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A REVIEW TOWARDS IDENTIFICATION OF VARIOUS CHALLENGES OBSERVED TO LOCATE DISEASED TISSUES IN THE PATIENTS INFECTED WITH nCOVID-19 BY USING NEURAL NETWORK

[1]Isha Nitin Meshram, [2]Dr.Vijay Gadicha

[1]Research Scholar, [2]Dean Academics, Professor

[1]Data Science, G.H. Raisoni University Amravati, India

[2]Data Science, G.H. Raisoni University Amravati, India

Abstract: The COVID-19 pandemic has had a significant impact on global health, with millions of people infected & numerous deaths. The rapid identification of infected individuals and accurate diagnosis are critical to prevent the spread of the virus and provide appropriate treatment. The use of neural networks to identify disease tissues in people infected with COVID-19 has emerged as a promising approach. Neural networks can be trained to detect patterns in medical images, including those from computed tomography (CT) scans, Xray images of COVID-19 patients. However, utilizing neural networks for COVID-19 diagnosis poses some significant challenges. Firstly, training data availability is limited, and acquiring labelled data requires expertise and time. Secondly, the high level of variability in COVID-19 imaging and clinical presentations can affect the neural network's accuracy. Thirdly, the neural network's interpretability and explain ability can be a challenge, making it difficult to understand how the algorithm reaches its decisions. Despite these challenges, neural networks have shown promise in identifying disease tissues in people infected with COVID-19. Neural networks have achieved high levels of accuracy in COVID-19 diagnosis, potentially reducing the need for radiologists and allowing for faster and more accurate diagnoses. As more data becomes available and neural network algorithms improve, they could play a significant role in improving COVID-19 diagnosis and treatment.

***Keywords*: Neural Networks, Disease tissue, Covid19**

I. INTRODUCTION

It is urgently necessary to commit to the battle against the pandemic COVID-19 (Coronavirus) throughout the whole human populations. Because to the sudden epidemic & deserted environments, there aren't many crises requiring human health care. While COVID-19 often presents as a minor respiratory tract's infections transmitted by air droplets, emerging data suggests that affected individuals may also have multiple organ involvements. The primary cause of these systemically interventions is thought to be the SARS-CoV-2 virus's binding to ACE2 receptors on a variety of human cell types. Lung participation, that may vary from mild pneumonia or silent diseases to a catastrophic situation that results in shocks, respiration collapses, multiorgan failures, or death, is the most common major symptoms of the illness.Four categories were used to characterize the approaches. A thorough overview of traditional methods is provided, along with tools for further study & advancement. The comprehensive overview on several image processing techniques for coronaviruses includes extensive references encourages future study. Yet, this study was favoured as a preliminary examination for assessing & containing the COVID-19 pandemic. Those initiatives influence the coronavirus environment & epidemic. The comprehensive overview on several image processing techniques for coronaviruses with extensive references encourages future study. Yet, that study was favoured as a preliminary examination for assessing & containing the COVID-19 pandemic. Those initiatives influence the coronavirus environments & epidemic.

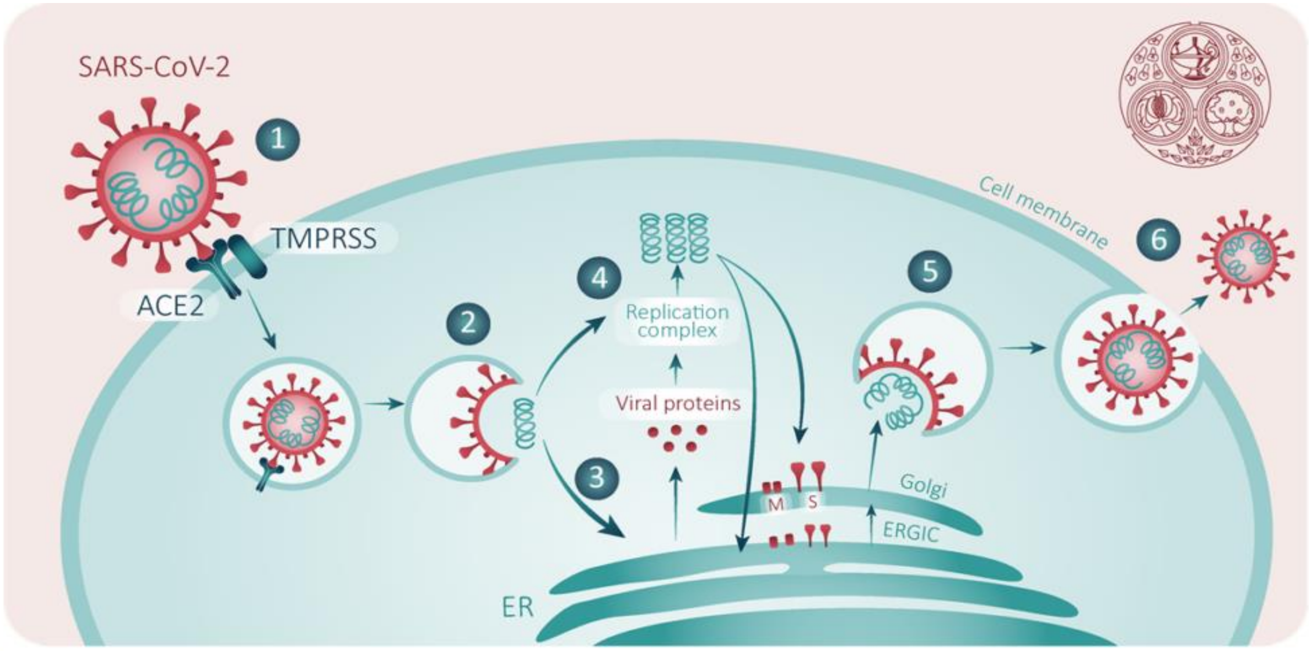

Fig 01: SARS-COV-2

Acute interstitial pneumonia & diffuse alveolar damage Emerging information from COVID-19 pneumonia autopsy examinations demonstrates (DAD) including macrophage infiltration, establishment of hyaline membranes, oedema, and thickness of the alveolar wall. In addition, hyaline thrombosis, hemorrhage, vessel wall oedema, intravascular neutrophils trapping, and immune cell infiltration impact the pulmonary vessels' (intra & extra) microvasculature. In one research, 5 out of 23 subjects had significant pulmonary vascular thromboembolic and/or hemorrhagic events reported. snRNA-Seq was then used to describe the effects of COVID-19 on the heart, kidney, and liver. Parenchymal, endothelial, and immune cells were both manually and automatically annotated. While earlier investigations demonstrated viral reads in COVID-19 non-lung tissues43, we discovered very few viral RNA readings in all 3 tissues, the bulk of which cannot be assigned to nuclei. Such absence was confirmed by Nano String DSP & RNA scope. In terms of the heart, COVID-19 & a healthy heart has various gene & cell combinations. Cardiomyocyte & pericytes proportions were significantly decreased, whereas vascular endothelial expression was elevated (FDR). Lung AT2 cells had the largest number of driving genes, which were spread across numerous loci & suggested a polygenic framework connecting AT2 cells having severe COVID-19. OAS3 in lung AT2 & club cells & SLC4A7 in lung CD8+ T cells are two genes implicated in GWAS proximity studies. We linked certain cell types to heritable risks using the profiles & GWAS of COVID-19, particularly AT2, ciliated & CD8+ T cells, macrophages, as well as genes in multi-gene areas that underlie the connection. This analysis could become more accurate as GWAS & atlases develop.

II. LITERATURE REVIEW

Introduction

People's lives all throughout the globe have been significantly disrupted by the COVID-19 epidemic. A worldwide health emergency had resulted from the SARS-CoV-2 virus-caused illness' rapid global spreading. To successfully treat patients & stop the spread of the virus, an accurate & prompt diagnosis is essential. The ability to detect COVID-19 & assist stop its spread quickly & accurately with this technology has the potential to transform how we treat the illness. They would examine current developments in image processing & machine learning strategies for recognizing COVID-19 in medical pictures, as well as the difficulties & limitations of those methods, in this literature review.

2.1 Identify COVID-19 using image processing

An enormously high-quality 3-dimensional picture of COVID-19 is produced using a CT scan. The greatest popular ROI technique for CT scans combines VB-Net, U-Net, & U-Net++. For X-Ray picture segmentations, none of the approaches are currently perfected. Considering restricted segmentation techniques, several scholars see segmentation as a critical step in understanding COVID-19. synthetic intelligence (AI) Artificial intelligence is a dynamic tool for COVID-19 predictions & analysis. DL algorithms are utilized to identify solutions for COVID-19, & current research & studies reveal that AI has been extensively employed for COVID-19 difficulties utilizing ML (Machine Learning) & DL. The linked weight vectors utilize the several neural network layers. Many DL-based COVID-19 solutions were developed via AI techniques.

In recent months, the SARS-CoV-2 virus had spread around the globe, having a significant negative effect on healthcare systems & economics. Since December 2019, when the first verified case was discovered in Wuhan, China, the highly contagious virus has spread over the world and caused harm. While the viruses normally cause a lower tracts respiratory infection which is disseminated by air droplets, it is becoming additional obvious that the diseases are multisystemic as further evidence becomes accessible. This may be related to the virus' affinity for the ACE-2 receptors present on a variety of human cells. Emerging information from COVID-19 pneumonia autopsy examinations demonstrates acute interstitial pneumonia and diffused alveolar damages (DAD) includes macrophage infiltrations, establishment of hyaline membranes, oedema, and thickening of the alveolar walls. In addition, hyaline thrombosis, hemorrhage, vessel wall oedema, intravenous neutrophil entrapments, & immune cells infiltration impacts the pulmonary vessels' (intra & extra) microvasculature's. Major pulmonary vascular thromboembolic and/or hemorrhage was documented in one study in 5 out of 23 individuals.

2.2 Convolutional neural network approaches:

The COVID-19 novel coronavirus illness first appeared in Wuhan, China in December 2019, & it quickly spread around the globe. There have been millions of confirmed illnesses & thousands of fatalities consequently thus far (Shayan Hassantabar et.al, 2020) The goal of feature extractions is to reduce the number of resources needed to fully explain a huge collection of data. The large number of variables used in sophisticated data analysis is one of the main issues. A categorization technique which makes usage of the instructive sample & generalizes to the fresh cases is often needed for analysis with a high number of variables. An approach for creating a set of variables to tackle high-precision issues is referred to as feature extractions. Image analysis looks for a distinctive approach to portray the essential elements of photographs. A grey surface matrix was used in the fractal approach to simulate statistical aspects. One of the more effective algorithms for accurately analyzing medical pictures is the convolutional neural networks. Convolutional neural networks have been used in the past to identify the kind of lung nodules in CT scans, forecast pneumonia in X-ray pictures, & automatically label polyps during colonoscopy movies. The bilateral distributions of patchy shadows & ground glass opacity are the authenticating characteristics for recognizing COVID-19 in medical photographs.

2.3 Deep convolutional neural network:

Sohaib Asif et al. 2020, Since diagnostic methods are now unavailable anywhere, it is challenging to test for COVID-19, that is generating anxiety. We must rely on other measurement techniques since COVID-19 testing kits are not widely available. Since COVID-19 attacks the epithelial cells which line our respiratory systems, we may use X-rays to see inside a patient's lungs to determine how strong they are. To diagnose pneumonia, lung inflammations, abscesses, & swollen lymph nodes, the doctor commonly employs X-ray pictures. However, practically all hospitals have X-ray imaging equipment, therefore it would be able to test for COVID-19 using X-rays without the need of special test kits. Another disadvantage of X-ray inspection is that it takes a lot of time & calls for a radiology expert, which is important when people are ill all over the globe. Consequently, creating an automated analysis system is crucial to saving the valuable time of medical professionals. It's crucial to predict COVID-19 patients early in order to stop the disease from spreading to new individuals. In this article, we suggested a deep transfers learning-based method for the automated diagnosis of COVID-19 pneumonia using chest X-ray pictures from COVID-19 patients, normal, & viral pneumonia. More than 98% accuracy was attained by the COVID-19 detection categorization model that was suggested. Considering our results, it is widely expected that the strong overall efficiency would assist physicians in making judgments in scientific practices. These work sheds light on the potential usage deep transfer learning techniques to detect COVID-19 at an early phase. The COVID-19 virus has already caused thousands of deaths & is now a threat to the global healthcare system. Failure of the respiratory system, that leads to the failures of other organs, has been the cause of deaths. Doctors' time is restricted because of the large number of patients who attend outside or emergency situations, & computer-aided analysis may save lives by performing early screening & providing the appropriate therapy. The Inception V3 models successfully trained itself from a very small set of photos, and it has outstanding performance for diagnosing COVID-19 pneumonia. The effectiveness & accuracy of identifying COVID-19 cases, in our opinion, will be substantially improved using those computer-aided diagnostics. Whenever there were low resources, there is a large illness burden, & there is a large demand for preventive measures, they could be highly beneficial throughout a pandemic. Ramin Ranjbarzadeh et.al,2021 The COVID-19 pandemic is a global, national, & local public health issue that has resulted in a sizable epidemic for both men & women worldwide in all nations & areas. An excellent opportunity exists to improve patient treatment health - care methods for addressing COVID-19 & its effects via the automatic identification of lung infections & its borders through medical pictures. One of the quickest methods for diagnosing patients is by looking at the results of a lung CT scan. Nevertheless, identifying diseased tissues & isolating them from CT slices is difficult due to irregular infections, identical neighboring tissues, & ill-defined borders. We suggest a two-route convolutional neural networks (CNN) for COVID-19 infections detection & classification using CT images to overcome these challenges. Every pixel from the picture is divided into healthy & pathological tissues. To describe the input picture differentially & increase classifying accuracy, we applied two distinct procedures, fuzzy c-means clustering & local directional pattern (LDN) encoding approaches.

2.4 Impact of Neural Network to Identify Disease Tissues:

Artificial intelligence has the potential to improve patient care and intelligent health systems for providers. Artificial intelligence techniques ranging from machine learning to deep learning was extensively employed in the healthcare industry for the diagnosis of illnesses, the creation of novel medications, and the identifying of patients risks. A variety of patient care & intelligent health systems might gain from artificial intelligence in 2022, according to Yogesh Kumar et al. providers. Artificial intelligence techniques, through machine learning to deep learning, was extensively employed in the field of health to diagnose illnesses, produce novel medications, and identify patients hazards. Artificial intelligence has the potential to improve patient care and intelligent health systems for providers. Artificial intelligence techniques ranging from machine learning to deep learning was extensively employed in the healthcare industry for the diagnosis of illnesses, the creation of novel medications, and the identifying of patients risks. A variety of patient care & intelligent health systems might gain from artificial intelligence in 2022, according to Yogesh Kumar et al. providers. Artificial intelligence techniques, through machine learning to deep learning, was extensively employed in the field of health to diagnose illnesses, produce novel medications, and identify patients hazards. The necessity for early disease predictions using artificial intelligence-based methods utilizing preferred reporting items for systematic reviews & Meta guidelines led to the selection of articles published up to October 2020 on Web of Science, Scopus, Google Scholar, PubMed, Excerpta Medical Database, & Psychology Information. Depending on the examination of several publications on sickness diagnosing, the results were also compared using different quality metrics, such as predictions rate, accuracy, sensitivity, selectivity, areas underneath the curve precisions, recall, & F1-score.

2.5 Challenges of Neural Network to Identify Disease Tissues

2020 Sachin Kumar Deshmukh et al The process of diagnosing entails determining the individual's ailment from its symptoms & indicators. As it affects the effectiveness of therapy & prevents lengthy problems for the sick individual, early & accurate diagnosis is essential. Sun et al. created ANN & fuzzy clustering approaches which categorize vital signals like respiratory rate, heart rate, & face temperature in order to identify individuals with influenza infection. Image analysis-trained machine learning algorithms could spot anomalies & highlight the location which needs quick attention. It provides a neutral viewpoint that may greatly increase effectiveness. Many types of cancers may be diagnosed & staged using images through histopathological biopsies, magnetic resonance, computed tomography, & mammography. Cancer forecasting, diagnosis, & prognosis are all significantly aided by machine learning (ML) techniques. Artificial intelligence technologies were employed to monitor & pinpoint the COVID-19 pandemic's progress, according to Israel Edem Agbehadji et al. in 2020. By the usage of fever-detecting infrared cameras, computer vision surveillance, & face recognition systems, smartphone technologies which leverage AI have been used to track a person's whereabouts as well as to scan public space for possibly afflicted folks. Countries like South Korea and Singapore have deployed a contact monitoring software for COVID-19. In South Korea, contacts tracing for COVID-19 infections involves using GPS phone monitoring, credit card history, surveillance video recording, and patient interviews. Although utilizing a neural network to identify disease tissues in COVID-19-infected individuals has the potential to improve diagnostic efficacy & accuracy, there are several challenges with this approach. Some of the challenges involved.

2.6 Limitation of dataset:

A significant amount of data is needed for the installation of prediction tools employing deep learning & machine learning. Even though there aren't many publicly accessible datasets for textual & medical image analysis, those datasets pale in comparison to what deep learning systems require. The frequent division of data across various geographic locations is the major cause of the dearth of measurable data. As a result, one of the major problems that must be resolved is the alignment of the data sources. The fact that real-time datasets include poorly defined biases creates even another barrier to the creation of high-quality datasets. Therefore, if models were trained on inaccurate data, bad results would emerge. While transfers learning enables models to be tailored with regional features, model selection is challenging because of the data's dynamic nature. Consequently, one of the major issues that must be solved is creating an analytical strategy to get beyond those constraints. Most scientists & technologists are also struggling with the issue of a lack of actual data. By producing additional real-world datasets containing up to date COVID-19 data, this problem may be resolved. The lessening of the medical community's engagement is another problem that must be considered.

1. Accuracy of prediction: Due to the fact that most of the study's methodologies were based on statistical learning on hastily generated datasets, there is a concealed risks inherent in every scientific endeavour. The results of the study might be biased, which could influence the government's policy for preventing the spreading of illness. Finding the ambiguity of the research's results is therefore a difficulty. The data's accuracy may be assured by offering findings that could be replicated. This in turn makes it difficult to strike a balance between the immediacy and the needs.

2. Algorithm selection: Machine learning algorithms come in a wide variety, every having advantages & disadvantages. It may be difficult to identify the best algorithm for a specific dataset & research issue & choosing the incorrect method might lead to subpar performances & erroneous findings.

3. Model validation: For application in clinical settings, the neural network model's correctness & dependability must be guaranteed. Nevertheless, verifying the models might be difficult, especially when there were few test & validation datasets accessible.

4. Overfitting and underfitting: In overfitting, a model that is overly complicated & behaves well on training data but badly on fresh data, neural networks might be vulnerable. On the other hand, under fitting happens whenever the model is too straightforward & can't adequately represent the complexities of the underlying information. It might be difficult to strike a balance between model complexity and under fitting or overfitting.

5. Ethical considerations: Ethics issues arise when neural networks & other AI technologies were used in clinical settings, including the possibility of biased models, the require for informed permission, & the requirement for clear rules for the use of AI in healthcare.

2.7 Necessity of advanced intelligent systems on symptom-based identification of COVID-19

Most of the research have only taken COVID-19 & other pneumonia's features into account. Those research' findings may not be true since they did not account for the effects of other variables including age, gender, diabetes, hypertensive, chronic liver & renal diseases, & so on. Thus, additional study must be done on COVID-19 symptom-based identification in order to provide reliable predictions. In addition, future research must pay greater attention to the categorization issues of COVID-19 via a variety of symptoms for simple & rapid diagnosis. These issues go beyond prediction & forecasting-based models. (Swapna rekha Hanumanthu 2020) Also, most of the study on this pandemic illness is focused on the greatest severely impacted nations, & future research might be expanded to include the remaining more severely impacted nations worldwide. Moreover, it is crucial in the current situation to accurately anticipate the number of illnesses & fatalities using an advanced machine learning technique. It may be important to note that with the growing number of data & datasets from major COVID-affected nations, many very accurate models would be produced as a leading solution to this epidemic since the majority of machine learning models were extremely accurate using a significant quantity of data.

III. PROPOSED SYSTEM:

The proposed architecture for the system to identify diseased tissues in patients infected with nCOVID-19 using neural networks consists of several components that work together to achieve accurate disease localization and diagnosis.

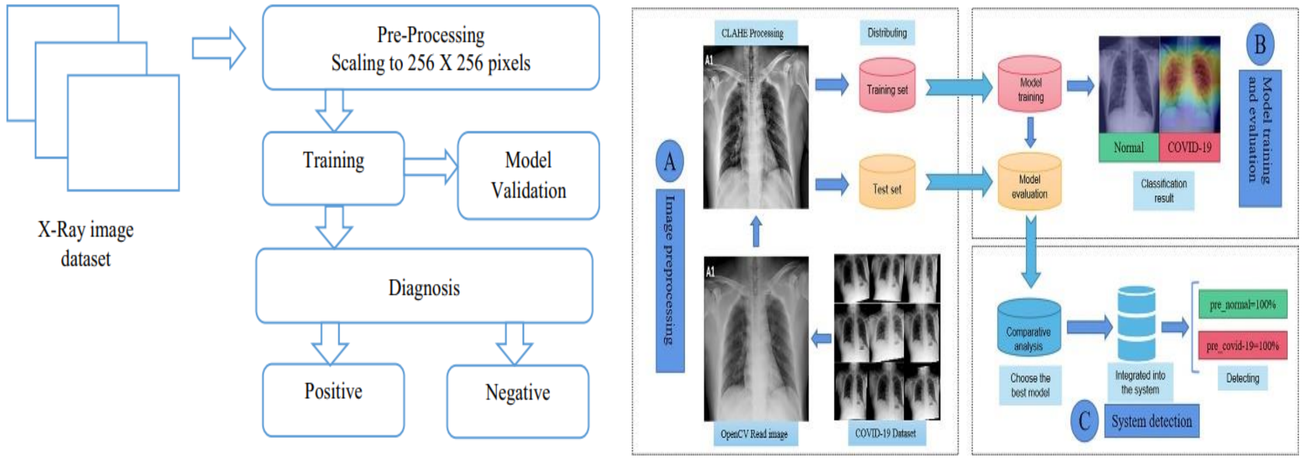

Fig 02 & 03: Proposed Architecture Diagram

1. Data Acquisition:
The system starts by acquiring medical imaging data, such as chest X-rays or CT scans, from patients infected with nCOVID-19. The data is collected from reputable sources, ensuring a diverse and representative dataset.

2. Preprocessing:
The acquired medical images undergo preprocessing steps to enhance their quality and standardize the input. These preprocessing techniques include noise reduction, normalization, and resizing to a standardized resolution. The aim is to improve the reliability and consistency of the data for subsequent analysis.

3. Feature Extraction:
The preprocessed medical images are fed into a feature extraction module, which utilizes deep learning techniques, such as convolutional neural networks (CNNs). The CNNs extract relevant features from the images, capturing disease-specific patterns and abnormalities.

4. Neural Network Architecture:
The extracted features are then passed to a neural network architecture designed specifically for diseased tissue localization. The architecture typically consists of multiple convolutional layers, followed by pooling layers to reduce dimensionality, and fully connected layers for classification. The architecture is carefully chosen to balance model complexity, interpretability, and computational efficiency.

5. Training and Optimization:
The neural network is trained using the acquired dataset. During training, suitable loss functions, such as binary cross-entropy or categorical cross-entropy, are utilized to measure the discrepancy between the predicted and actual disease labels. Optimization algorithms, such as stochastic gradient descent or Adam, are employed to iteratively adjust the network's weights and biases to minimize the loss function.

6. Evaluation and Validation:
After training, the performance of the system is evaluated using appropriate evaluation metrics, including accuracy, sensitivity, specificity, and the area under the receiver operating characteristic curve (AUC-ROC). The system is validated on independent test data to assess its generalization capability and robustness.

7. Integration with Clinical Workflow:
Once the system demonstrates satisfactory performance, it can be integrated into the clinical workflow. This involves deploying the system in a secure and reliable infrastructure, allowing medical professionals to upload patient medical images and obtain accurate disease localization results. The system's output can be visualized and interpreted through a user-friendly interface, enabling efficient diagnosis and treatment planning.

Business Flow

The proposed business flow for the system involves several steps to ensure effective implementation and adoption:

1. Needs Assessment:
Conduct a comprehensive needs assessment by engaging with healthcare professionals, radiologists, and other stakeholders to understand the specific challenges and requirements in diseased tissue localization for nCOVID-19 patients.

2. System Development:
Develop the proposed system based on the identified needs and requirements. Collaborate with domain experts, data scientists, and software developers to design and implement the architecture, ensuring scalability, reliability, and user-friendliness.

3. Data Acquisition and Collaboration:
Establish collaborations with healthcare institutions and research centers to acquire relevant medical imaging datasets. Ensure compliance with data protection regulations and ethical guidelines. Foster partnerships to enable continuous data acquisition and improvement of the system's performance.

4. Testing and Validation:
Thoroughly test and validate the system using rigorous evaluation protocols. Engage with healthcare professionals and domain experts to provide feedback and validate the system's performance against ground truth annotations and clinical outcomes.

5. Regulatory Compliance and Security:
Ensure compliance with applicable regulations, such as data privacy regulations (e.g., GDPR, HIPAA), medical device regulations (e.g., FDA), and cybersecurity standards. Implement robust security measures to safeguard patient data and protect against unauthorized access.

6. Deployment and Training:
Deploy the system in healthcare settings, providing comprehensive training and support to medical

IV.SUMMARY OF THE LITERATURE STUDY

We reviewed a variety of literature research on The Effects & Difficulties Encountered while Using a Neural Network to Detect Disease Tissues in COVID-19 Infected Individuals in this study. In the Covid 19 emergency, neural networks & artificial intelligence was successfully used, however there were certain difficulties & unintended consequences. The review clarifies the potential of artificial neural networks for locating the patient's sick tissues. finding tissues that is COVID-19-infected. The difficulties were that the accuracy of classifications for efficient predictions & diagnosis was a problem for the present neural network-based technological interventions for screening, diagnosing, & forecasting COVID-19 patients.

V. SUGGESTIONS/RECOMMENDATIONS

The length of time & quantity of data required to train the networks determine the complexities of neural network-based models for illness detection & diagnosis. Although precise illness diagnosis is more crucial in medical imaging applications, analytical complexity (like time & computing complications) is often sacrificed.

VI.FUTURE RESEARCH:

Nevertheless, in the future, various approaches to dealing with the challenging problem of minimizing excessive resource consuming without compromising accuracy may be introduced through neural network-based illness detecting apps. Moreover, data augmentations, variable standardization, & appropriate initializations of CNN are all examples of data transformations methods. Several efforts have been made to use computer vision (machine learning, deep learning, artificial intelligence) to diagnose COVID-19, but they have not proven successful. Artificial intelligence-based image capture turns out to be useful & efficient for scanning. The dataset must have a higher number to be used in clinics. issues like the algorithms' complexity, the scarcity of data, privacy & security concerns, & the integration of bio sensing using CNNs. To expand the potential of CNNs for medical diagnosis & therapy, those research paths need a lot of emphasis.

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