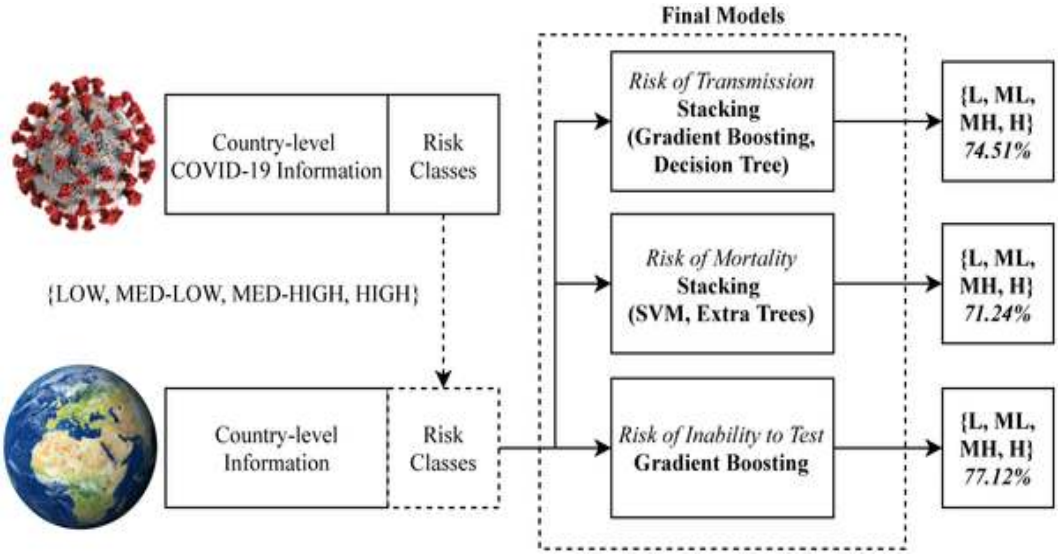

Figure 1.1: Classification Based in Covid-19.

1.1 MOTIVATION

The focus of research in textual content discovery is on developing novel approaches to discovery and creating new, textbook-specific viewpoints that accurately delineate the regions of textual material. The Experimenter labored on recognizing textual material the utilization of an admixture of ripples and achromatism angles in a videotape frame(3). Following marine contamination, three high-frequency sub-bands were obtained from the three achromatism bands. In addition to elucidating the textbook pixels, each of the three sub-bands for each shade band was considered common. Students completed the Elementary Motivation Scale in French to assess the degree to which provocation is managed throughout computation assignments (4). This check consists of nine questions that assess identity, foreign regulation, and IM. To indicate if they agreed with each statement, actors had to respond to each question with a double "yea/No" (for example, "Learning how to carry out calculation is important in life" or "I do calculation for the benefit of my parents and preceptors").

1.2 OBJECTIVES

This data set has advantages over the others. The goals of the proposed search are to provide a framework based on portions of natural scene prints for automatic textbook recognition and attentiveness.

Since there are no identical items in the training groups, the results are improved.

The dataset's parameter cases are helpful for bracket techniques that use comparisons, and its strength is improved every day.

Relative result verification is possible because to the availability of a respectable number of training and test datasets.

Because there are no outliers in the datasets, studies can employ clean, verified data.

1.3 PROBABLE STATEMENT

For many children and adults, the COVID-19 pandemic that is spreading havoc around the world is contributing to a drop in academic performance. All scholars will be very concerned about the trauma this epidemic causes, especially those who live in impoverished surroundings, as well as the academic achievement gap this infection brings to public seminaries. Undoubtedly, the most fortunate kids on the planet may observe continuous instances of what could be called "negative nonage gests." Most communities will see this pandemic confirm the suffering experienced by families living below the poverty level. Only when seminaries create a secure and probative environment for kids can academic recuperation start. After this is accomplished, the access to technology gap formerly caused by poverty needs to be closed. Closing the literacy gap requires visionary sweats to be made as early as feasible. Evaluate internal health concerns, address them, and consider how they may affect vulnerable populations. Break down social-emotional barriers by addressing trauma and reaction SEL (social-emotional literacy) techniques are diverse in every context.

1.4 THESIS ORGANIZATION

The study findings are arranged in the following five chapters.

Chapter 1 (Introduction); provides an overview of text content detection and focus from natural scene pictures. It explains the components, applications, goals, and challenges of identifying text content for this research.

Chapter 2: Review of Literature This chapter highlights relevant past work in the subject of text content identification with a focus on photos. It outlines the popular datasets that are accessible, text content identification techniques, and other methods used in previous relevant lookup work.

Chapter 3: The Methodology; this chapter provides the suggested approach that was used for the investigation. The strategies are described in theoretical and mathematical terms here.

Chapter 4 (Result): The experimental evaluation procedure and results are thoroughly discussed in this chapter. Here, numerical and graphical examples are used to define the relative efficacy outcomes.

The outlook's conclusions are covered in Chapter 5 (Conclusions), which was completed in tandem with the search.

2. LITERATURE REVIEW

2.1 INTRODUCTION

Globally, there is currently a severe and fatal COVID-19 pandemic caused by SARS-CoV-2. Since its discovery, the fast spreading coronavirus has caused concern all around the world. As of May 5, 2021, there have been 154,988,353 confirmed cases and 3,241,164 deaths [5]. COVID-19 will take place in Wuhan, China in December 2019. Right now, the number of instances is rising quickly. Traditional Technology This pandemic has proven too strong for the medical community to contain. Researchers, policymakers, think tanks, and industry professionals are looking for novel technology to manage this coronavirus outbreak. Currently, in order to help individuals deal with this epidemic, medical practices and practitioners need to have access to timely and accurate information as well as countermeasures. Cutting-edge digital technology can be a useful tool for treating COVID-19, slowing its spread, and controlling it. Create medications and vaccinations. Greater knowledge of the precautions, prevention, and readiness needed for COVID-19 is another benefit of information access. The only thing that can guarantee public access to COVID-19-related material is current, cutting-edge technology. Many academics [2–8] believe that people should have access to COVID-19-related information using cutting-edge digital technology. Big data, artificial intelligence (AI), deep learning (DL), the Internet of Things (IoT), 5G, and 6G are all part of this. These technologies are essential for resolving significant clinical issues and dismantling obstacles to people's information access.

Machine learning (ML) is one of the most promising methods for quickly and reliably evaluating enormous amounts of data. Analytical models are easier to create with the use of ML, a data analysis technique. The idea behind the artificial intelligence area known as "machine learning" is that computers are capable of learning from data, identifying patterns, and making decisions with little to no assistance from humans [6].

After being discovered for the first time in Wuhan, China in December 2019, the novel coronavirus, or COVID 19, is spreading swiftly throughout China and several other countries. Addressing this epidemic is a global issue that needs to be addressed. The figure from the World Health Organization is generating enormous amounts of data. Every day,

there are more verified cases of the coronavirus. Extensive case studies have demonstrated the clinical characteristics of pneumonia patients [7].The country's coronavirus sickness classification is shown in Figure 2.1.

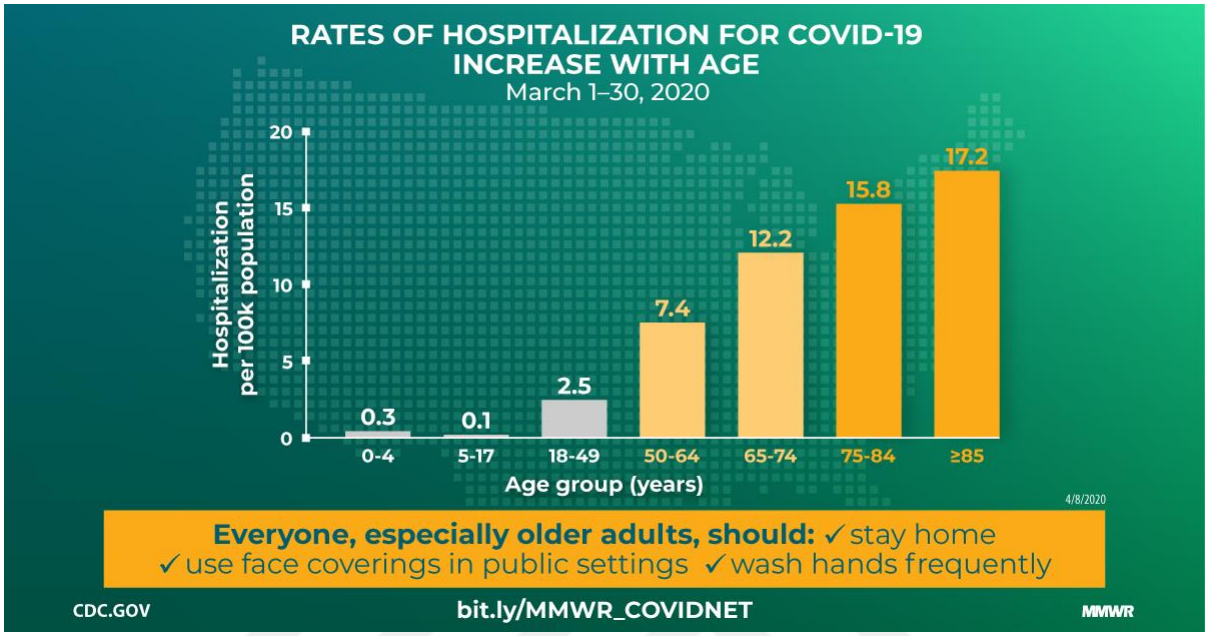

Figure 2.1: Country Wise Classification of Status of Corona Diseases

There is still a (SARS-CoV-2) outbreak. More people are becoming infected as the virus spreads swiftly. There has been 1,133,758 cases of her COVID-19 reported from over 200 countries and territories by April 5, 2020, with an estimated 62,784 deaths (case fatality rate of 5.54%). The reason for this is that on March 11, 2020, and January 30, 2020, respectively, the World Health Organization (WHO) declared the disease to be a pandemic and a Public Health Emergency of International Concern (PHEIC). 2020 It is a major public health concern in the global community.

The quick development of DT has increased demand across the board. In a larger sense, artificial intelligence (AI) includes deep literacy. AI's compass also includes symbolic structures in addition to DP. Emblematic systems generate intelligent gestures by manipulating symbols and applying sense. Examples include information graphs and expert structures. Expert systems form judgments based on if-extra rules. BenevolentAI's use of Knowledge Graphs is unquestionably beneficial for COVID-19 measurements. Information graphs in graph data structures maintain connections between items. A

technological revolution is occurring in several related fields, including information, health, and emerging technologies, all of which are included in health information technology (megahit). In actuality, this shift is away from conventional medical procedures and toward the application of cutting-edge technologies to promote growth throughout the entire healthcare process. Megahit incorporates several cutting-edge technology. Those looking for drugs and healthcare can profit greatly from these inventions. Compared to other healthcare systems, information systems (IS) have had a greater impact on the COVID-19 pandemic. These systems aid in data management, ensuring prompt communication of necessary dispatches. They also improve healthcare by providing intelligence, which adds to the evidence needed to establish programs and strategies, adopt conduct, coordinate other fundamentals, and form opinions. Healthcare systems rely largely on 5G (fifth generation) networks to support smart healthcare operations, however their limited bandwidth resources don't provide a long-term backup for the quickly expanding related operations. Sixth generation (6G) networks provide greater services than fifth generation (5G) networks in terms of bandwidth, effectiveness, prospects, and data pets.

The three main categories for 5G deployments are mMTC (mechanical massive dispatching), URLLC (ultra-reliable low quiescence), and eMBB (enhanced mobile broadband). Through VHS conversations and Internet connectivity, it can facilitate telemedicine through mMTC. It can also facilitate the use of autonomous, colored vehicles and drones to monitor infectious diseases like COVID-19. However, 5G's services are still unable to handle advancements in disaster relief and medical technologies. Specifically, Internet of Medical Effects (IoMT) device connectivity, telemedicine security and sequestration, telemedicine dispatches in places with sparse infrastructure, and genuinely trustworthy and low anticipation dispatches for mixed reality tele-surgical treatment Robotics and digital technology can provide better medical installations, particularly in light of the current pandemic (8). If authorities are qualified to create cutting-edge information systems (IS), people will be better served. Information systems (IS) can ensure access to vulnerable people when caring for them by providing precise, timely, productive, coordinated, and real-time data to support responsive and health-promoting recommendations. Differences in public and regional health can only be ruled out if

individuals have simple access to information systems (IS). Since data is the foundation of information technology (IT), frequent data production, collecting, operation, and analysis is necessary for IT governance. It also necessitates the establishment of a framework through the use of cutting-edge technology, computer programs, and real-time databases. This process requires the integration and collaboration of state- of- the- art technologies similar as big data, AI, deep literacy, IoT, and machine literacy

The authors proposed to use nonlinear autoregression of artificial neural networks (NARANN) to evaluate the total number of COVID-19 vindicated cases in Egypt. They then compared their results to those of autoregressive integrated moving normal. The results of this investigation show that, based on interesting statistical criteria, NARANN performed better than ARIMA.

To read the return of infected individuals, five data mining algorithms were developed using an epidemiological collection of COVID-19 cases in Korea. In this investigation, the arbitrary timber system yielded the results with the least amount of uncertainty when compared to the other models. Artificial neural networks were incorporated into the SEIR epidemiology model in order to assess the extent and peak of the COVID-19 pandemic. The authors claim that while the dynamic SEIR model was successful in predicting the size and apex of the epidemic, it ignored factors like individual capacity and seasonal products that could have increased the number of confirmed cases. employed demographic, health, and geographic data on COVID-19 cases to predict recovery or death liability and case inflexibility. This work combines the algorithmic grid hunt and the AdaBoost algorithm with an arbitrary timber model.

Reverse recap-polymerase chain reaction (RT-PCR) testing is the most reliable method for connecting COVID-19 individualities. However, RT-PCR assays consistently decline abruptly, especially in many regions that were not greatly impacted by the initial pandemics of the disease. Erroneous negative results in laboratory testing are also common due to numerous factors, such as sample processing and quality control. Accessible imaging resources such as coffin CTs and coffin X-rays are extremely beneficial to clinicians. Many instances, particularly in China, were permitted to be classified as COVID-19 when specific symptoms were visible on CT scans. In fact, suspected cases

were either hospitalized or isolated for additional testing if they showed no clinical symptoms (such as fever or cough). Due to the high rate of false-positive results in nucleic acid testing, numerous questionable cases must undergo numerous tests at various ages before a definitive conclusion can be reached. Therefore, imaging problems are essential to stopping the spread of infections and fighting COVID-19.

Taking chest CT as an example, the workflow of image-based diagnosis of COVID-19 generally has his three stages:

a. Prescan preparation,
b. Image acquisition, and
c. Disease diagnosis.

During the pre-scan preparation step, a technician instructs each subject to pose with her coronavirus disease 2019 (COVID-19), which is induced by the bed of a severe acute respiratory syndrome coronavirus 2 patient, in accordance with a preset protocol. Encouraged and backed by As the CT scans are being taken, she holds her breath for a single second. Scanners run from the top to the base of the lung. The scan is conducted from the level of the upper thoracic inlet to the lower level of the rib angle, using optimal criteria that the radiologist has defined based on the patient's morphology. Her CT scans will be reconstructed using the acquired raw data and sent via a picture archiving and communication system (PACS) for additional examination and diagnosis.

Coronaviruses are members of the Nidoviridae family of enclosed RNA viruses, which are almost spherical in shape. Virion particles have an average diameter of 120–160 nm. This virus was called a "corona" virus because the birion particles are often adorned with petal-like protrusions (spike proteins) that resemble a crown when viewed under an electron microscope. Coronaviruses are distinguished from other RNA viruses by having a very large genome (~28–32 kb). As of right now, coronaviruses are found in a wide range of non-human animals, including pigs, cats, rats, cattle, bats, pigeons, and ducks. The primary clinical symptoms of these viruses are intestinal and respiratory disorders (Figure 2.2). Despite having a long history, coronaviruses were not widely known until the 1960s. The abrupt 2002–2003 outbreak of severe acute respiratory syndrome (SARS) in the southern

Chinese province of Guangdong brought coronaviruses to the forefront of medical research. Three groups comprise the coronavirus family: SARS-CoV is a member of Group 2, and Group 3 coronaviruses have only been identified from birds. Group 1 and Group 2 viruses almost exclusively infect mammals as hosts, while Group 3 coronaviruses have only been recovered from birds. As of right now, seven distinct coronavirus strains have been found to infect humans across species boundaries:

HCoV-229E, HCoV-NK63, HCoV-OC43, HCoV-HKU1, SARS-CoV, MERS-CoV, and SARS-CoV-2. Of these, only SARS-CoV, MERS-CoV, and SARS-CoV-2 were able to infect humans and cause fatal illness **Error! Reference source not found.**

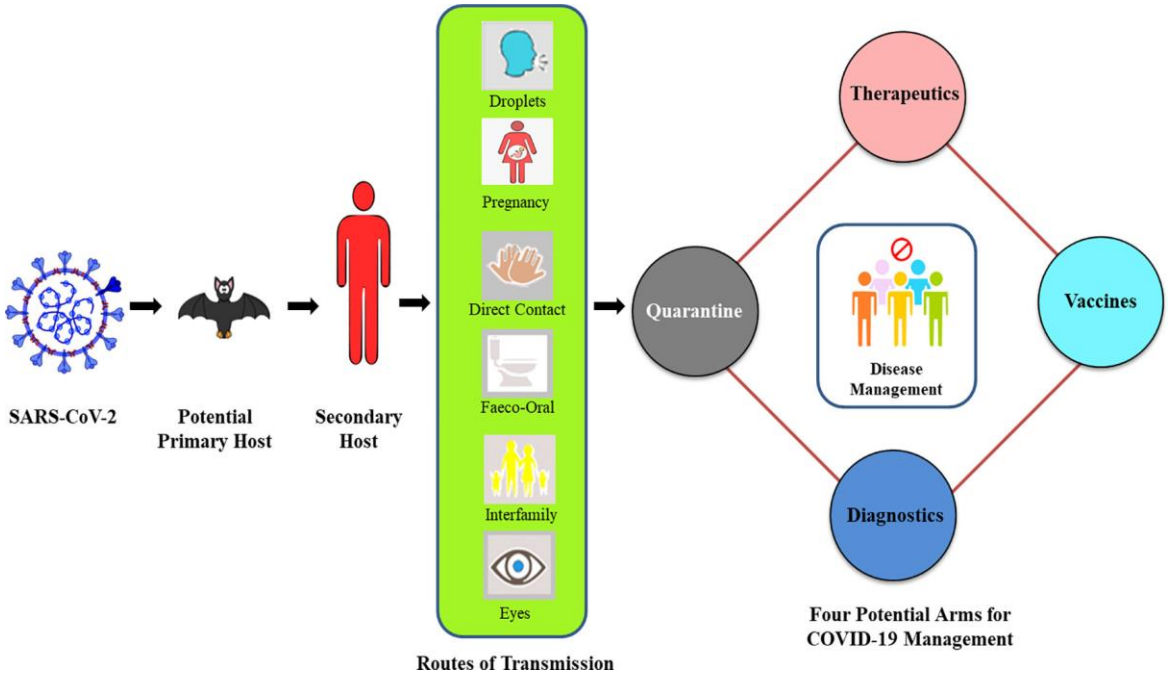

Figure 2.2: Explanation of the COVID-19 Development And The Crucial Four Management Pillars.

In order to combat the life-threatening coronavirus globally, researchers and interpreters are putting a lot of effort into creating efficient countermeasures and methods in response to the COVID-19 pandemic. Cutting-edge digital technologies will contribute to the creation of the most personalized clothing and therapies. Utilizing cutting-edge digital technologies effectively may potentially help contain this worldwide pandemic quickly. In order to improve therapeutic concerns, situation-specific technology development must go

on. In addition to helping combat the COVID-19 pandemic, digital technologies are crucial for people's social and economic well-being during the pandemic. The flaws in the health system in both wealthy and underdeveloped nations are highlighted by this outbreak. To combat this extreme, governments in many nations have made the development of cutting-edge technologies a top priority. Nevertheless, strategies including social separation, webbing, mass testing, contact dogging, and door-to-door control have not been able to stop the coronaviruses from spreading quickly. Examples of successful use of digital technology in response to the COVID-19 pandemic may be found in Korea, specifically in the areas of monitoring, examination, webbing, and counterblockade. A crucial component of daily living is digital technology, or DT [11].

2.2 RELATED WORKS

2.2.1 COVID-19 Management Mechanism via 5G Communication

There is currently debate regarding the state of 5G (fifth generation) wireless communication installations and related operations. One of the most important challenges is to develop 5G dispatches and IoT from a social and charitable standpoint, that is, to expand communication networks to improve people's quality of life. A strong communication structure in smart healthcare systems can help ameliorate and enable monitoring and preventative measures in epidemic situations in relation to better trustability, stability of connectivity, super-massive availability, network scalability, and rapid-fire response inflexibility. Keep in mind that during an outbreak, telemedicine can be a useful tool for training medical professionals and ensuring improved patient care. It is also advised to employ deep literacy tactics to ensure the best possible healthcare services with the newest 5G technologies. Wireless communication technology can improve health, medical procedures, and socioeconomic sectors while also preventing the transmission of infections. The influx of treatment campaigners into hospitals during a crisis might quickly overwhelm them. The situation is difficult to manage because there are not enough medical personnel or supplies, and there are not enough patients. Because of the rapid spread of the infection, the situation is in fact worse in an epidemic. Reducing the amount of time that the treatment candidate and the croaker come into contact physically is an efficient strategy to avoid this issue. IoMTs and robots can be used in hospitals and particular centers to

meet this need. These biases may also contribute to the dissemination of patient health records to croakers via the Internet, thereby deteriorating relationships. Pall structures are useful in several situations, including as outfitting, health examinations, and disinfecting case-relevant regions.

2.2.2 Using Deep Learning to Manage the COVID-19 Outbreak

Wi-Fi and deep literacy (DL) technologies are helping the healthcare industry to briefly emerge (13). It's a multi-billion dollar business today. Due to the growing number of low-income people in developing nations, assiduity is particularly flourishing there. Campaigners for treatment have a different demand: they are always in favor of easily accessible medical care in a welcoming environment. People today barely have time for routine check-ups and consultations with professionals due to the hectic nature of modern living. Hospital visits are discouraged by a number of variables, including business traffic and croaker shortages. Sometimes a patient starting treatment needs to travel to see a specialist in another nation. This can be easily managed by employing smart technology to record a video of the patient drooling with the croaker. However, there are still some infectious diseases that a battalion must cope with. As an example, COVID-19 needs to be addressed case-by-case. Stakeholders, croakers, and treatment aspirants can be systematically managed and dazzlingly connected. The healthcare industry can use the most recent wireless connectivity technologies, such as 4G and 5G, to provide people with unified, timely, and ongoing services; the Internet of Things (IoT) has brought about new operational models by providing a variety of crucial data about the individuals and locations beginning treatment. However, there is still a significant bandwidth problem due to the enormous amount of data on treatment seekers.

2.2.3 Pandemic Management for COVID-19 Powered by Digital Technology

The coronavirus, or COVID-19, is currently causing a worldwide epidemic due to its fatality rate, infection rate, and route of transmission. The greatest health crisis to affect humanity in a century is this epidemic. Information is the foundation of modern drugs. Information is relevant to everyone seeking medical attention, not just experimenters and health care providers. Health care assiduity is laboriously involved in and depends on the

accession, storage, analysis, and interpretation of information. It also primarily depends on information in the treatment process, opinion, complaint forestallment, and protection against complaint. In their investigation on the process of seeking medical attention, Jacobs et al. (2014) came to the conclusion that people frequently gather information from traditional media and the Internet. Nevertheless, they came to the conclusion that because it lacks credibility and fosters inequality, the Internet shouldn't be utilized to obtain information about health care. Once more, a number of people desire to acquire knowledge easily in order to defeat COVID-19 because of persistent barriers to communication. People's adoption of non-scientific information gleaned from social media and the Internet is a significant issue as a result. Interpreters can access and utilize electronic case information in colored information systems (IS) through health information systems (IS)(15). This offers a number of benefits, such as simpler long-term patient data storage, simpler processing of enormous amounts of data, simpler vaccination of inflexible complaints, and simpler diagnosis and treatment. However, there are still issues like the lack of compatibility and the requirement for professionals, digital equipment, and astronomically high expenditures. Tao et al. (16) identified a number of similar elements that have a direct impact on people's acceptance of health technology, including tone efficacity, subjectivity, beliefs, attire, and relinquishment gesture. The authors contended that factors such as technology kind, origin, and level of stonerness influence people's acceptance of health information.Information technology (IT) is exploding, taking over every industry, including health, and transforming society reliance from antiquated methods to cutting-edge information and communication technologies (ICT). These advantages are also being utilized by the health industry, which grew dramatically during the COVID-19 pandemic. People all across the world may easily obtain a vast array of health-related information from social media and the Internet. People still want trustworthy information from healthcare providers because a large portion of this material has not been proven to be accurate. The most recent technological advancement in healthcare is mobile health, which enables information gatherers to use desktop and laptop computers to obtain information from healthcare practitioners. The two most significant technologies in the healthcare industry are mobile health and electronic health, or e-health.

2.3 MANAGING REGIONAL COVID-19 USING DIGITAL TECHNOLOGY

Abolhassani et al. (17) investigated how well-educated older adults embraced health ICT, finding that they did so without any reservations. Hossain and Muahmmad assert that emerging digital technologies can assist stakeholders in the health sector in producing creative outcomes. The development of information systems (IS) for population access as well as cutting-edge technological support through big data, AI, IoT, etc. can be ensured by these technologies. Alsadan et al. dissected the health information technology (megahit) that is now available in Arab nations and established that the Arab healthcare assiduity's. According to their reports, public hospitals employ less sophisticated digital technology than private hospitals, and megahit relinquishment is low.It has already been shown that using emerging technology to combat the COVID-19 pandemic is crucial in a number of developed nations, including China, Taiwan, Japan, South Korea, and Taiwan. Digital technologies include large data, the Internet of Things, precise predictive models, nanotechnology, and telemedicine, as well as simple access to information systems (IS); AI can assist combat the COVID-19 extreme by supporting quick fire decisions and preventing coronaviruses from spreading quickly during fires. It might be a useful instrument. It might also be useful in comprehending the vaccination development process. However, as Naude(14) points out, artificial intelligence (AI) will not be helpful in controlling the COVID-19 extreme due to the volume of unnecessary data and the dearth of relevant data. Aceto et al.(18) established that information technology (IT) has emerged as a critical driver of the Internet of Things (IoT), big data, and information systems (IS) through artificial intelligence (AI) and parallel computing operations to ensure better healthcare, they concluded in their study on Assiduity4.0 and health. By giving up on cutting-edge digital technologies, traditional healthcare methods are giving way to technology-based smart healthcare. Chen et al. (19) explored the obstacles that big data in healthcare faces as well as how it might improve services. These writers discussed how to put up operating scripts that consider the atmospheric environment and how big data may provide prompt preventative services.Large amounts of data were collected from health surveillance during the COVID-19 pandemic, but defense models against hostile discontent were overlooked (37, 38). Hua and Shaw (38) state that data-driven digital technologies must be well-integrated with strict governance, legislation, and The

involvement of individuals to ensure that people can easily access information systems (IS) and that prenatal illnesses like COVID-19 can help prevent prenatal illnesses like COVID-19 on Figure 2.3.

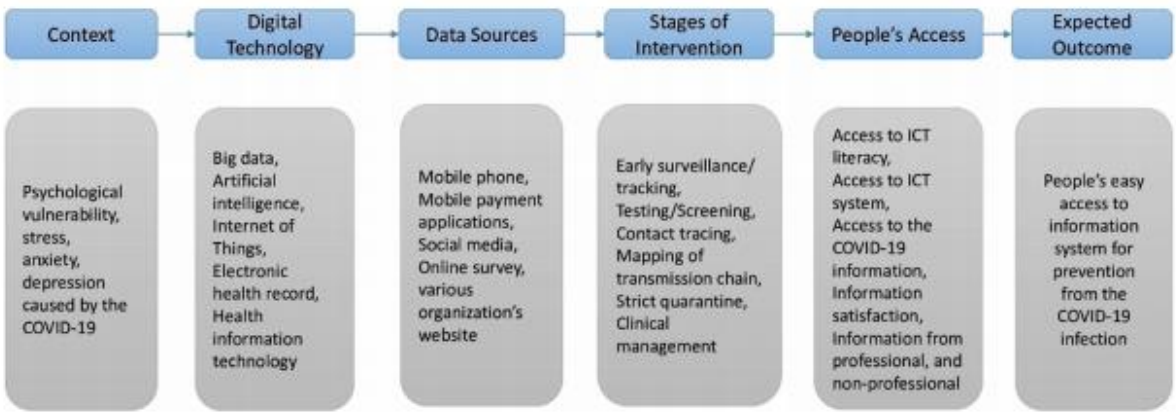

Figure 2.3: Significant Technological 5G Allowed Moves Pandemic COVID-19 Controversy.

The importance of statistical models and data mining techniques for forecasting the course of illness has been highlighted by the COVID-19 pandemic. Considering this, a number of exploration brigades have examined and analyzed studies that use data mining techniques to predict the spread of diseases such as COVID-19.

In order to obtain a better understanding and more effective models for complaint extension analysis, Clement (20) looked at cutting-edge fine models of COVID-19, such as compartmental, statistical, and machine literacy models. The authors provided evidence to support their precise opinion, showing that limiting the spread of COVID-19 and chancing afflicted individuals bear fruit. This research presents an extensive assessment of deep literacy models for complaint opinion as part of its exploration. The primary difference between Clement's paper and the exploration findings is that, whereas in Clement's paper we looked at essential styles like the use of natural language processing, in our case the literature review is focused on fine models and data that condense or enhance the current epidemiological models suggested by health agencies booby-trapping ways.

Several studies employing data mining techniques for comprehending, evaluating, and treating ailments are discussed in Mehrotra's study (21). The composition looks at how data mining techniques, grouping and association, retrogression and bracketing, and

textbook analysis and NLP work. The current composition examines some of the workshop papers that are most frequently cited and emphasizes the application of colorful data mining techniques to investigate colorful COVID-19-related problems, ranging from result identification to forestallment methods. The discourse took role in Mehrotra's creation. The main difference between the findings and Mehrotra is the vast array of articles that are included in Mehrotra, such as prognostications, epidemic resolution, mood analysis, and topic modeling. This study, which focuses on the specific task of predicting the spread of an epidemic, uses an epidemiological model provided by a health association as its basis.

Safdari's study (22) set out to determine the most widely used data mining techniques that exploratory centers were using to address the newest diseases. Respectable 50 papers were set up by the scoping review. The exploration separated the paths into 14 orders. According to 22 of the papers analyzed, natural language processing was the most widely used data mining technique, and according to 22 of the papers assessed, describing ailments was the most frequently advised tactic.

The fact that several countries fail to properly conduct serologic testing is equally abhorrent. specific Models Understanding the results is challenging in many circumstances where epidemiologic models are mixed with only populations. Therefore, it's not obvious how to interpret the results. Study articles that looked at the earthquake and riffle matured as a result of them. In a limited number of cases, epidemiological models were merged with a single set of data. Epidemiological models were combined with a single data set for COVID-19 and utilized for a number of purposes, such as pre-mining techniques, mining methods, and the visualization of complaint transmission. Epidemiological models predict the peak of an epidemic and the dynamics of viral transmission. Additionally, data booby-trapping techniques are employed to evaluate the effectiveness of COVID-19 countermeasures and read data repair. In the context of COVID-19, they perform distinctly different roles, such as identifying the infection route. It is utilized, for example, to read the healing of afflicted individualities. This wide range of topics highlights how important mining is.

2.4 5G TECHNOLOGY OVERVIEW

It is projected that 5G, the newest wireless mobile phone technology, would enhance mobile device performance, provide a wide range of new applications, and serve numerous industries, including healthcare. Like previous cellular technologies, 5G networks rely on signals that generate radiofrequency emissions (or waves) via the 5G network and across 5G mobile phones and other devices. 5G networks, on the other hand, employ higher frequencies than previous mobile networks, allowing for faster and more simultaneous connections to the Internet from more devices. In order to attain wider coverage, 5G networks' radio waves necessitate the placement of more transmitter towers close to the ground than those of previous technologies. Enabling the services that 5G will provide globally requires the deployment of 5G cellular networks, which involves the placement of new 5G base stations throughout communities and the distribution of 5G user equipment among users.

2.5 5G RADIO FREQUENCY (RF) EMISSIONS

Five-gauge radio waves are generated by 5G technology. The first kind of radiation is called ionizing radiation, and it consists of radio waves strong enough to remove electrons from the nuclei of living human cells. Human cells exposed to ionizing radiation either die or become malignant. 2. Non-ionizing radiation: The energy of these radio waves is insufficient to ionize human cells, which shields the exposed cells from harm and death. On the other hand, the radio waves might be strong enough to shift the molecules, which could be harmful to a person's health.

The following are potential health risks:

a. Uncommon cancer types (e.g., malignant tumours in the brain, glial tumours of the heart, parotid gland tumors)
b. Minimal skinburns
c. Eye impact (e.g., cataracts, retina damage, corneal issues)
d. Infertility in men and electromagnetic susceptibility (e.g., headaches, fatigue, stress, burning sensations, rashes)

These two types of radiofrequency radiation exposure will have a negative impact on human health. Reducing these contaminants is necessary to stop them from entering the human epidermis. According to one study, the epidermis acts as a shield to keep internal organs like the brain safe from radiofrequency radiation. Figure 2.4.

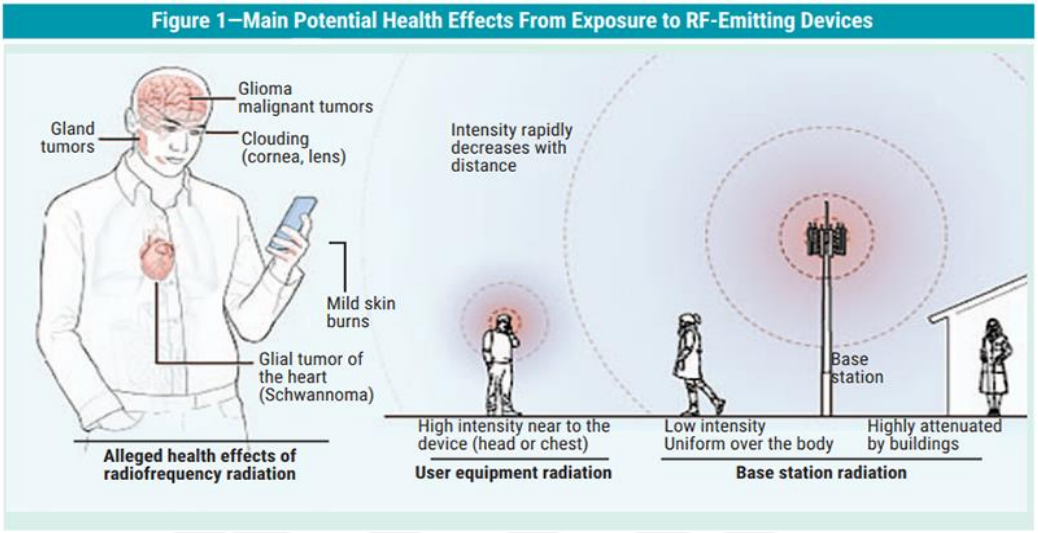

Figure 2.4: Main Potential Health Effects From Exposure To RF.

2.6 CHALLENGE FOR THIS RESEARCH

The first issue is that finding infected individuals and their links is undoubtedly tough. The second challenge is that patients cannot be identified in advance since those who test positive for COVID-19 must stay in confinement for 14 days. Patients can infect everybody they come into contact with during the necessary quarantine period; this presents a third challenge because data may be gathered in a disorganized manner. Thus, maintaining the quantity and quality of the data is essential prior to the training phase. Accurate data is a basic requirement for any successful prediction method. The second problem is that models may underperform on new data if overfitting occurs. The fifth problem is that although clean data is essential for analysis, there are times when clean data compromises data security. The sixth challenge is that even with so much data available, feeding the model with it all doesn't improve precision; the seventh challenge is that choosing the wrong approach can produce inaccurate findings. The same applies if the wrong attributes are selected.

2.7 DATA MINING DM OF HEALTH

The 1990s saw the development of the concept of data mining. It's a field of computer knowledge with connections to artificial intelligence, statistics, probability, and machine literacy, which makes it a great subject to research. Because of how it manages knowledge discovery and data processing, it has attracted a lot of attention. It can also be defined as an assortment of methods, approaches, and approaches for extracting significant perceptivity, connecting patterns, and drawing connections from large datasets. Additionally, it employs a range of techniques and approaches for complex data processing, simulation, and reclamation. It is considered one of the top 10 disciplines influencing technology and is a modern subject with numerous activities. To utilize data mining techniques for health data, experimenters need to have a solid understanding of the composition and functionality of data mining styles. Data booby-trapping techniques, including descriptive and prophetic literacy, are applied in both supervised and unsupervised literacy procedures. Descriptive analysis searches the data for previously unidentified patterns in order to find relationships. As a result, drug users can now access a consolidated data collection based on how similar certain details or records are. Check data mining refers to categorization, association, summarization, and sequence discovery.

AlMoammar conducted his two classification orders on model performance using his MERS-CoV dataset in Saudi Arabia from 2013 to 2017. Three different techniques were used to assess the dataset's perfection: decision trees, SVM, and NN. In spite of these changes, researchers have recently turned to line data mining—a distinct kind of data mining—for methods of infection containment and control as well as scientific research. Line data is a set of geographic locations that is used to create traces using a date and a geospatial match group. An investigation into the prevention and management of epidemics yielded ninety-nine delicacies in a sample of twenty affected communities. Similar to this, data processing in illnesses is hampered and complex because of the nature of moving objects. Thus, we developed the spatio-temporal variation system based on this exploration. This makes it possible for research to consider spatial information in the context of time, when colored rates are used to gather data. Additionally, he examined the global epidemic's caseload, losses, and claims for COVID-19. Mature exploration concentrates on soothsaying methods that vary from crude techniques to his use of ARIMA

to lower the root mean square error for every style. Another investigation used 13 different time-series soothsaying models, comprising machine literacy and statistical long-short-term memory (LSTM) models, to predict his Covid-19 cases across 187 countries. The main finding of these research is that while Holt's direct trend is consistent with both exponential and direct patterns, ARIMA offers more accurate prophetic outcomes for exponential growth patterns. It works better than other models. Figure 2.5.

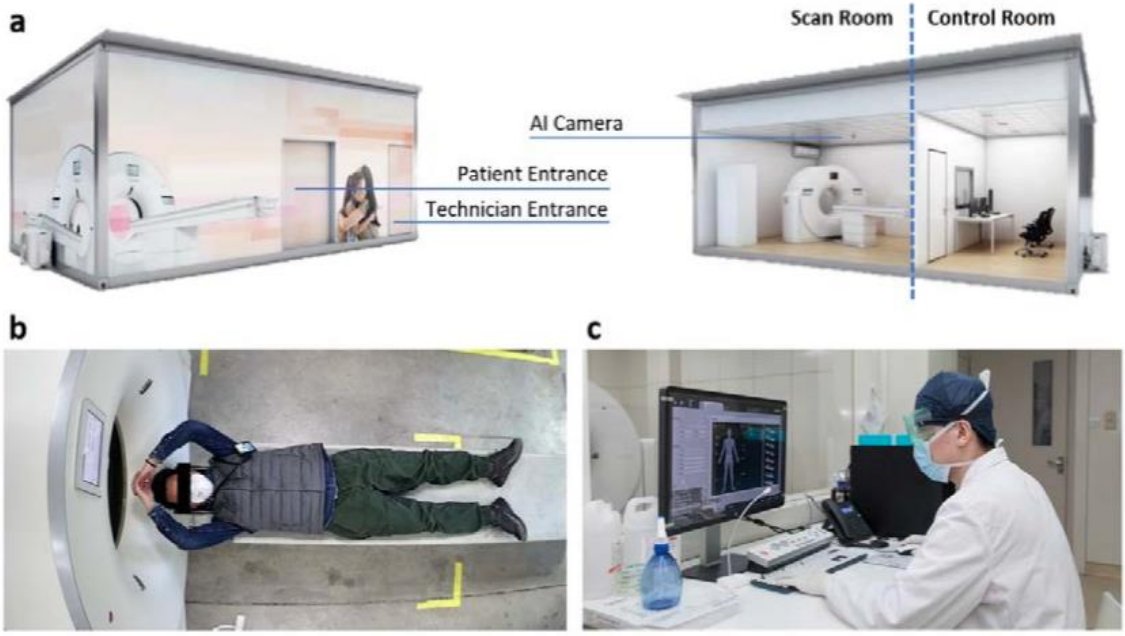

Figure 2.5: (a) Mobile CT Platform With AI-Powered Automated Image Acquisition Workflow. (b) An Example of an Image Captured By A CT System Patient Monitoring Camera. (C) Patient Positioning and Scanning Remotely Controlled By A Technician.

The analysis in these papers also makes use of output from algorithms such as genetic algorithms, particle swarm optimization, and the Grew Wolf Optimizer. This article's analysis of machine learning and analytical models revealed that the multilayer perceptron produced the most accurate results. An initial 21-day lockdown on the total number of COVID-19 infections in India was compared to other, less drastic non-pharmaceutical interventions in terms of their short- and long-term effects. The analysis was conducted using a Poisson regression model, Markov Chain Monte Carlo (MCMC), and a Bayesian extension of the eSIR (extender SIR) model.

using a combined Monte Carlo model (CMCM) and the Group of Optimized and Multisource Selection (GROOMS) approach. The latest novel coronavirus epidemic case study was utilized to demonstrate the effectiveness of GROOMS+CMCM in identifying the top-performing deterministic forecasting system. The study's conclusions confirm that the recommended approach is feasible during the early stages of a disease outbreak, when data is few and ambiguous.

In the Mexican context, two mathematical models—the Gompertz and the Logistic models—as well as one computational model—the inverse Artificial Neural Network—have been used to estimate COVID-19 infection cases through confirmed cases. The main data mining tool in this process is the Bayesian Artificial Neural Network. The results of this study allow for more precise estimation of the artificial neural network model since there is a decent fit between the estimated cases and the real data on the total number of verified instances.

2.8 SEARCH STRATEGY

A search of the last five years' published papers on IEEE Xplore, PubMed, and Scopus was carried out in October 2021. It was limited to English-language articles that have appeared in academic journals and included an abstract. Quests were completed by title or summary using terms, content titles, and Boolean drivers. We searched relevant objectifications and publications for essential phrases. Wildcard quests were utilized to locate the versions of the hunt terms. 5G AND (medical, healthcare, telemedicine, COVID-19, emergency medical services, telesurgery, telediagnosis, telecardiology, teleconsult, telemonitor, teleoperation, or teleradiology) was the protocol for the disquisition. Examining written reviews and their references gave the search more context. Reviews, letters, unblinkedly evaluated papers, objections to meetings, and proceedings were all prohibited. The entire textbook, the data source, and the references were scrutinized in addition to the titles and objectifications of the selected works.

2.9 APPLICATIONS FOR COVID-19 (5G)

2.9.1 Fangcang Hospitals

These are large, makeshift hospitals that were built to treat and isolate COVID-19 patients who require hospital admission. Public venues such as stadiums and exhibition halls were converted into medical facilities. A Fangfang (cabin) hospital is a rapidly mobilizing mobile medical and surgical unit equipped with imaging equipment, a diagnostic lab, and nursing staff [23]. Wuhan swiftly constructed the first Fangcang hospital, which had 4000 beds, in February 2020. The Chinese government built more than 20 of these facilities concurrently, and in less than 48 hours, 5G connected them all. Their main responsibilities were testing blood, carrying out transportable computed tomography (CT) scans, and giving oral medication.

2.9.2 Radiology: Robot-Assisted Tele-Ultrasound

Robot-assisted tele-ultrasound has attracted a lot of interest during the COVID-19 pandemic [21]–[24]. The absence of dangerous radiation and ease of use for trained ultrasonographers are two advantages of ultrasonography over CT [24]. An overview of 5G research in robot-assisted tele-ultrasound for COVID-19 is given in Table I. MGI Tech Co., Ltd. (Shenzhen, China) reported that the MGIUS-R3 robotic tele-echography system produced good picture quality scores (4.73 out of 5) on 32 patients for exams of the kidney, pancreas, liver, spleen, and gallbladder [25]. The doctor in Wuhan demonstrated the feasibility of this imaging modality on an 81-year-old patient by using an MGIUS-R3 robotic tele-echography system from Zhejiang province, which is approximately 700 km away [25]. In a different study, robot-assisted tele-ultrasonography was used to assess four patients receiving treatment in isolation units. This allowed for online expert consultation for lung ultrasonography, echocardiography, and blood volume measurement for cardiopulmonary assessment. Another version states that the COVID-19 diagnoses made in two patients with robot-assisted tele-ultrasound and CT were identical [26]. A professional operating an MGIUS-R3 system in Hangzhou (Zhejiang, China), approximately 560 kilometers away from the patients, conducted a recent study in Wuhan using a robot-assisted tele-ultrasound system on 23 COVID-19 patients (12 with non-severe and 11 with

severe illness). The scientists pointed out that the 5G robot-assisted remote tele-ultrasound system is still in its infancy and has a number of shortcomings, despite their remarkable COVID-19 detection results.

2.9.3 Contact Tracing

5G has also been employed to ensure privacy-preserving contact tracking in a decentralized system that includes users, healthcare institutions, fog networks, medical organizations, and blockchain [27]. Enrollment is handled by the medical center, and the fog nodes that detect body temperature are situated close to checkpoints. Users sent their hidden locations and identities via cellphones. This decentralized approach was often tested on thousands, even tens of thousands of users, with contact tracking times ranging from 40 to 50 ms.

2.9.4 Tele Mentoring for Ophthalmology

More people became interested in tele-ophthalmology during the COVID-19 pandemic. These days, ophthalmologists need to consult with data scientists and technology specialists in order to deliver the finest sustainable ophthalmic services. They need to receive training and continue their professional education in order to offer this new type of eye therapy. In a prospective experiment on six patients with diabetic retinopathy, a specialist in Beijing was able to practically supervise a surgery performed by a specialist in Huzhou, which was located about 1200 kilometers away (Table I) [28]. In order to ensure safe, real-time coordination during the treatments with an average latency of 20 ms, the expert managed the Huzhou ophthalmologist over videoconferencing.

Table 2.1: COVID-19 Applications 5g Studies.

Study	Country	Application	Number of patients	Distance	Latency	Speed
Wang et al, 2020 [21]	China	Ultrasound	1	700 km	--	930 and 132 Mbps for the physician and patient sites
Wu et al, 2020 [22]	China	Ultrasound	4	54 km - 1,773 km	23-30 ms	930 Mbps (download) and 130 Mbps (upload)
Yu et al, 2020 [23]	China	Ultrasound	2	700 km	--	--
Ye et al, 2021 [24]	China	Ultrasound	23	560 km	--	930 Mbps (download) and 132 Mbps (upload)
Duan et al, 2021 [25]	China	Ultrasound	32	--	< 200 ms	580 Mbps (download) and 92 Mbps (upload)
Chen et al, 2021 [27]	China	Teleretinal laser surgery	6	1,200 km	20 ms	854 MB/s (download) and 88 MB/s (upload)

2.10 MACHINE LEARNING

2.10.1 Supervised ML Models

ML has become a prominent area of research in the last few years. Machine learning is capable of incontinently resolving multiple complex situations. In supervised literacy, a labeled dataset is used to build a model via a literacy method; machine learning (ML) techniques are often applied, and examples include condition vaticination, soothsaying rainfall, and identifying absent values in medical data. Direct retrogression is a crucial statistical research in machine literacy. This COVID-19 prognosticating exploration included five retrogression models: Support Vector Machine (SVM), Random Forest (RF), Exponential smoothing (ETS), Linear Retrogression, and LASSO Regression. The results are shown on the map that goes with it. Significant AI fields are also planned.

2.10.2 SVM

Alghazzawi et al. proposed SVM as a technique for the prognostic analysis of COVID-19. SVM is an iterative ML approach that is utilized for prophetic analysis. Typically, SVM methods are used on datasets that have annotations. The input data is split into three

classes—mortality, negative case, and positive case—when employing SVM. As a result, a number of input- affair mapping functions with point information annotations are produced. This data is utilized to train a model to predict the danger of a COVID-19 outbreak; however, since SVM is a double bracket technique, it cannot be employed directly to a multiclass problem. To split multiclass scenarios, they used binaries arranged according to class. Three double SVMs, with three denoting the number of classes, were constructed for this investigation. Each double bracket differed from the others by one degree. The SVM model is one of the best machine literacy strategies that is very easy to use. SVMs help to lower the test's dimension error. Unlike conventional methods, we utilize a method that syncopates the boundary distance between the training data and the hyperplane to increase perfection.

2.10.3 RF

RF is generally regarded for working with retrogression and categorization as an unsupervised literacy fashion. RF is an ensemble learning approach that can be used for categorization as well as retrogression problems. The classifier displays M of their labors after this manner yielded M decision trees. Voting processes are used to form opinions. Rf is a simple paradigm for parallel computing. Yesilkanat describes it as a machine literacy system that uses numerous decision trees. Arbitrary subspace methods and trailing are included in the Rf package. A data collection is first utilized for training data in order to train and evaluate the training position in Rf. additionally, many decision trees are built at random from that data collection.

2.11 DEEP LEARNING MODELS

Deep Literacy models show how quickly many uses have advanced at this point. Using data from the time-series data obtained in COVID-19, convolutional neural networks (CNN), long short-term memory (LSTM), intermittent neural networks (RNN), nonlinear autoregression neural networks (NARNN), reopened intermittent units (GRU), variational autoencoders (VAE), bi-directional LSTM (Bi-LSTM), and other optimal vaticination methods are developed in this study. A method for employing deep literacy for diagnosis and shadowing in the medical field was proposed by Verma et al. The effectiveness of

deep literacy models for both language literacy and image processing has been established. With its integration with edge smart bias to manage automated monitoring and deep literacy styles, the proposed design FETCH provides an incredibly useful framework for factual healthcare services, like to those for heart complaint.

2.11.1 CNN

CNN was proposed by Nabi et al. as a system for COVID-19 cast styles. In a bitsy cube, all convolutional layers and one neuron are found in the highest neuron. This network can collect information on high-position traits in the next hidden subcaste and focus on low-position basics in the previous retired subcaste, among other things. This cast combines four convolutional layers to identify complex features and patterns in the time series. In order to resolve the concerns raised, one flat subcaste and two thick layers are utilized in the last stage, which leverages CNN's capacity to identify characteristics from a sizable amount of data. Actually, a CNN is a hierarchical point extractor, with low-position extracts from the first subcaste. edges and lines, while the upcoming subcaste extracts more intricate textures, forms, or object fractions. CNN models are trained using features inferred from inputs such as images, 2D signals, and 1D detector data, depending on the format of the data..

2.11.2 RNN

Zeroual proposed an RNN (29), which could be used to read Covid-19. Numerous processes have seen the successful application of normal feed-forward neural networks. Similar networks just permit the current condition to have a single, hidden circumstance-based impact on the affair as data peregrination. RNNs were created in order to circumvent this limitation and take time-dependent literacy difficulties into consideration. RNNs are designed to generate problems even when accounting for the influence of literal data. It intends to accomplish that. Cells showing gates that compute based on past compliances are also included to elicit conclusions. The LSTM and GRU are significant RNN algorithms for time-dependent time series data.

Table 2.2: COVID-19 Applications 5g Studies.

Sr. No.	Techniques	Advantage	Disadvantage
1.	ARIMA [9,25]	For stationary time series, this model is utilized. It is used for future predictions of a fixed time series.	Recognition of model is difficult. Not suitable for long term prediction.
2.	LSTM [22,26]	Each weight adjustment's complexity is reduced to O (1).	Training is done for a long duration of time. It is possible to stack a few LSTM layers, which leads to more overfitting.
3.	MLP [2,27]	For long term prediction, it gives good result. MLP can distinguish data that cannot be separated linearly.	For representing complex data, Networks should learn.
4.	ANN [8,28]	Based on the output variable, its categories as supervised or unsupervised learning. Could access various training algorithms.	Nature of being a black box, overtraining. Depend on weight value initialization.
5.	SEIR [29]	An iterative model that uses a change in relative average recently.	It declares the output only, not describing the process.
6.	BI-LSTM [19,30]	PM2.5 concentration prediction is used in Bi-LSTMs. The situations that requiring context input the Bi-LSTM is useful.	It needs long data to pull out relevancy in time-series data
7.	NNETAR [2]	It uses in machine learning problems because it is a statistical model in a neural network.	It will take more time because it is a two-phase forecasting process.
8.	ELM [2]	ELM has high speed in learning because it gives better generalization performance and lesser the training time.	non-iterative method because it has one pass learning.
9.	CNN [21]	Due to its feature learning capability that made CNN the best forecasting model.	CNN design causes over-fitting in the model.
10.	SIR [8,10]	SIR modeling is done local(county) level.	SIR model was not applied where the data size is not large.
11.	NARNN [22]	This model makes a non-linear regression by the neural network.	The NARNN model made optimistic estimates that were lower than the actual values.
12.	RNN [3,19]	The problems that are time-dependent learning are handled. temporal information learning is efficient in RNN.	RNN is difficult to train because of the gradient vanishing/exploding problem.

3. METHODOLOGIES

This section covers the dataset, data cleaning, pre-processing, point birth, and bracket fashion utilizing machine literacy techniques. Robotization machine learning Weka program is used to disassemble, preprocess, point uproot, and classify the DS4C COVID-19 dataset. Figure 3.1 validates the occasion of the examined document.

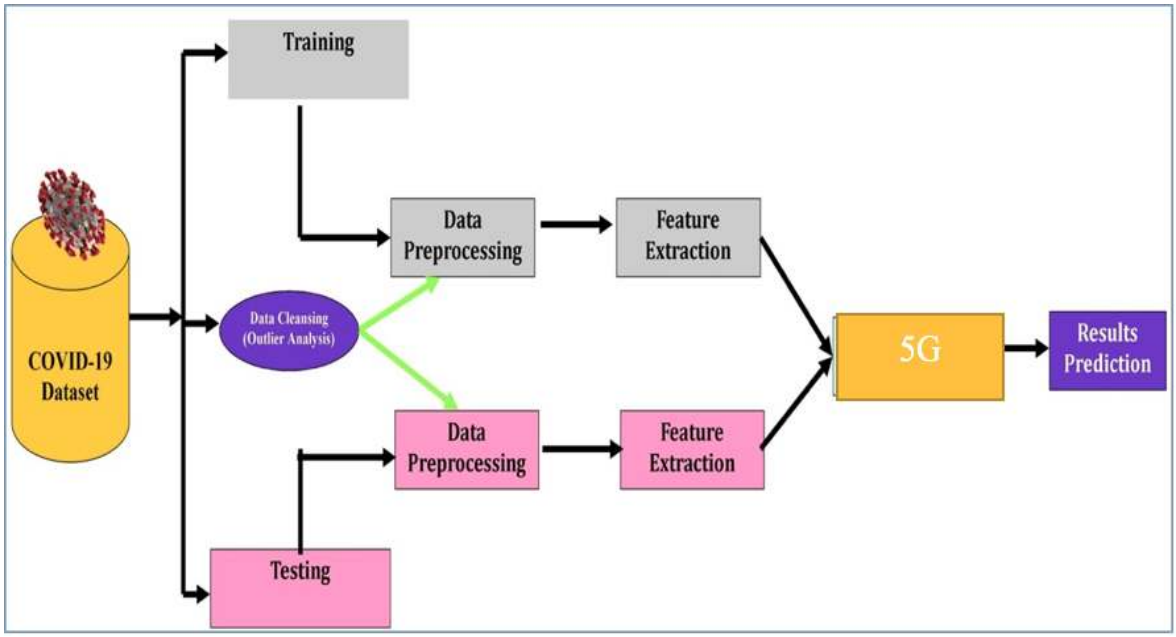

Figure 3.1: shows a Flowchart For Carrying Out the Study.

3.1 FEATURE EXTRACTION

This data interpretation was repurposed and point birthed using the top element analysis manner. To reduce processing time and improve performance, PCA point birth and selection techniques are required. The old features are directly combined to form the new set of characteristics produced by the PCA point birth styles. This method excludes friction that was previously counted in favor of capturing the dataset's maximum friction. Every element has a value that is lower than the initial values, and the PCA-produced element covers the highest friction.

In machine literacy, PCA is the most prominent and well-known point birth system. PCA's perceptivity is to drop dimension and exclude indistinguishable records in a certain stratum of point selection.

3.2 TECHNIQUES FOR CATEGORIZATION

The selected point was categorized using deep literacy, BayesNet, and arbitrary tree styles, and the data was interpreted again using the same methodology.

3.2.1 Deep learining Classification (CNN)

A deep literacy classification element is part of the machine literacy system grounded in representation literacy and neural networks. The deep literacy design is applied to large-scale databases using deep neural networks, complexity neural networks, and intermittent neural networks. This deep neural network has the best performance when compared to an abecedarian neural network. This network's multiple layers show the direct sense. Convolutional neural networks are one of the classification methods utilized for the deep earning group (CNN). The convolutional neural network makes use of a feed forward artificial neural networkRecently, the deepest literacy has veered because of the prosecution's optimization, which takes into account endless layers of ability. analysis are explained. illustrates the organizational structure of the complex neural network.

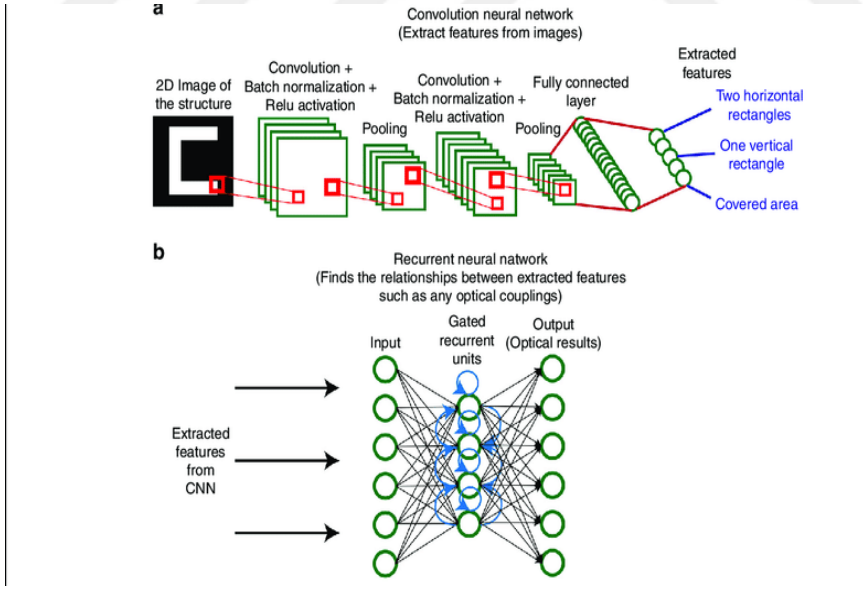

Figure 3.2: Convolution Network Deep Learning Method Structure.

This machine literacy bracket class employs several layers to gradationally prioritize advanced position features from the raw input.

Table 3.1: Before and After Filtering DS4C Dataset.

Ref	Dataset	Accuracy
(Lu,2019)	ImageNet	74%
(Zhang,2019)	VegFru	94.94%
(Katarzyna,2019)	Own	99.78%
(Steinbrener,2019)	Own	85.93%
(Sakib,2019)	Fruit-360	100%
(Mure,2020)	Fruit-360	99% for all
(Zhu,2020)	ImageNet	92.1%

3.2.2 BayesNet Classification

The basis for the BayesNet categorization is the Bayes thesis. The directed acyclic graph that results from this network is created using the approximate probability of each element. This system does not use worldwide reserves for absence value parameters; instead, its attributes are nominal. The output of this categorization algorithm can be shown as a graph. The bracket model and method are illustrated and demonstrated.

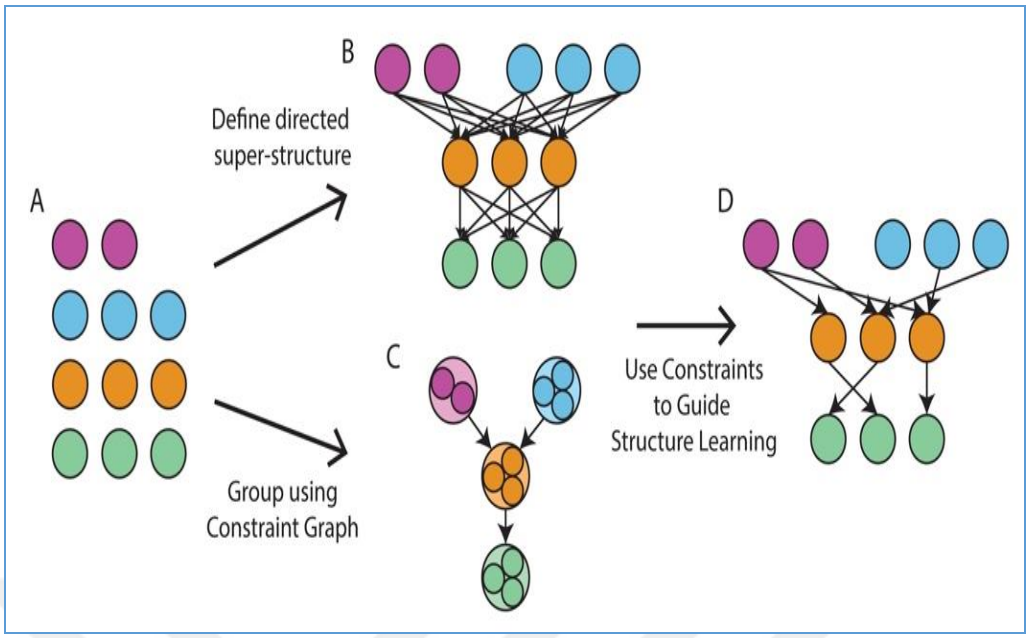

Figure 3.3: BayesNet and Steps For Text Detection Mechanism.

3.2.3 ADtree Classification

Weak propositions generated by boosting can be merged into a single, easily readable form with the use of alternate decision trees (ADtree) bracket styles. To implement this method, take inequality conditions that evaluate a single point with a constant as the weak suppositions generated during each boosting replication. Using this method in the elimination situation is difficult. This approach provides the excite decision tree in an alternate manner by utilizing the improved logistic algorithm. The average values of the cases are used to form the network.

a. Terms related to performance dimension

   The experiment in this study focuses on three classifiers that use deep literacy grounded complication neural networks, ADtree styles, and BayesNet. During the performance review, delicacy, delicacy, and perfection were considered (16).

b. Using appropriately categorized exemplifications from the dataset, delicacy is used to evaluate performance. It provides the ratio of precise forecasts to total forecasts. You can use Equation 1 to decipher it.

$$\text{delicacy} = TN\ TP/\ TN\ TP\ FN\ FP \quad (3.1)$$

c. perceptivity is the unfold the rate of true cons with all the all particulars in the trial. It's calculated using equation 3.2

$$\text{perceptivity} = TP/\ TP\ FN \quad (3.2)$$

d. Precision is the positive vaticination values with bit cases among al recoup cases. It's calculated using equation 3.3

$$\text{Precision} = TP/\ TP\ FP \quad (3.3)$$

3.3 COST FUNCTION

The donation of the given knowledge is estimated through cost work so that machine literacy models can be tested and prepared. Minimizing labor costs for the order problem donation improvement is good. The cost capabilities are used in machine literacy to validate the donation for a particular dataset. This function computes the error between the expected and expected figures. The enrollment capacity limitations are shown both factually and graphically. Through preparation and testing, the cost work is utilized to assist the student with managing the shift or behaving in a way that reduces error. Estimating the weight, boundary, and structure of cost work is the grouping model's goal. The reduction of cost and boob is the motivation behind the application of the cost function in the classifier grounded problem. Finding the boundary that achieves the base rates for cost estimating job is the important part. The alternative method of estimating costs and yielding compensation. The idea is to apply the projected cost work at the highest possible rates.

The three classifier preparation and testing prosecution estimating the styles square mistake estimation capacities used for this exploratory experimental analysis. The MSE's base estimates are obviously navigating the fashionable with the fewest errors.

3.4 COVID-19/ 5G

Based solely on data obtained from Facebook's analytics platform CrowdTangle—which only contains data about verified accounts, public runners, and public groups—we conducted our investigation. This restriction is fully justified because it protects the sequestration of Facebook druggies. However, it should be noted that it hinders our ability to monitor the dissemination of COVID/19 rumors through direct messaging or private or semi-private particular biographies (such as those whose posts are only accessible to musketeers or musketeers of musketeers). Instead, our analysis is limited to the fully public areas of the larger Facebook platformFor the purposes of our investigation, however, this is appropriate and relevant. We're more concerned with the major overflows of rumor transmission, which are probably going to happen very quickly in highly visible public spaces, than with the additional small overflows that might divert from this sluice. The main purpose of CrowdTangle is to provide social media data to businesses. Facebook purchased this third-party followership criterion product in 2016 (28), and Facebook's business partners are the main users. Remarkable university social media research centers and organizations around the world can now access CrowdTangle more widely. For implicit academic drug users, there is an open operation form, but as of right now, access to CrowdTangle is still mainly provided upon request. We are concerned about the divisions this creates within the Internet exploration community, and in line with our earlier positions on this matter, we nevertheless support greater research access to social media data. It's also critical to remember in this context that academic CrowdTangle access is granted without any limitations on the study conditioning objects, styles, or content matter. We searched CrowdTangle using the query (covid, nimbus, contagion, epidemi, pandemi) AND(5g) to find posts on public groups, runners, and vindicated biographies that contained any of the five words or word stems related to the COVID-19 outbreak as well as the term "5G," which is widely used to relate to this technology. To possibly include words like "epidemic," "epidemiologists," and other related terms, we employed the word stems "pandemi" and "epidemi" in our hunt. Additionally, the usage of these terms produced results from a range of languages spoken on Facebook, as several of them—particularly "COVID" and "nimbus"—are used identically in a variety of languages, frequently in scripts other than Latin. We note that, compared to other

languages, our data content is still more likely to be complete for languages that use Latin jotting. More generally, our dataset's worldwide content is shaped by Facebook's global withdrawal as a communication platform. Specifically, because Facebook is largely unreachable in mainland China and contributes to VKontakte in Russia and certain other post-Soviet democracies, the dissemination of COVID-related rumors in these nations is most likely going to occur on other social media platforms.

3.5 DATA ANALYSIS

As seen in Figure 1, the number of Facebook posts in the public domain that contain the search phrases climbs gradually at first and then steadily over the course of the study's analysis period. Indeed, one may astronomically partition the propagation of similar posts on Facebook into many phases.

a. Phase 1 Being Conspiracy propositions(January 26, 2020)

   There were a ton of Facebook posts that fit our selection criteria in the first few weeks of January, and very few, if any, of them had anything huge do with the COVID-19 pandemic. Instead, these posts rehash standard conspiracy theory jargon concerning a covert plot to exterminate the majority of the world's population via a combination of chemtrails, water fluoridation, mass vaccinations, genetically modified foods, and "poisonous" 5G emigrations. In other words, they essentially constitute anti-science/anti-technology rhetoric. At this point, it's still unclear if this assertion is specifically connected to the initial COVID-19 outbreak reports or if it just reflects general anxiety.(The WHO did not coin the term COVID-19 until February 11, 2020; so, the information in these early bulletins is inevitably kindly ambiguous; see WHO, 2020.)

   However, some of these messages specifically reshare older Facebook posts that predict active destruction through a "epidemic contagion," and this act of resharing can be seen as a purposeful attempt to draw a connection between the present outbreak and earlier conspiracy theories. This could also be seen as a deliberate attempt to connect similar conspiracy theories with the present outbreak. Comparable sharing demonstrates the earliest indications of combining current affairs with conspiratorial

worldviews. In actuality, ideologically tinged interpretations of news events are a foundational element of any nonpartisan media consumption process and seem to be shared by the most conspiratorial organizations (see Hall, 1980).

This link was revealed in a post published on January 20 on the French-language site Les Moutons Enragés, also known as The Rabid Sheep. The post gained at least 65,000 followers and was shared across 13 French Facebook groups that support the anti-vaccine, anti-5G, indispensable drug, and Gilets Jaunes movements. The author then talks about viral diseases, mentions that there are rumors that 5G emigration has bad effects on health, and makes the case that Wuhan has started a large-scale rollout of 5G technology. Our research indicates that this is the first instance of a Wuhan–5G connection claim making its way widely on Facebook.

b. Phase 2 Wuhan- 5G connectivity goes global(1/ 27- 2/ 24, 2020).

Although Wuhan was the first Chinese fiefdom to have a 5G phone network in place, the Moutons Enragés composition was unable to break through the language barrier and only became widely known for a few days after it was posted on the German-language indispensable drug website connectiv.events on January 27. The post claimed that 5G technology was linked to an open letter from "180 scientists and croakers" warning of the troubles (including "flu- suchlike symptoms"). Additionally, it includes a significant amount of content that purports to validate these issues.

It is requesting money to support the point's operations and advocating for more stringent regulations from the European Union.

Similar content was posted in the discussion forum of the entertainment website allkpop on January 27. It took a while to gain traction, but it did so from 87 spots with a combined following of at least 1.1 million people. Although it was later taken down from the forum, a piece that aptly captures the essence of the theme—"Wuhan, the fiefdom where 5G was introduced, now the center of a deadly contagion"—remains. This essay was the first written in the English language to summarize the COVID/19 and 5G allegations that were widely shared on Facebook. Although its original textbook can no longer be verified, it's probable that statements stated in previous

French and German papers were true as well. This composition has widely engaged in multiple language communities on Facebook, from Sweden to Pakistan, from Spain to Hong Kong, even if the link to it is in English.

It is noteworthy that these documents became public during the British government's significant policy decision at the end of January to permit Huawei, a Chinese telecommunications company, to participate in the development of the UK 5G phone network, despite the clear advice of the US government (Kleinman, 2020). As Figure 1 illustrates, there has been a notable surge in the quantity of Facebook posts connecting COVID-19 to 5G after January 27. This volume has grown from less than 30 posts per day to between 80 and 220 posts per day in February. It is unlikely that this is cohabitation. The UK decision and the US administration's subsequent oral opposition may have, at the very least, increased public interest in 5G technology and increased the circulation of conspiracy content related to 5G; the writers and participants of the COVID/ 5G posts may have also been drawn to the content by comparable public contestation. The topic of COVID/ 5G cessions may have appealed to the writers and participants due to comparable public debate.

c. Phase 3 Localization and Embellishment(2/ 25- 3/ 11, 2020)

For the most part of February, these tales remained largely intact, but toward the end of the month, there was a noticeable change in tone. On February 26, a lengthy Facebook post was made in Romanian and received responses from 159 Romanian spaces, totaling almost 3.9 million followers. The coronavirus is merely a pretext for the spread of a lethal vaccine activated by 5G radiation, which would result in the wholesale eradication of humanity at the command of mysterious organizations led by Bill Gates and George Soros; a videotape interview with a person who is allegedly a "croaker" (posted on February 29, participated in 141 spaces, with about 1.8 million followers, now removed by YouTube), a lengthy post on the essential drug website Electric Sense (posted on March 4), and a British nanny discussing the health benefits of 5G, including claims that 5G will "destroy oxygen" (posted on February 29).

In contrast, the "Agenda 21/30" videotape (participated in 156 spaces, at least 3.5

million followers) asserts that COVID-19 symptoms are caused by 5G emigrations as part of the UN's Global Overpopulation Plan. On March 7, a Facebook videotape (127 spaces, at least 1.4 million followers) added up colorful enterprises about 5G technology and its health goods and suggesting that 5G may make COVID-19 further malign, with no contagion present.

Particularly, between February 25 and February 29 alone, the number of language communities that similar content specifically targets increased significantly. Facebook posts about COVID-19 and 5G increased from roughly 120 to 330–580 posts every day, and the majority of the most widely shared posts and links were written in Eastern and Southern European languages, such as Romanian, Czech, Croatian, Italian, Spanish, and French. The exact cause of this diversification is unknown from the outside, however it might be related to the gradational use of imprisonment and counterblockade tactics in these nations. As an example, Romania declared on February 24 that all travelers entering the nation must face a counterblockade (Budu, 2020). Thus, original conspiracy theorists started interacting with the content directly as the COVID-19 extremity started to impact the original population (using English-language accoutrements that were previously circulating through Facebook and other social media in doing so), and the lockdown may have also given them more time. An additional exculpatory explanation would be that nations or other information generators aiming to destabilize these nations purposefully disseminated similar geographically focused conspiracy stuff. The emphasis on Eastern and Southern Europe fits well with the "Internet Research Agency"'s previous conditioning to work in tandem with the Kremlin, especially in St. Petersburg (Chen, 2015). As of right now, the data does not clearly support any such intentional effort.

As reported in multiple well-known cessions, we observe the COVID/ 5G rumors growing throughout this time, sometimes going against each other. Some focus on the health benefits of 5G radiation (even going so far as to deny the existence of coronaviruses and argue that COVID-19 is just a plot device to justify the outcomes of the 5G trial in Wuhan), while others focus on 5G in order to further situate it within a

more comprehensive and intricate docket. These conspiracy theories imply that this illness is the work of colorful conspirators. Bill Gates, George Soros, the World Health Organization, the United Nations, high-tech firms like Huawei, China, and the United States, or secretive international conspiracy groups like the Illuminati are a few examples of these.

d. Phase 4 Oxygen immersion Claims and Lockdown Allegations(3/ 12- 28, 2020)

Perhaps as a result of the lockdowns' effects, another wave of lockdowns has been implemented globally since mid-March. Celebrities caught up in the extremity started posting their views of events as these lockdowns started to affect many people worldwide, occasionally echoing the talking points of conspiracy theorists. For instance, on March 16, African-American R&B singer Keri Hilson wrote a series of tweets that included the following: agreed with the claim that a significant number of COVID-19 cases had occurred in Africa as a result of the continent not serving as a model for the worldwide rollout of 5G. The following day, screenshots of these tweets and news and entertainment articles about Mr. Hillson's opinions and his operation's capacity to quickly refute them were widely shared on Facebook, resulting in a significant rotation of these articles throughout the US, Africa, and Southeast Asia. The composition in which Mr. Hillson participated the most.

Analysis (Nigerian review) With at least 39 million followers, 15 different news outlets (including The Nation, Kenyan news portal Tuko, Indonesian TV news show Liputan 6, entertainment spots Rappler, Complex, and Popular stars) participated. Although Hillson's comments were almost always prohibited by these papers, they nevertheless dramatically amplified her tweets (the majority of which were verbatim). Indeed, it was confirmed that in the days that followed Hillson's post, COVID/19 and 5G speculations were widely disseminated in the African community for the first time, thanks to the post's content. We note the proximity of these events on March 16—a long Facebook post and videotape, both since deleted—claiming that 5G radiation lowers the mortal body's capacity to absorb oxygen. It's unclear whether Hillson herself was informed by these posts, or whether her tweets played a role in them. It also suggested that COVID-19 was merely a "accidental event." Additionally, a

YouTube videotape that claimed that the lockdown was just a front to install 5G masts in academy structures across the nation while preceptors, parents, and scholars were offline started to circulate widely as lockdown measures were implemented in various countries around the United States. The videotape was first posted on March 17 and eventually reached 531 spaces and groups, garnering over 8 million views. The videotape has been viewed in locations ranging from Australia to Israel and from Romania to Canada. Following up on this news, an associated post on the website Take Back Your Power, which advocates against smart electricity measures, gathers several videos of 5G installation vans next to seminaries and encourages compendiums to share their original seminaries. released on March 22, this video has over 1.4 million followers and has been featured in 118 places.

Vibrant posts in Italian have also been widely shared since March 22. The announcement made late on March 21 by Italian Prime Minister Guiseppe Conte regarding the suspension of any unnecessary business and the complete prohibition of domestic travel may have set this off (Safi etal., 2020). A post on the essential medication website Oasi Sana, or Healthy Oasis, redirected attention to a tweet from Gunter Pauli, a Belgian economist who is regarded as a profitable advisor to the Italian high minister. Pauli reiterated Wuhan's status as the world's first location to implement 5G technology and further noted that the country's worst COVID-19 outbreak occurred in northern Italy, supporting Wuhan's claim to be the first region in Europe to do so. The Affari Italiani (Italian Affairs) composition, which has since been deleted, also links COVID-19, vaccinations, and 5G. Furthermore, a lengthy Facebook movie featuring intelligence officer Nicola Porro criticizing the new lockdown rules while revealing that she has tested positive for COVID-19 has received a lot of attention.

The three posts together reach over 112 spaces with at least 1.1 million followers, amongst fans of far-right former Interior Minister Matteo Salvini. Following March 16, a composition on the conspiracy theory website Odkrywamy Zakryte (We Reveal Secrets) in Poland purportedly demonstrated a connection between 5G and COVID-19 by biologist Paul Doyon. However, the tightening of state leaguer measures in late March reached a larger space because of the In the end, it involved nine spaces with a minimum of 3.7 million followers.

3.6 5G AND COVID-19

Conspiracies surrounding 5G-COVID-19 fall into two categories. The first contends that 5G radiation reduces immunity and makes people more vulnerable to viral illnesses (Shultz, 2020). It would appear that the notion that specific exposures can lower overall immunity is comparable to earlier assertions that long-term exposure to electromagnetic fields (EMFs) can result in cancer. Asher Hamilton (2020a) notes that while similar concepts were already in the anti-5G world, they gained momentum only once the pandemic surfaced as a novel risk factor that directly harmed people's immune systems.The second, more well-known conspiracy theory holds that EMF exposure has mostly moved past these earlier worries about. Rather, it asserts that COVID-19 is directly caused by 5G. The conspiracy theory has numerous iterations. Among them are the following: (a) Wuhan is the origin of COVID-19, and Wuhan "became a guinea pig city for 5G" (Adams, 2020); (b) COVID-19 is a pandemic created to conceal the detrimental effects of 5G radiation (Asher Hamilton, 2020a); this is a bogus allegation. The idea that the epidemic was "designed by Bill Gates to depopulate an overcrowded planet" is an even more fantastical interpretation of this notion (Davidson Sorkin, 2020; Wilson, 2020).

The current 5G activist community has undoubtedly created a conducive environment for conspiracy theories, even though it is impossible to pinpoint their origins. Wired Magazine named Belgian GP Kris Van Kerckhoven as one possible source. He asserted that 5G is potentially fatal and "may be associated with a coronavirus" in an interview with the newspaper (Temperton, 2020a). According to Temperton (2020a), this remark was "quickly picked up by anti-5G activists in the Dutch-speaking world" and started to circulate on social media among activists. As a result of the disclosure, disgruntled organizations eager to spread the "truth" about the epidemic to the world—from "new agers (and) right-wingers (to) QAnon conspiracy theorists"—began producing fresh content (Broderick, 2020). Nonetheless, a BuzzFeed analysis found that some of the most watched videos on the internet are older ones that were uploaded after the UK's 5G deployment started in the middle of 2019 (Broderick, 2020; see also, Waterson, 2020). These frequently had little to do with the COVID conspiracy directly, but they did contribute to the general anxiety around 5G.

However, when some celebrities started putting the word out there, the conspiracy really got going in the mainstream media. In addition to a video that Woody Harrelson shared on Instagram showing "Chinese citizens taking down 5G antennas," Professor Emeritus Martin Pal asserted that Wuhan is the first "smart city" in China to use high-speed networks (Shultz, 2020). Known for disseminating false information were rapper M.I.A., actor John Cusack (Gallagher, 2020), "boxer Amir Khan, singer Anne Marie [...]. formerly of Dancing on Ice," and others.

3.7 THE TRANSFORMATION OF 5G

5G operates in a fundamentally different way than previous mobile infrastructure upgrades. Previous improvements have generally enabled faster data transfers and, as a result, have supported the development of innovative consumer technologies. For example, 2G helped mainstream SMS communications, 3G enabled powerful mobile devices such as the iPhone, and 4G supported mobile streaming media and real-time location technologies such as Uber. 5G will help improve the consumer experience through higher speeds and lower latency, but the drivers but proponents argue that it will have a much broader impact on society because of the configuration of the technology.

5G wireless networks can carry up to 1,000 times more traffic than existing services. To meet this greater demand, 5G will expand frequency allocations to take advantage of higher frequency signals (millimeter waves), which will be relayed through hundreds of small cell networks. These are receivers and mini-base stations. 5G will continue to use the existing network of large cell towers, but these cell towers will be equipped with hundreds more ports or antennas, dramatically increasing network traffic capacity (Nordrum et al., 2017). To streamline the delivery and flow of all this increased data, 5G will also utilize a variety of other technologies to transmit concentrated streams of data to users ("beamforming"). This is one of the fundamental changes that distinguishes 5G from 4G. While traditional antennas send signals radially in all directions, 5G networks use beamforming to focus the signal on the device that needs it at that moment. The network will also better manage the bidirectional flow of data through a signaling or switching system called "full duplex" (Nordrum et al., 2017). Currently, when mobile base stations and cellular phones operate on the same frequency, they must either take turns or operate

on different frequencies when exchanging information. Full-duplex allows for "simultaneous transmission and reception of data on the same frequency," which greatly speeds up data transfer.

Given these potential economic benefits and the long history of fear over the development of mobile technology mentioned earlier, it is perhaps not surprising that 5G is a major battleground. Countries are eager to deploy this new technology. They know that rapid deployment will allow them to get ahead of establishing new innovations such as autonomous vehicle networks (Wilken and Thomas, 2019) and provide a real economic boost for their countries. In Australia, geopolitical tensions are growing over which infrastructure providers should be included in the bidding process, such as the exclusion of China's Huawei from building a 5G network (Hunter, 2020; Remeikis, 2020). Along with these political issues, governments have also had to contend with vocal groups of citizens who claim that 5G poses unrecognized public health risks that are being ignored. These claims are similar to earlier complaints about mobile technology and public health. However, 5G is a very different form of mobile technology, which means that the concerns and subsequent protests also appear in a unique way, as seen in recent attempts to link this technology to the COVID-19 epidemic. In the next section, after examining how concerns about 5G relate to historical concerns over EMFs, we discuss where specific 5G conspiracies have emerged.

4. SIMULATION RESULTS AND DISCUSSION

Taiwan made two mistakes between May 2021 and May 2022. The primary inaccuracy in Taiwan was attributed to the aviation workers and their families not having undergone testing in May 2021. One criticism leveled at Taiwan's alternative failed was the relaxation of border restrictions beginning in May 2022. The wind is direct and smooth until Taiwan and New Zealand successfully advocated for mandatory test counterblockade measures; but, following the removal of border controls and the reduction of counterblockade durations, neither country was fit to contain the COVID-19 pandemic. This is really fascinating. The relaxation of border controls may have a substantial effect on the spread of the COVID-19 pandemic. The counterblockade time is critical to keeping the outbreak under control. Generally speaking, the longer the confinement, the faster the counterblockade time will be to limit COVID-19 transmission. The faster COVID-19 distributed, the faster the insulating period. In Japan, the wind speed is always visible and the score keeps getting higher with time. Put differently, Japanese time series conditions lack the smooth plots and straight lines found in Taiwan and New Zealand. The test insulation strategy that Japan advocates is soft and optional. This is because, in Japan, test insulation styles—which are crucial for mitigating the COVID-19 pandemic—are governed by a voluntary guideline rather than by mandatory legislation. Stated differently, there is need for improvement in Japan's COVID-19 control methods, including the necessary test-insulation approaches. Relaxed border constraints are to blame for Japan's present resurgence.

Niigata's all-encompassing strategy needs more discussion because it hasn't been formally proven. Niigata has one of the best COVID-19 programs in the world. Japanese people always cover their faces with face masks, whether or not they have received official warnings. Put another way, the overall geste of the Japanese populace might have a big influence on the tactic used in this composition. Consequently, COVID-19 is influenced by the actions of the general population as well as the views of policymakers.

According to daily statistics on third cure immunization content by prefecture provided by the Prime Minister's Office of the Japanese government, as of October 21, 2022, Niigata Prefecture had an immunization content of 73.9, which put it in the top rank but not

particularly high. Nevertheless, with a penetration rate of 70.7 for government-designated municipalities, Niigata City remains the nation's leader. About one-third of the population of Niigata Prefecture resides in Niigata City, based on the demographic map. This suggests that non-pharmacological methods, such as the city's unique test insulation technique, may have been employed to contain the spread of COVID-19.If this is the case, the author is probably correct to assume that the influence was caused by the Japanese people's ingrained herd intelligence.

4.1 DATASET USED

The proposed work consists of several tasks, first of all the data collection then preprocessing of this data. The third step was the data analysis and the last step was the classification, detection, and prediction.

The data collection task was performed using an open-source dataset available by the hospitals, it was available on Kaggle, consists of 5434X21 rows of columns. The dataset contains 20 variables can be used to predicate the COVI19 with one output attribute to define if the COVI19 was detected or not. The features are used in the data set were: ['Breathing Problem', 'Fever', 'Dry Cough', 'Sore throat', 'Running Nose', 'Asthma', 'Chronic Lung Disease', 'Headache', 'heart disease', 'Diabetes', 'Hyper Tension', 'Fatigue ', 'Gastrointestinal ', 'Abroad travel', 'Contact with COVID Patient', 'Attended Large Gathering', 'Visited Public Exposed Places', 'Family working in Public Exposed Places', 'Wearing Masks', 'Sanitization from Market', 'COVID-19']

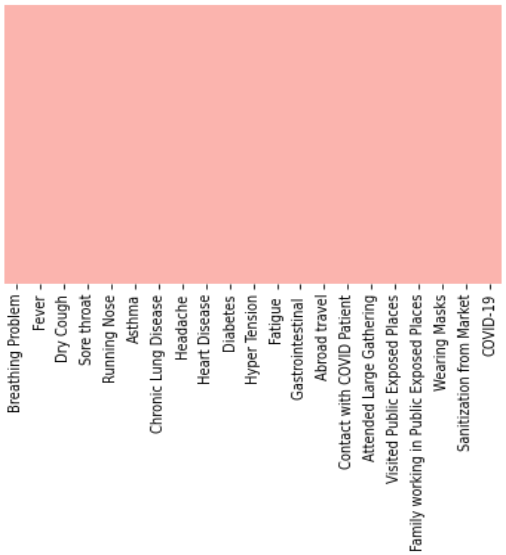

Figure 4.1: Features Available in the Dataset.

4.2 DATA PREPROCESSING

This is the first task in data preparing, this step is important to convert the data types and we must be sure that there are no missing or zero values. The bad data types and the zero values may affect on the training task and decreasing the accuracy of the whole system.

	missing_values	percent_missing %
Breathing Problem	0	0.0
Fever	0	0.0
Dry Cough	0	0.0
Sore throat	0	0.0
Running Nose	0	0.0
Asthma	0	0.0
Chronic Lung Disease	0	0.0
Headache	0	0.0
Heart Disease	0	0.0
Diabetes	0	0.0
Hyper Tension	0	0.0

Figure 4.2: Results of Missing Data Calculation.

4.3 REMOVING UNIMPORTANT VALUES

After defining the features and see the connection between then and the situation of COVID19 yes or no we find that one of the features has a value "No" for all the conditions which will not affect on the training or prediction of the system so we can drop this feature from the dataset.

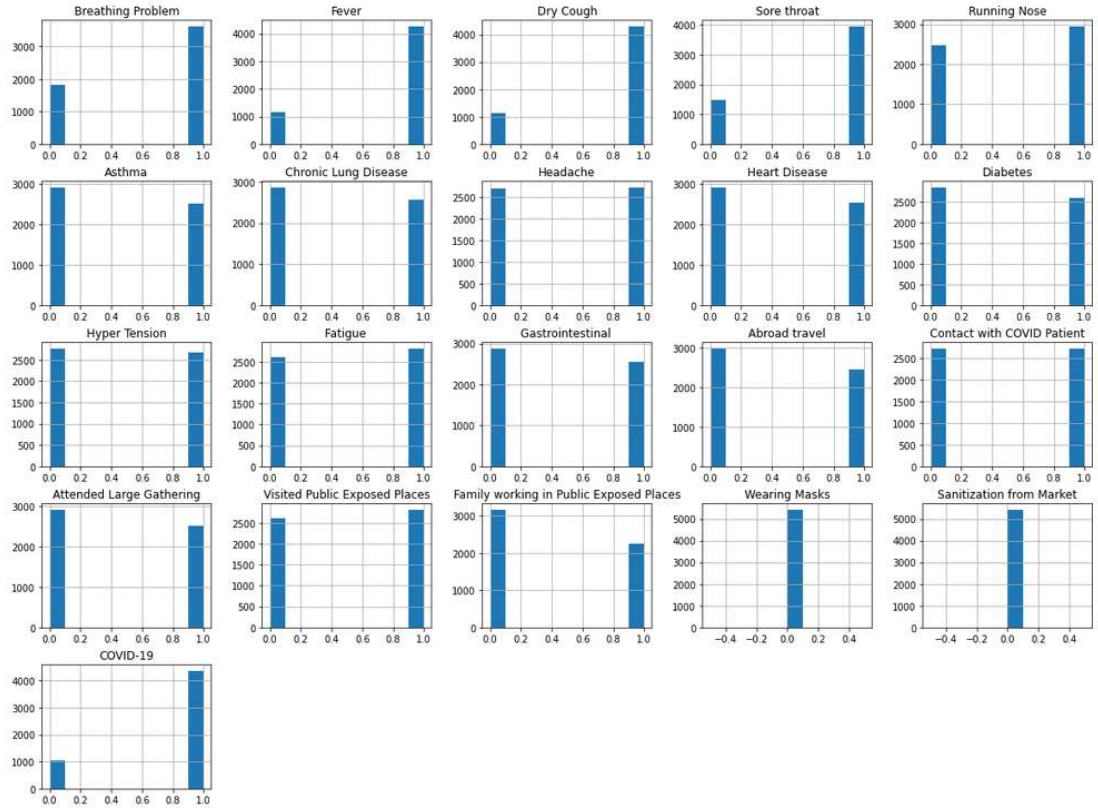

Figure 4.3: Defining the Unimportant Data.

4.4 ENCODING THE DATA

This is the second step, we will split the data set into training and testing dataset. There are several types for splitting like 60.40 , 70.30, 80.20. the best that is used in the studies is 80% of data for training and 20% for testing. we take 20 columns of data into x variable and the situation if we have COVID19 (the last column number 21) the the Y variable. So we want as a result if we enter a collection of symptoms to the classifier if we will have a COVI19 or not.

4.5 DATA ANALYSIS

The data analysis step is a very important task that can help us to understand the whole data structure and define the patterns of the data available in our hands so we can get the best result by using the suitable data.

4.6 TUNING THE PARAMETERS

Variables tuning is the next important task that is used to increase the accuracy of the model decreasing the error to the lowest rate. We can use several methods to do that, the method must give the best combination of parameters to increase the accuracy. The method used was gridsearchcv that defines the best accuracy score depending on parameters grid. Next Figures shows the results found.

As we can see from figure (4), the dataset contains 4383 situation with COVID19 disease and 1051 save situations.

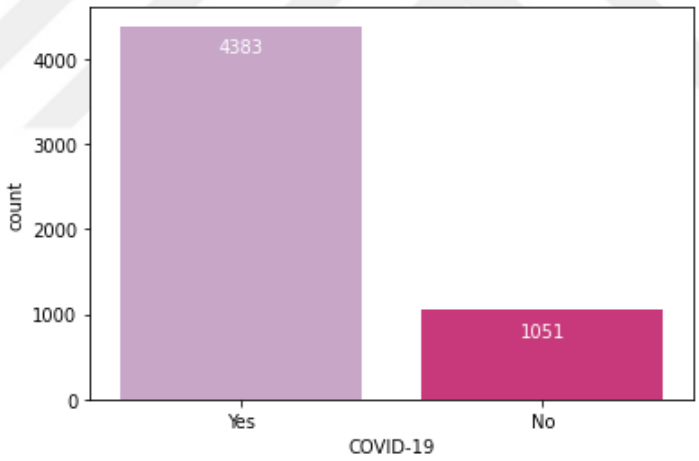

Figure 4.4: Number of COVID19 Patients Vs Healthy Ones in the Dataset.

As we can see from figures (5) and (6) we can see that we have 3620 persons with breathing problems, 3369 of them has COVID19 and 251 without it. For the persons who has no breathing problems, there are 1014 has COVID19 and 800 are save.

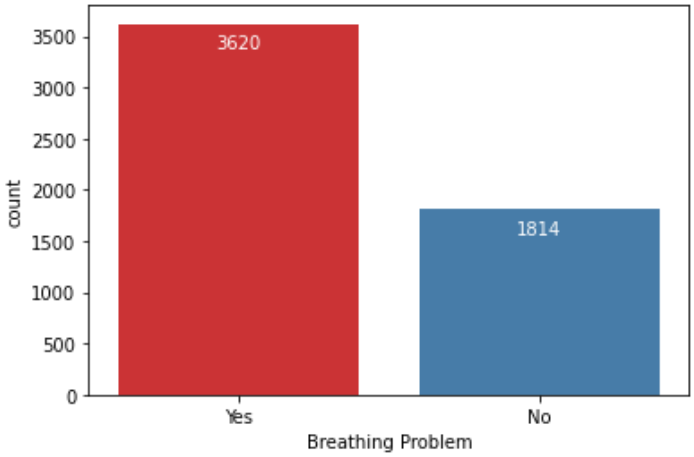

Figure 4.5: Number of People Has Breathing Problem Vs No Breathing Problems.

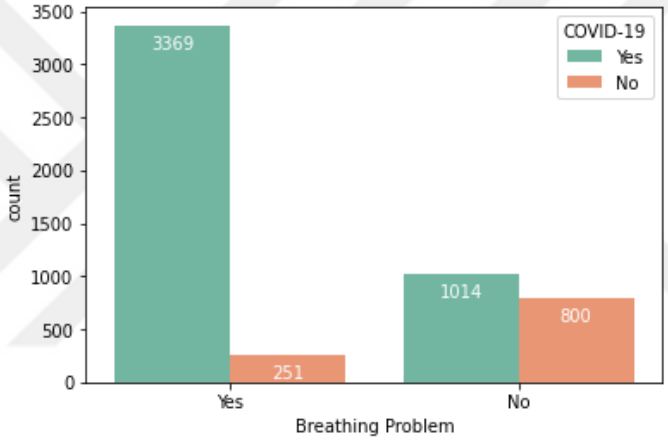

Figure 4.6: **N**umber of People That Have COVID19 When Has Breathing Problem Vs No Breathing Problems.

In the same way, there are 4273 persons has fever (3757 has COVID19 and 516 without it) and 1161 without fever (626 with COVID19 and 535 without it).

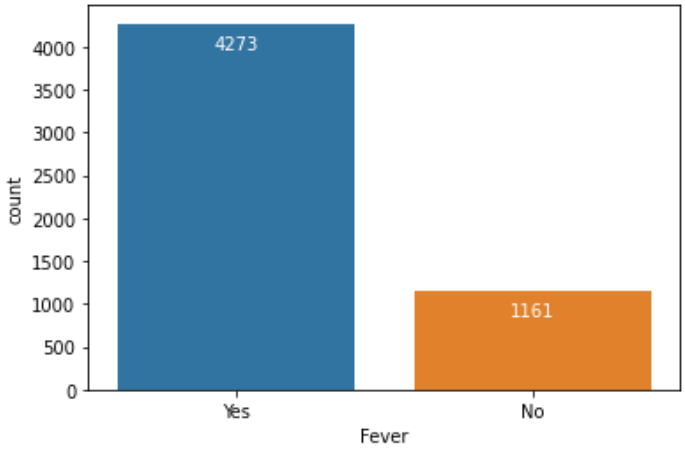

Figure 4.7: Number of People Has Fever Or Not.

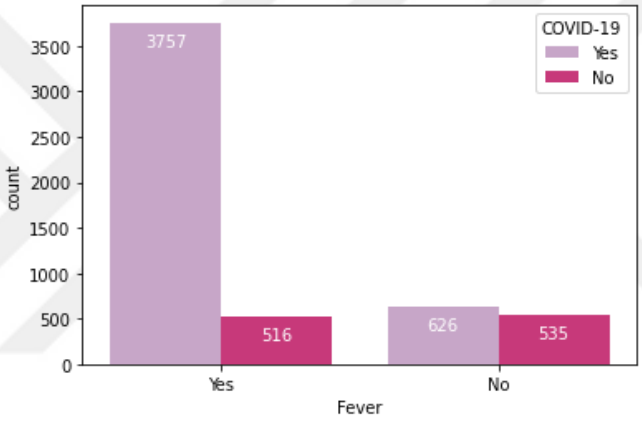

Figure 4.8: Number of People Have COVID19 When They Have Fever Or Not.

There are 4307 persons has a dry cough (3878 has COVID19 and 429 are save) and 1127 with no dry cough (505 with COVID19 and 622 without COVID19).

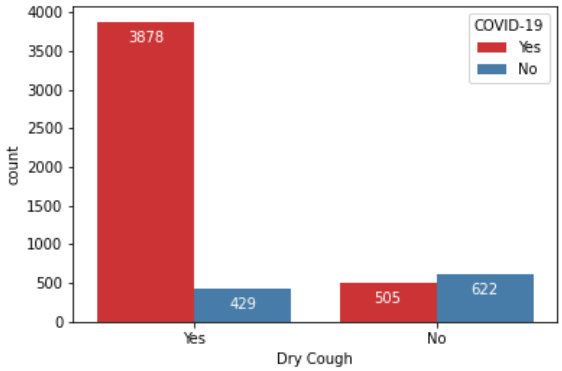

Figure 4.9: Number of People Have COVID19 When They Have Dry Cough Or Not.

In the situation of Sore throat, we can find that 3669 from the patients that have COVID19 has a Sore throat, where 284 do not have it. Where 714 from the save people has Sore throat and 767 do not have it.

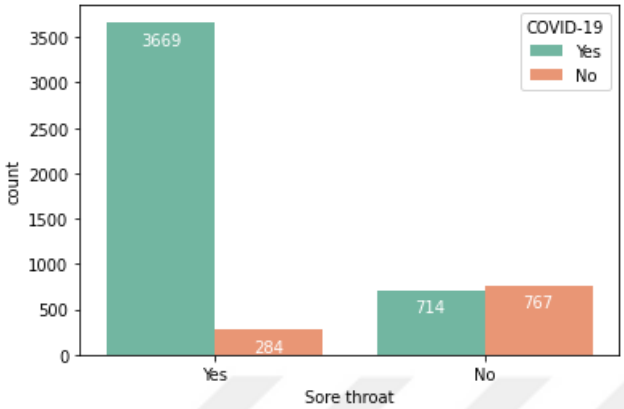

Figure 4.10: Number of People Have COVID19 When They Have Sore Throat or Not.

In the next figure we can see that 2451 people who has COVID19 was traveled abroad and 1932 did not travel.

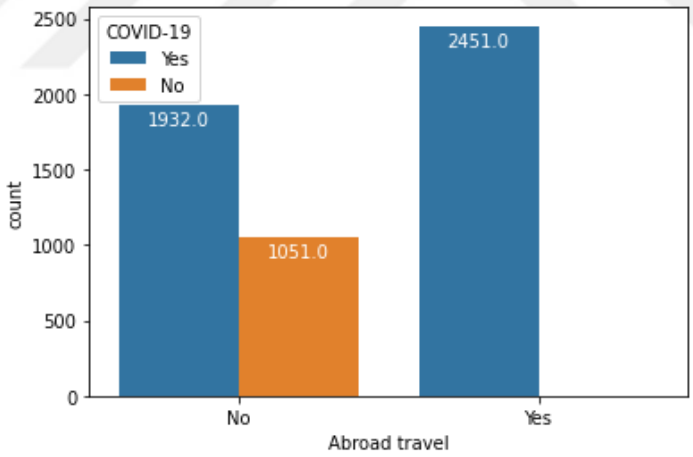

Figure 4.11: Number of People Have COVID19 When They Have Traveled Abroad Or Not.

We can find too the effect of contacting with ill patients, 2582 who has contact with COVID19 patients have got the disease where 144 has not.

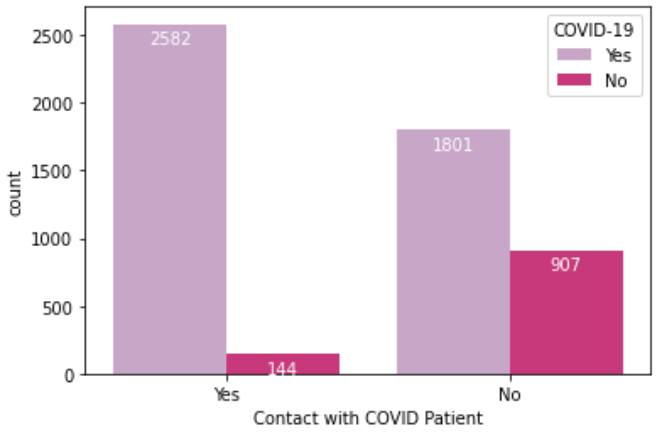

Figure 4.12: Number of People Have COVID19 When They Have Contact With COVID Patient.

At last, we can see the effect of attending to gathering. 2442 of people attends to gathering has the disease where 1941 were not.

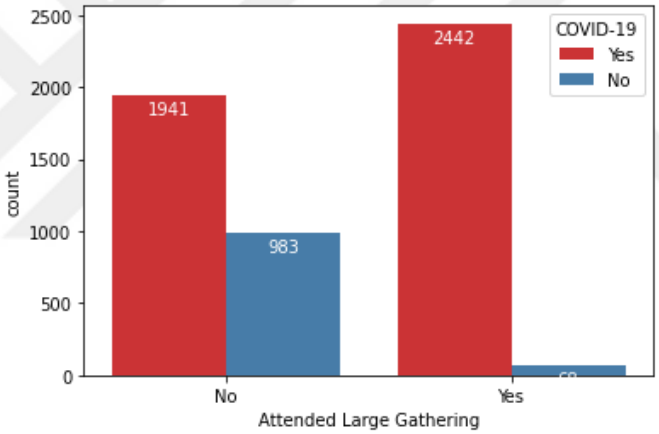

Figure 4.13: Number of People Have COVID19 When They Have Attended Large Gathering.

4.7 IMPLEMENTATION OF CLASSIFIERS

In recent days, there are several types of techniques that are used to give the best prediction. These technologies are more efficient, accurate, and less expensive than before. The methods used here were:

4.7.1 Logistic Regression

This is one of the oldest methods that used in machine learning. It uses the logistic function to give a single outcome. It depends on a group of independent variables to give a single

result that can be used by the logistic regression. This method depends on probabilities that means what is the probability of the case study to belong for a specific class. Because we have two classes here, the state “Yes” if we have COVID19 and “No” we do not have, so the result of the classifier will be y=0,1.

4.7.2 The K-Neighbors Classifier

It Is a supervised machine learning classifier. We define the class here by categorizing it to the K-nearest neighbors in the whole dataset. It calculates the distance between the item and the surrounded items by using distance calculations like Euclidean Distance.

4.7.3 Random Forest

This classifier uses an estimation method depending on several decision trees. These trees are built using sub-samples of the data available to increase the prediction capability of the model. It can give a good fit for the data and avoid the over-fitting.

This classifier in more accurate than the decision tree. At the last step in this classifier, we make a voting task between sub-trees to define the class the sample belongs to.

4.8 PERFORMANCE EVALUATION

After the training task for the model, we need to evaluate it using the test dataset with several accuracy standards like accuracy, recall, precision, F1-score…etc. these standards help us to determine if the model was trained fine and is able to predicate the right output for a specific input.

4.8.1 Confusion Matrix

It is a performance measure of the accuracy of the model used in a machine learning problem. It has four main predicated actual values which are:

a. True Positive (TP): this means that the model predicates the value was an intrusion and that is right.
b. True Negative (TN): this means that we predicate the value is not intrusion and it is true too.

c. False Positive (FP): here we predicate that we have an attack, but we have a normal brhavior.
d. False Negative (FN): here we predicate that we have normal behavior, but we have a attack.

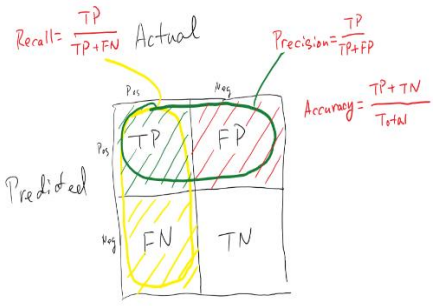

Figure 4.14: True Positive, False Positive, False Negative, True Negative Defnitions.

4.9 ROC CURVE

Or named the Receiver Operator Characteristic curve, this curve try to solve binary classification problem. And it is able to separate the signal from the noise. So it is able to view a good idea about the performance of the model in classification task in all thresholds that are available. Another plot named the Area Under the Curve (AUC) that shows if the binary classifier has the ability to create a distinguish between several classes so it can be a base for ROC curve performance.

If AUC is high then the model will have a great ability to distinguish between positive and negative classes.

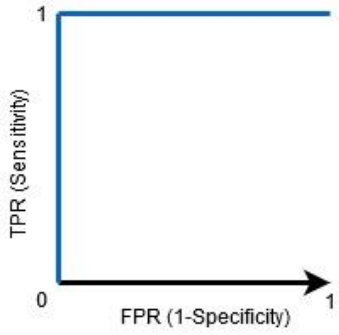

Figure 4.15: Best ROC Curve.

In the previous plot we can see that AUC=1 and the classifier is 100% able to distinguish between positive and negative classes points. Where in another hand, if AUC=0 then the classifier will not classify any right result (the positive will be negative and the negative will be positive). When the AUC value is between 0.5 and 1 then the classifier will have a high ability to make a distinguish between classes.

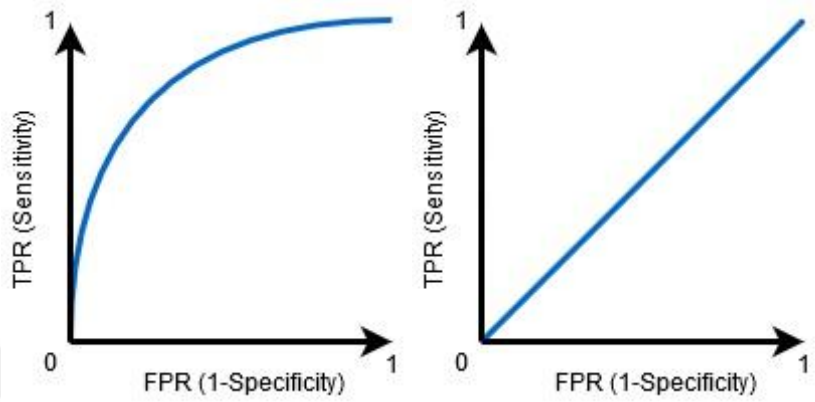

Figure 4.16: ROC Curve When AUC Between 0.5 and 1 (A) And Equals To 0.5 (B)

When the AUC is 0.5 then the classifier will fail to find the different between positive and negative values.

4.10 AUC-ROC PERFORMANCE

The horizontal axis defines the biggest value between false positives than the true negative. Where, the vertical axis defines the higher value of true positive than false negatives. So, here we must decide about the value of the threshold that we want to choose.

Results of logistic regression:

Logistic Regression:

ROC_AUC value : 93.23107498945218 %

Mean Squared Error : 3.035878564857406 %

R2 score is : 80.08627006861634 %

Accuracy Score : 97.03243616287095 %

Results of KNN:

K-NEAREST Neighbours

ROC_AUC value : 97.47213154797593 %

Mean Squared Error : 2.5758969641214353 %

R2 score is : 83.10350187640175 %

Accuracy Score : 98.3666896710375 %

Comparison between several classification techniques:
We have several standards to compare the performance of the classification techniques. First standard is the accuracy as we can see from figure (4.16), the random forest tree and the K-nearest neighbors where the best in accuracy which is nearly 100%, where the logistic regression was less in the accuracy standard.

Figure (4.17) shows the time consumed by each algorithm, as we can see the random forest classifier spent nearly 10 times of time than the K-nearest neighbors (with nearly the same accuracy). This plot shows how the random forest is computation consumption algorithm and needs more powerful hardware.

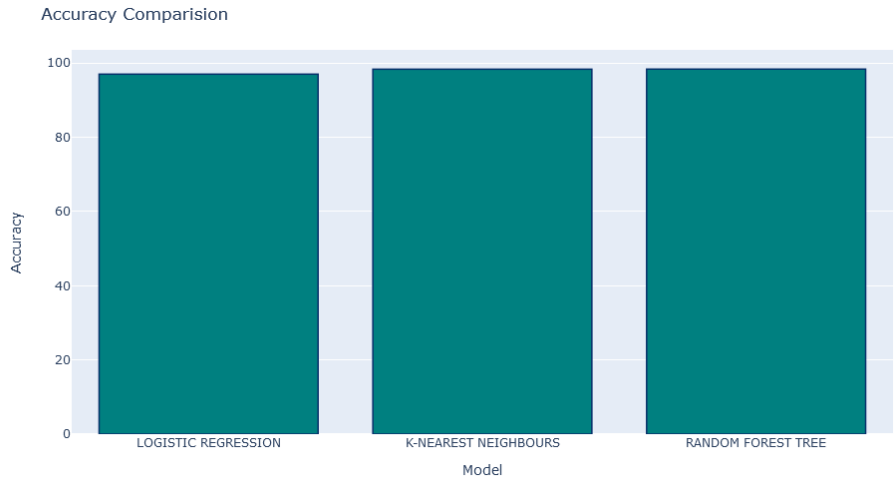

Figure 4.17: Accuracy Comparison of Three Classifiers

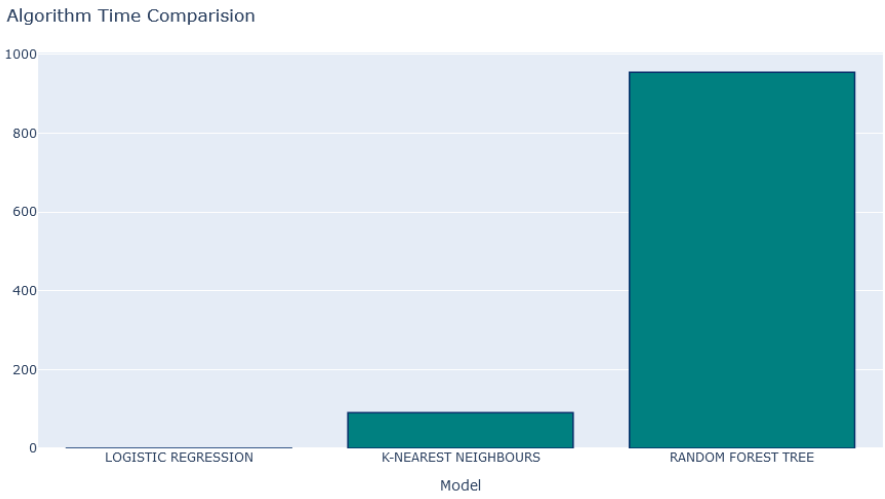

Figure 4.18: Time Comparison of Three Classifiers.

If we look to another comparison plot for the R2 score, we can find that the random forest has the highest score too, then the k-nearest neighbor, and the logistic regression at last.

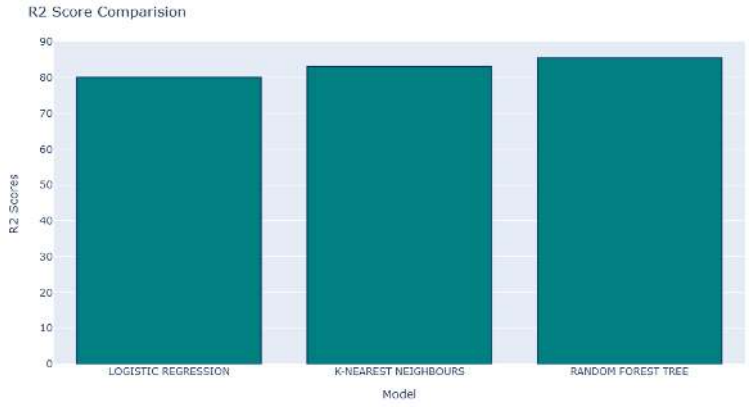

Figure 4.19: R2 Comparison of Three Classifiers.

If we take the mean square error and ROC standard too, we will have the figure () that compares between each algorithm. We can see that the KNN gives the best accuracy with a good speed that runs above all the other algorithms.

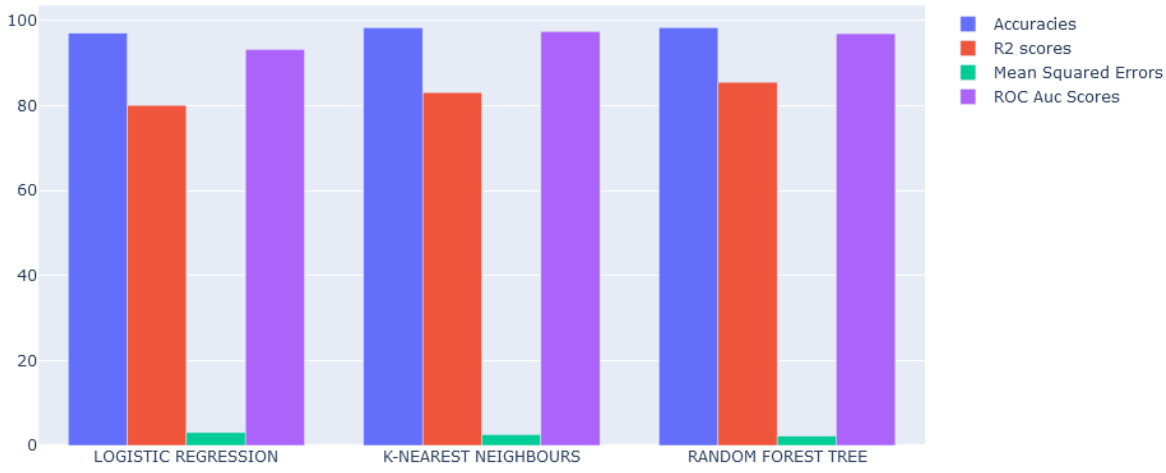

Figure 4.20: Total Performance Comparison of Three Classifiers.

If we plot the ROC curve for each algorithm we will have the next figures. Here we can see that if we use the logistic regression then we need a defined time to achieve the best time, where KNN and random forest do not need these curves and can achieve the accuracy quickly.

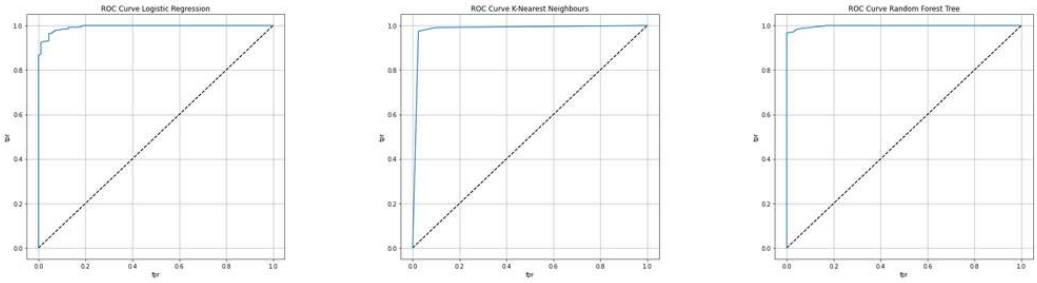

Figure 4.21: ROC Performance Comparison of Three Classifiers.

The system will ask the user several questions and then predicate the healthy condition if the patient has a COVID19 or not. Then a message will be sent for the user to tell him about the response required.

We choose KNN method because of its accuracy with the high speed, and then we create a query system using python to predicate the healthy situation of the patient.

4.11 IOT (INTERNET OF THINGS)

Many devices and instruments these days depend mainly on internet. We can count several devices like smartwatches, cars, smart lock doors, thermostat, or any other device. These devices are able to communicate with each other and send information between them. These devices are able to have a specific identity and behave like a smart device. This overall system is called the internet of things.

For example, if we take the smart watch as an example, it collects data about the number of steps, heart rate, the temperature of the body. And then send this information to other devices like smart phones, laptops, or tablets. Then these data might used by the smart phone for analyzation task to tell for example the number of calories used by the user so he can take care and make a close watch about his body.

4.11.1 Importance of IOT

This technology allows people to control their whole live, and can give the task of home or factory automation easier. It can give a good control of any system in the real time. And let the people to look how the machines are doing their performance and if there is any problems with the system control.

It helps to reduce the costs of workers and make the manufacturing tasks goes for a longer period. It is able too to give a better performance for the delivery operations that it could be less expensive.

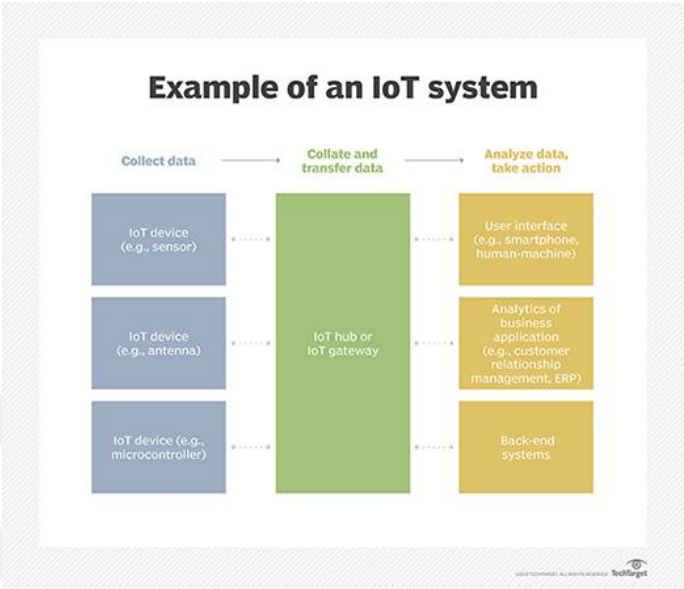

Figure 4.22: Example of an IOT

In our proposed system we aims to predicate the situation of the patient using the deep learning method and using a query system that asks the patients about his or her conditions and then try to predicate if the patient has COVID19 or not. The result will sent to the patient using the 5G technology.

4.11.2 Using the PubNub

PubNub structure is a global DataStream network with a rea time capabilities which can send the stream via the internet and network by the web, or mobiles, or any compatible. This library depends on an architecture similar to MQTT protocol where a user can send a specific topic and the other users can listen to the responds sent for it.

4.12 DISCUSSION

Soothsaying algorithms and new information can be ripened from literal data through data mining. The criteria mentioned and the way the data is processed have a significant impact on knowledge discovery. Different data mining approaches are employed to read

outbreaks. As a matter of public health, COVID-19 had actually previously been one of the largest heads worldwide. In this investigation, we proposed examining the global COVID-19 pandemic over a two-week period using a prophetic model built on actual data. It was found that this model could be displayed with a reasonable amount of error.

In this investigation, a model for vaticinating the prevalence of COVID-19 was developed using a coronavirus dataset. Based on the prevalence rate each day, the model was trained on three groups: fewer than 200 cases, 200–1000 cases, and more than 1000 cases. A one-way analysis of friction revealed that there was a statistically significant difference in the frequencies of the three orders (p-value 0.001). For every cohort, the complaint frequency for the next two weeks was read using a prophetic algorithm.

The proposed model achieved an error of around 10(90 delicacy) for the group of fewer than 200 cases, 18(82 delicacy) for the group of 200 to 1000 instances, and 13(87 delicacy) for the group of more than 1000 cases. After evaluating the 68-day COVID-19 pandemic worldwide, the investigation produced a two-week protuberance model (March 30-April 12, 2020) that predicted the occurrence of over 100,000 cases in the next two weeks, representing a statistical increase of 58 over the 700,000 cases that had occurred by March 29, 2020.

The investigation found that nearby communities with a frequency of less than 1,000 had comparable prevalence rates, demonstrating the applicability of using neighborhood data to determine the prevalence rate in each community. By employing surrounding knowledge, the model may implicitly account for successful programs in other regions while vaticinating the frequency of COVID-19 in each area.

The recommended model was trained on 68 days of data, the most recent available at the time of writing, thus we assume we were appropriate to guarantee a prevalence vaticination delicacy of over 81. Furthermore, the model's trip in vaticination was less than 2 over a total of 12 days in 252 regions. With a more precise data gathering process for each country using fewer locations, it was thus hoped that a model that accurately estimates the frequency of cobid19 during a 2-week period for each country would be acceptable to be built.

Despite the fact that time series typically need to be long enough (typically several times) to fully account for seasonality, we believe that the model can manage seasonality and predict patient counts with respectable delicacy using short time series. This is based on the model's perpetration results. Future research should continue to focus on how seasonal variations affect the frequency of this condition.

One of the study's shortcomings is the dearth of reliable data from every nation. Since the disease did not spread to all mainlands simultaneously and the maturity of indigenous cases occurred after day 40 of the first case in China, 68 days of data did not seem appropriate to interpret the frequency of such an unfamiliar complaint.

After day 50, more than 80 out of the 45 geographic regions in Africa reported their first cases. 4682 cases have been validated since then, accounting for 97.83 of the 4783 confirmed cases across Africa. In more than 45 of Australia's 11 regions, the first incidence was reported after day 40. Of the 4504 instances on the mainland, 4478 (or 99.4) had been found not guilty at that point. The first case in Europe was reported after day 40 in 60 of the 69 geographic regions where the data were collected.

After day 50, 88 of the cases in the North American region were found for the first time. Of the 46 cases verified by March 29, 2020, 38 instances on the mainland were validated after day 50 (82.61) and 41 cases after day 40 (89.13). The data set does not reflect the effects of the increased number of diurnal tests and the insulations examined from March 30 to April 12 on some mainlands, similar to Europe, because of the delay in publicizing the outbreak in some mainlands, which resulted in a lack of information.

However, the erroneous projections of the number of cases in Africa can be attributed to the incomplete data on the continent that was part of the data collection. In 80 African regions, the first confirmed cases were reported on day 50 of the pandemic. 4682 (more than97) of the 4786 cases that were reported there total were registered after day 50.

Another limitation of the work is the lack of thickness in establishing latitude and longitude for colorful geographic areas, which are important labels of the data collection. In certain regions, the data concerns a particular state inside a single country, whilst in other regions, it concerns the entire country. For example, the COVID-19 case data in the

Netherlands are provided at four different dyads of latitude and longitude, while all cases in the American data set are provided at a single latitude and longitude.

These tactics have all been effectively used in various drug-related fields. Furthermore, more bracket styles have been employed in exploration than was initially thought. By selecting a fashionable system and applying precise predictive models, researchers can find multiple biomarkers under unidentified circumstances, enabling them to predict critical problems. Therefore, the application of prophetic models can benefit society, health policy makers, and smokers. The information shows that the most crucial step in responding to an epidemic is preventing the spread of infectious diseases. Scientists are worried about the features of a new complaint since, generally speaking, the nature of a new complaint outbreak during an epidemic is unknown. In light of this, the maturity of exploration has focused on describing complaints. Scientists should put their opinions about the complaint above all other responsibilities during this outbreak. The other main worry with infectious epidemics is the means of transmission. Therefore, estimating the complaint's circumstances takes up about ten of the investigation. However, because different approaches are employed, there is a wide range in the sample sizes of the data sets.

The results show that most research employ a small number of different data sources and kinds of data. The model's robustness and delicacy can be improved by using large data sets. Findings can aid scientists in resolving this problem. developing grievance. Thus, researchers have to use large-scale data-set studies. worldwide for improved guidance and care. suggestions. During our investigation, we encountered certain restrictions. Because of this, certain studies might be missed in situations like this.

5. CONCLUSION AND FUTURE WORKS

5.1 CONCLUSION

The aim of this work is to estimate the DS4C COVID data set using machine literacy techniques from the WEKA programming terrain. Testing was done on bracket styles, point birth, data remembering, and data preprocessing. To get rid of outliers and missing numbers from the dataset, preprocessing was done on the data. Using the hunt- search methodology and top element analysis, features were named and uprooted; ten features were named for the further bracket using PCA. Adtree, BayesNet, and convolutional neural networks (deep literacy) were the styles utilized for the bracket. The convolutional neural network for deep literacy was built using Weka's Deep Learning4J program.

Convolutional neural networks, ADtree, and BayesNet bracket styles were compared using statistical measures of delicacy, perfection, and perceptivity. The ADTree bracket system achieved the alternate loftiest delicacy of 97.36; the BayesNet bracket achieved the smallest delicacy of 97.95; the analysis of the DS4C COVID-19 dataset indicated that convolutional neural networks were the superior bracket system. The experimental results showed that the convolutional neural network achieved the loftiest delicacy of 99.06.

Policy Counteraccusations:

This study provides ballpark estimates of the costs related to a COVID-19 pandemic for seven potential COVID-19 evolutionary scenarios. Rather than making definitive conclusions about a viral epidemic, the goal is to familiarize the anthology with the range of implied profitable charges linked with the complaint; if COVID-19 becomes a global epidemic, the fees could climb briefly. However, as of the time of writing, neither the extent of potential damages nor the liability of such an incident are known for sure.

There will be a range of policy outcomes required in the near and long term. In the near future, governments and central banks will have to ensure that the anxious frugal continues to function smoothly while the epidemic of complaints persists. In the event of actual financial strain, governments have a significant role to play. Although interest rates can be lowered by central banks in response, shocks are complicated events that lead to challenges

with demand management as well as financial, public, and health policy concerns. According to Levine and McKibbin (2020), there is a widespread abandonment of good hygiene habits. One low-cost and generally successful reaction that lowers the extent of transmission and, hence, the social and financial consequences is the widespread abandonment of excellent hygiene practices. Reducing social links and isolating affected individuals are two more successful reaction strategies.

In actuality, the long-term reaction is more crucial. Even though there is a chance that many lives may be lost and a great deal of disruption, many governments unintentionally fail to invest enough in their own health care systems, let alone in the public health systems of less developed nations where many infectious diseases are expected to occur. Experts have cautioned—and still do—that zoonotic illnesses represent a persistent risk to millions of lives and have the potential to significantly impair the associated worldwide frugal lifestyle. The COVID-19 pandemic refutes the idea that any nation can exist as an anomaly within a larger global thrifty trend. International collaboration is crucial, particularly in the fields of profitable growth and public health. Every important nation needs to participate actively.

Poor people die of poverty. However, the COVID-19 pandemic demonstrates that these illnesses can affect people in any socioeconomic class and in any community if they are caused by filthy living conditions, overcrowding, or contact with animals in developing nations. A few examples of how public health and development can be impacted are provided below. Significant resources are spent on public health and development, both in wealthy nations and particularly in the world's poorest nations. This analysis illustrates the potential savings that come from coordinated international investments in public health across all nations. This major shift in the administration has been known for decades.

REFERENCES

[1] WHO. (April 5, 2020). Coronavirus disease 2019 (COVID-19) Situation Report - 76. Available: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200405-sitrep-76-covid-19.pdf

[2] WHO. (2020, 30 January, 2020). Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV).

[3] WHO. (2020). WHO Director-General's opening remarks at the media briefing on COVID-19.

[4] T. Ai, Z. Yang, H. Hou, C. Zhan, C. Chen, W. Lv, et al., "Correlation of Chest CT and RT-PCR Testing in Coronavirus Disease 2019 (COVID-19) in China: A Report of 1014 Cases," Radiology, p. 200642, 2020.

[5] T. Liang, Handbook of COVID-19 prevention and treatment, 2020.

[6] J. P. Kanne, "Chest CT findings in 2019 novel coronavirus (2019-nCoV) infections from Wuhan, China: key points for the radiologist," Radiology, p. 200241, 2020.

[7] A. Bernheim, X. Mei, M. Huang, Y. Yang, Z. A. Fayad, N. Zhang, et al., "Chest CT findings in coronavirus disease-19 (COVID-19): relationship to duration of infection," Radiology, p. 200463, 2020.

[8] X. Xie, Z. Zhong, W. Zhao, C. Zheng, F. Wang, and J. J. R. Liu, "Chest CT for typical 2019-nCoV pneumonia: relationship to negative RT-PCR testing," Radiology, p. 200343, 2020.

[9] A. Narin, C. Kaya, and Z. Pamuk, "Automatic detection of coronavirus disease (COVID-19) using X-ray images and deep convolutional neural networks," arXiv:2003.10849, 2020.

[10] I. D. Apostolopoulos and T. Bessiana, "Covid-19: Automatic detection from X-Ray images utilizing transfer Learning with convolutional neural networks," arXiv:2003.11617, 2020.

[11] L. Wang and A. Wong, "COVID-Net: A tailored deep convolutional neural network design for detection of COVID-19 cases from vhest radiography images," arXiv:2003.09871 2020.

[12] L. A. Bullock Joseph, Pham Katherine Hoffmann, Lam Cynthia, Luengo-Oroz Miguel A., "Mapping the landscape of artificial intelligence applications against COVID-19," arXiv:2003.11336, 2020.

[13] J.-H. Lee, D.-i. Kim, and M.-k. Cho, "Computed tomography apparatus and method of controlling X-ray by using the same," ed: Google Patents, 2017.

[14] P. Forthmann and G. Pfleiderer, "Augmented display device for use in a medical imaging laboratory," ed: Google Patents, 2019.

[15] V. T. Jensen, "Method and system of acquiring images with a medical imaging device," ed: Google Patents, 2009.

[16] S. Scheib, "Dosimetric end-to-end verification devices, systems, and methods," ed: Google Patents, 2019.

[17] United imaging's emergency radiology departments support mobile cabin hospitals, facilitate 5G remote diagnosis. Available: https://www.prnewswire.com/news-releases/united-imagings-emerge ncy-radiology-departments-support-mobile-cabin-hospitals-facilitate- 5g-remote-diagnosis-301010528.html

[18] V. K. Singh, K. Ma, B. Tamersoy, Y. Chang, A. Wimmer, T. F. Odonnell, et al., "DARWIN: Deformable patient avatar representation with deep image network," in Medical Image Computing and Computer Assisted Intervention, 2017, pp. 497-504.

[19] Lang, S., Bravo-Marquez, F., Beckham, C., Hall, M., & Frank, E. (2019). WekaDeeplearning4j: A deep learning package for Weka based on Deeplearning4j. Knowledge-Based Systems, 178, 48-50.

[20] Norouzi, M., Souri, A., & Samad Zamini, M. (2016). A data mining classification approach for behavioral malware detection. Journal of Computer Networks and Communications, 2016.

[21] AL-Rawashdeh, G. H., & Mamat, R. B. (2019). Comparison of four email classification algorithms using WEKA. International Journal of Computer Science and Information Security (IJCSIS), 17(2).

[22] Daw, S., & Basak, R. (2020, March). Machine Learning Applications Using Waikato Environment for Knowledge Analysis. In 2020 Fourth International Conference on Computing Methodologies and Communication (ICCMC) (pp. 346-351). IEEE.

[23] Zhang, J., Shao, J., Ren, Z., Yu, J., Li, X., & Jia, Z. (2020). A High-Accuracy Calibration Method Using Sensor Sensitivity Difference for Piezoelectric Dynamometer. Journal of Dynamic Systems, Measurement, and Control, 142(1).

[24] Daw, S., & Basak, R. (2020, March). Machine Learning Applications Using Waikato Environment for Knowledge Analysis. In 2020 Fourth International Conference on Computing Methodologies and Communication (ICCMC) (pp. 346-351). IEEE.

[25] Lai, C. C., Shih, T. P., Ko, W. C., Tang, H. J., & Hsueh, P. R. (2020). Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and corona virus disease-2019 (COVID-19): the epidemic and the challenges. International journal of antimicrobial agents, 105924.

[26] Hertel, L., Collado, J., Sadowski, P., Ott, J., & Baldi, P. (2020). Sherpa: Robust Hyperparameter Optimization for Machine Learning. arXiv preprint arXiv:2005.04048.

[27] Ting, Daniel Shu Wei, Lawrence Carin, Victor Dzau, and Tien Y. Wong. ”Digital technology and COVID-19.” Nature Medicine (2020): 1-3

[28] Benvenuto, Domenico, Marta Giovanetti, Lazzaro Vassallo, Silvia Angeletti, and Massimo Ciccozzi. ”Application of the ARIMA model on the COVID-2019 epidemic dataset.” Data in brief (2020): 105340

[29] Deb, Soudeep, and Manidipa Majumdar. ”A time series method to analyze incidence pattern and estimate reproduction number of COVID-19.” arXiv preprint arXiv:2003.10655 (2020)

[30] Dey, Samrat Kumar, Md Mahbubur Rahman, Umme Raihan Siddiqi, and Arpita Howlader. ”Analyzing the Epidemiological Outbreak of COVID-19: A Visual Exploratory Data Analysis (EDA) Approach.” Journal of Medical Virology (2020)

[31] Lauer, Stephen A., Kyra H. Grantz, Qifang Bi, Forrest K. Jones, Qulu Zheng, Hannah R. Meredith, Andrew S. Azman, Nicholas G. Reich, and Justin Lessler. ”The incubation period of coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: estimation and application.” Annals of internal medicine (2020)

[32] Singer, H. M. ”Short-term predictions of country-specific Covid-19 infection rates based on power law scaling exponents.” arXiv preprint arXiv:2003.11997 (2020)

[33] Daniel Grossman and Pedro Domingos (2004). Learning Bayesian Network Classifiers by Maximizing Conditional Likelihood. In Press of Proceedings of the 21st International Conference on Machine Learning, Banff, Canada.

[34] Vasan, K. K., & Surendiran, B. (2016). Dimensionality reduction using principal component analysis for network intrusion detection. Perspectives in Science, 8, 510-512.

[35] Lang, S., Bravo-Marquez, F., Beckham, C., Hall, M., & Frank, E. (2019). WekaDeeplearning4j: A deep learning package for Weka based on Deeplearning4j. Knowledge-Based Systems, 178, 48-50.

[36] Norouzi, M., Souri, A., & Samad Zamini, M. (2016). A data mining classification approach for behavioral malware detection. Journal of Computer Networks and Communications, 2016.

[37] AL-Rawashdeh, G. H., & Mamat, R. B. (2019). Comparison of four email classification algorithms using WEKA. International Journal of Computer Science and Information Security (IJCSIS), 17(2).

[38] Daw, S., & Basak, R. (2020, March). Machine Learning Applications Using Waikato Environment for Knowledge Analysis. In 2020 Fourth International Conference on Computing Methodologies and Communication (ICCMC) (pp. 346-351). IEEE.

[39] Zhang, J., Shao, J., Ren, Z., Yu, J., Li, X., & Jia, Z. (2020). A High-Accuracy Calibration Method Using Sensor Sensitivity Difference for Piezoelectric Dynamometer. Journal of Dynamic Systems, Measurement, and Control, 142(1).

[40] Gao, W.; Veeresha, P.; Baskonus, H.M.; Prakasha, D.G.; Kumar, P. A new study of unreported cases of 2019-nCOV epidemic outbreaks. Chaos Solitons Fractals 2020, 138, 109929. [Google Scholar] [CrossRef]

[41] Farooq, J.; Bazaz, M.A. A novel adaptive deep learning model of Covid-19 with focus on mortality reduction strategies. Chaos Solitons Fractals 2020, 138, 110148. [Google Scholar] [CrossRef]

[41] Arango-Londoño, D.; Ortega-Lenis, D.; Muñoz, E.; Cuartas, D.E.; Caicedo, D.; Mena, J.; Torres, M.; Méndez, F. Predicciones de un modelo SEIR para casos de COVID-19 en Cali, Colombia. Rev. Salud Pública 2020, 22, 1–6. [Google Scholar] [CrossRef]

[42] Yang, Z.; Zeng, Z.; Wang, K.; Wong, S.-S.; Liang, W.; Zanin, M.; Liu, P.; Cao, X.; Gao, Z.; Mai, Z.; et al. Modified SEIR and AI prediction of the epidemics trend of COVID19 in China under public health interventions. J. Thorac. Dis. 2020, 12, 165–174. [Google Scholar] [CrossRef] [PubMed]

[43] Djilali, S.; Ghanbari, B. Coronavirus pandemic: A predictive analysis of the peak outbreak epidemic in South Africa, Turkey, and Brazil. Chaos Solitons Fractals 2020, 138, 109971. [Google Scholar] [CrossRef] [PubMed]

[44] Russo, L.; Anastassopoulou, C.; Tsakris, A.; Bifulco, G.N.; Campana, E.F.; Toraldo, G.; Siettos, C. Tracing day-zero and forecasting the COVID19 outbreak in

Lombardy, Italy: A compartmental modelling and numerical optimization approach. PLoS ONE 2020, 15, e0240649. [Google Scholar] [CrossRef]

[45] Zhang, Y.; Yu, X.; Sun, H.; Tick, G.R.; Wei, W.; Jin, B. Applicability of time fractional derivative models for simulating the dynamics and mitigation scenarios of COVID-19. Chaos Solitons Fractals 2020, 138, 109959. [Google Scholar] [CrossRef]

[46] Capistrán, M.A.; Capella, A.; Christen, J.A. Forecasting hospital demand during COVID-19 pandemic outbreaks. In CIMAT-CONACYT, UNAM.; Cornell University: Ithaca, NY, USA, 2020; pp. 1–30. Available online: https://arxiv.org/abs/2006.01873 (accessed on 24 February 2021).

[47] Tan, S.-D.; Chen, L. Real-Time Differential Epidemic Analysis and Prediction for COVID-19 Pandemic; Department of Electrical and Computer Engineering, University of California: San Diego, CA, USA, 2020; pp. 1–9. Available online: https://arxiv.org/abs/2004.06888 (accessed on 1 May 2021).

[48] Alkahtani, B.S.T.; Alzaid, S.S. A novel mathematics model of COVID-19 with fractional derivative. Stability and numerical analysis. Chaos Solitons Fractals 2020, 138, 110006. [Google Scholar] [CrossRef]

[49] Hasan, N. A Methodological Approach for Predicting COVID-19 Epidemic Using EEMD-ANN Hybrid Model. Internet Things 2020, 11, 100228. [Google Scholar] [CrossRef]

[50] Torrealba-Rodriguez, O.; Conde-Gutiérrez, R.; Hernández-Javier, A. Modeling and prediction of COVID-19 in Mexico applying mathematical and computational models. Chaos Solitons Fractals 2020, 138, 109946. [Google Scholar] [CrossRef]

[51] Saba, A.; Elsheikh, A. Forecasting the prevalence of COVID-19 outbreak in Egypt using on linear autoregressive artificial neural networks. Process Saf. Environ. Prot. 2020, 141, 1–8. [Google Scholar] [CrossRef]

[51] Kırbaş, I.; Sözen, A.; Tuncer, A.D.; Kazancıoğlu, F. Comparative analysis and forecasting of COVID-19 cases in various European countries with ARIMA,

NARNN and LSTM approaches. Chaos Solitons Fractals 2020, 138, 110015. [Google Scholar] [CrossRef]

[52] Basu, S.; Campbell, R. Going by the numbers: Learning and modeling COVID19 disease dynamics. Chaos, Solitons and Fractals. Nonlinear Sci. Nonequilibrium Complex Phenom. 2020, 138, 110140. [Google Scholar] [CrossRef]

[52] Chaurasia, V.; Pal, S. Application of machine learning time series analysis for prediction COVID-19 pandemic. Res. Biomed. Eng. Soc. Bras. Eng. Biomed. 2020 2020, 38, 35–47. [Google Scholar] [CrossRef]

[53] Datilo, P.M.; Ismail, Z.; Dare, J. A Review of Epidemic Forecasting Using Artificial Neural Networks. Int. J. Epidemiol. Res. 2019, 6, 132–143. [Google Scholar] [CrossRef]

[54] Pal, R.; Sekh, A.A.; Kar, S.; Prasad, D.K. Neural Network Based Country Wise Risk Prediction of COVID-19. Appl. Sci. 2020, 10, 6448. [Google Scholar] [CrossRef]

[55] Muhammad, L.J.; Islam, M.; Usman, S.S.; Ayon, S.I. Predictive Data Mining Models for Novel Coronavirus (COVID-19) Infected Patients' Recovery. SN Comput. Sci. A Springer Nat. J. 2020, 1, 1–7. [Google Scholar] [CrossRef]

[56] Iwendi, C.; Bashir, A.K.; Peshkar, A.; Sujatha, R.; Chatterjee, J.M.; Pasupuleti, S.; Mishra, R.; Pillai, S.; Jo, O. COVID-19 Patient Health Prediction Using Boosted Random Forest Algorithm. Front. Public Health 2020, 8, 357. [Google Scholar] [CrossRef]

[57] Pasamontes, J.C. 2.7 Evaluación de los Sistemas. In Estrategias de Incorporación de Conocimiento Sintáctico y Semántico en Sistemas de Comprensión de Habla Continua en Español; Colás, J.P., Español, E.D., Eds.; Escuela Técnica Superior de Ingenieros de Telecomunicación: Madrid, Spain, 2001; Volume 12, Available online: http://elies.rediris.es/elies12/cap27.htm (accessed on 8 March 2021).

[58] Sanford, J. P. (1969). Influenza: consideration of pandemics. Advances in Internal Medicine 15: 419-53.

[59] Schoenbaum, S. C., 1987. Economic impact of influenza. The individual's perspective. American Journal of Medicine 82(6A), 26-30.

[60] Scholtissek, C., 1994. Source for influenza pandemics. Eur J Epidemiol 10(4), 455-8.

[61] Shannon, G. W. and J. Willoughby, 2004. Severe Acute Respiratory Syndrome (SARS) in Asia: A Medical Geographic Perspective. Eurasian Geography and Economics 45(5), 359-81.

[62] Shortridge, K. F., J. S. Peiris, et al., 2003. The next influenza pandemic: lessons from Hong Kong. Journal of Applied Microbiology 94 Suppl, 70S-79S.

[63] Simonsen, L., M. J. Clarke, L. B. Schonberger, N. H. Arden, N. J. Cox and K. Fukuda (1998). Pandemic versus epidemic influenza mortality: a pattern of changing age distribution. Journal of Infectious Diseases 178(1): 53-60.

[64] Simonsen, L., D. R. Olsen, et al., 2005. Pandemic influenza and mortality: past evidence and projections for the future. The threat of pandemic influenza: Are we ready? Workshop Summary. S. L. Knobler, A. Mack, A. Mahmoud and S. M. Lemon. The National Academies Press, Washington, D.C., 89-106.

[65] Smith, R. D., M. Yaho, et al., 2005. Assessing the macroeconomic impact of a healthcare problem: The application of computable general equilibrium analysis to antimicrobial resistance. Journal of Health Economics 24(5), 1055-75.

[66] Sui, A. and Y. C. R. Wong, 2004. Economic Impact of SARS: The Case of Hong-Kong. Asian Economic Papers 3(1), 62-83.

[67] Sunstein, C. R., 1997. Bad Deaths. Journal of Risk and Uncertainty 14(3), 259-82. The World Bank, 2006. Socioeconomic Impact of HIV/AIDS in Ukraine. The World Bank and The International HIV/AIDS Alliance in Ukraine, Washington D.C. . http://siteresources.worldbank.org/INTUKRAINE/Resources/328335-1147812406770/ukr_aids_eng.pdf.

[68] Viscusi, W. K., J. K. Hakes, et al., 1997. Measures of Mortality Risks. Journal of Risk and Uncertainty 14(3), 213-33.

[69] WHO Commission on Macroeconomics and Health, Ed. 2001. Macroeconomics and Health: Investing in Health for Economic Development. World Health Organization.

[70] Wilton, P. (1993). "Spanish flu outdid WWI in number of lives claimed." Canadian Medical Association Journal 148(11): 2036-7