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AI And COVID-19 Deep Learning Approaches For Diagnosis and Treatment

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Abstract: *COVID-19's spread triggered an unparalleled global disaster, impacting millions of people and killing tens of thousands. COVID-19 hasspread to 212 nations and territories by May 22, 2020, with a total of 5,212,172 cases and 334,915 fatalities. The use of artificial intelligence tocombat infection is proposed in this research (AI). GANs, ELMs, and LSTMs are just a handful of the various Deep Learning (DL) algorithms that have been proved to function for this purpose. It offers a comprehensive bioinformatics technique that brings together structured and unstructured data sources to develop user-friendly platforms for doctors and researchers. The main purpose of these AI-based solutions is to speed up the diagnosis and treatment of COVID-19 disorders. The goalof recent publications and clinical investigations on the topic is to determine the network's inputs and goals in order to build a reliable artificial neural network-based solution to COVID-19-related difficulties. Furthermore, each platform has its own set of inputs, which contain a variety of information: B. Clinical data and medical imaging may aid in the improvement of new pathways' performance in order to attain the greatest outcomes in real-world circumstances.*

Key Word: *Artificial Intelligence; Deep Learning; LSTM and ELMs; ANN; Virus; Respiratory Syndrome; SARS-Cov; MERS-Cov*

I.INTRODUCTION

SARS-CoV-2, a novel coronavirus that caused the COVID-19 respiratory illness pandemic, surfaced in December 2019 and has shown to be a complicated disease with a broad range of symptoms and severity levels. Organ failure is more likely to kill you. Lung illness that ranges from mild to severe, with symptoms ranging from pneumonia to multiple organ failure and death [1] [4]. The impact of this viral infection is of considerable worry, and rightly so, as the pandemic continues and the number of confirmed cases, as well as the number of people suffering from severe respiratory failure and cardiovascular difficulties, rises [5]. The task of identifying appropriate technology to address COVID-19-related issues has gotten a lot of attention. Another significant issue for academics and decision-makers is the rising volume of "big data," which makes the virus's combat even more difficult. It demonstrates how and to what degree Artificial Intelligence (AI) helps to global development and health-care system modernisation [6]. In a variety of domains, including engineering [7] [9], medicine [10] [13], economics [14], and psychology [15], AI has lately scaled up research efforts to handle complicated challenges. As a consequence, in such dire situations, medical, transportation, and human resources must be organised and saved, and AI not only makes this easier, but also saves time, saving an hour. When the corona virus is present, survivors might be rescued or lost. Given AI's expanding popularity in the healthcare sector, it plays an important role in decreasing needless redundancies, enhancing productivity and efficiency in large sample [16] investigations, and improving accuracy and analysis. [17] Estimation Large data may also aid research that simulate viral activity in different countries. Health officials may utilise outcome analysis to help their nation plan for disease transmission and make educated choices [18]. Improved diagnostic methods, such as treatment planning, crisis management, optimization, and medical imaging and image processing techniques, are well-suited to effectively assist undesirable medical approaches and their struggle against health-care systems. For example, AI's contribution to early and precise detection of Kovid-19 initiating and life-saving image-based medical diagnosis is particularly important in the field of Kovid-19 [19]. The use of AI technology to COVID-19-related issues may be able to bridge the gap between AI and medical methods and therapies. AI platforms can assist AI experts develop links between various aspects and speed up procedures in order to reach best outcomes.Our team will leverage the most recent research on Kovid-19 to generalise and give new techniques for high-risk populations, epidemiology, radiology, and other themes in this project. Expands, investigates, and investigates AI approaches' capacity to address COVID-19 challenges.

II. MATERIAL AND METHODS

The virus's introduction, as well as a spike in the number of confirmed cases and patients with severe respiratory failure and cardiovascular difficulties, raises worries about the virus's influence on the current system. The task of discovering acceptable technology to address COVID-19-related issues has gotten a lot of attention. Another crucial factor that researchers and decision-makers should be aware of is the ever-increasing number of data known as Big Data, which is obstructing the virus's battle. It demonstrates how and to what degree Artificial Intelligence (AI) helps to advance and modernise healthcare globally.

Disadvantages of Existing System:

❖ As the epidemic progresses and the number of confirmed cases and patients grows, the present approach is no longer viable.

❖ The ever-increasing volume of so-called Big Data, which is proving to be a barrier in the battle against the virus, is a problem that researchers and decision-makers must address.

❖ It is not feasible to make a medical diagnosis only on visuals.

❖ A kind of algorithm is the back-propagation (BP) algorithm.

Proposed System:

The proposed approach will concentrate on implementing certain AI-based tactics that may supplement current COVID-19 management procedures in health-care systems across the globe. To show the success of these techniques and approaches, the mostrecent medical updates on AI, as well as their language based on the most recent updates on COVID-19, have been provided. As a consequence, this component includes instructions for improving and speeding up treatment and health-care management procedures, as well as the ANN-based procurement process for improved detection and diagnosis. During COVID-19 outbreaks, on the other hand, the influence of AI technologies is dependent on human participation and contribution to the multiple roles that people play.

Advantages of proposed system:

❖ The input layer is a database-related layer that is used to access databases. One or more high-speed connections connect this layer to the primary (front-end) computer.

❖ The CT scan picture must be sent to the "user model," which will identify where the virus is located for each individual.

❖ For learning sequences with infinitely long-term patterns, LSTM networks are extremely useful.

Algorithm: LSTM, ANN

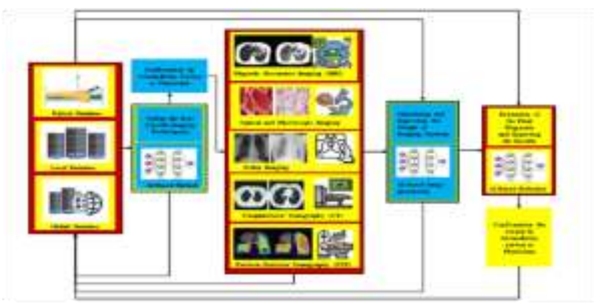
LSTM:

Long short-term memory (LSTM)[1] is an artificial neural network used in the fields of artificial intelligence and deep learning. Unlike standard feedforward neural networks, LSTM has feedback connections. Such a recurrent neural network can process not only single data points (such as images), but also entire sequences of data (such as speech or video). FIG shows a model that uses Long/Short Term Memory (LSTM) network put forward in . This model relies on appropriately considered inputs to predict the best treatment as precisely as possible. Being capable of maintaining long memory, LSTM networks are very advantageous for learning sequences with longer-term patterns of unknown length.

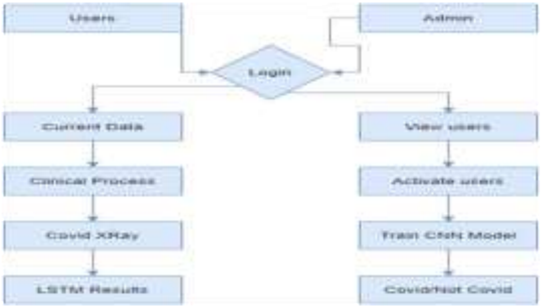
Statistical analysis:

Data was analyzed using a website developed by using Python with Pycharm, Visual Studio Code and SQLite. It was tested by using the data set which is Coronavirus Disease 2019(COVID-19) Clinical Data Repository. by uploading the X-Ray Image and training the data set with COVID-19 detector with Keras and TensorFlow which represents the CT Scan results of a person having Covid-19. And then Covid-19 Deep Learning for Diagnosis gives the result whether the person has tested positive or negative or any other symptoms, any high risk exposure of the person.

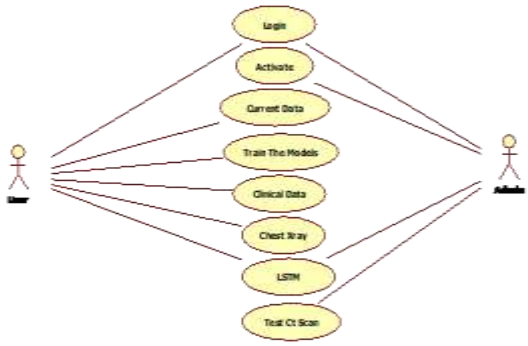
System Design And Architecture:



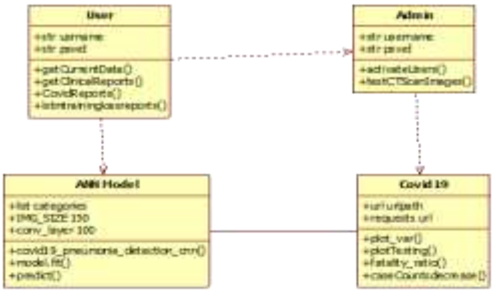
Data flow chart:



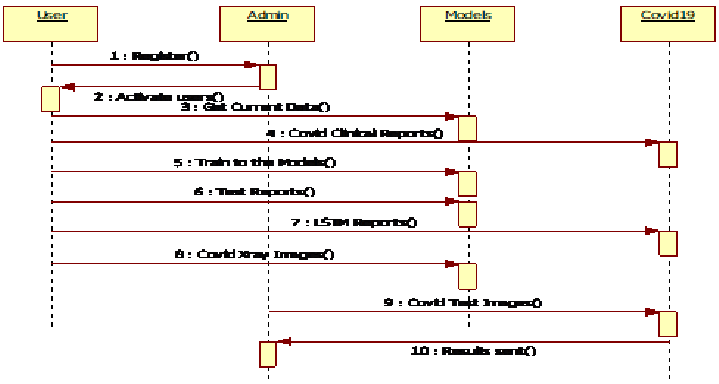
Use Case Diagram:



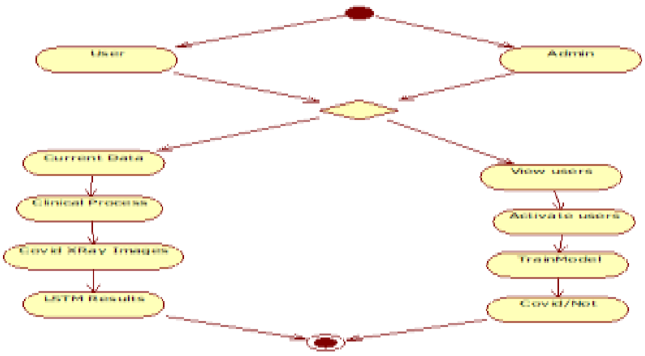
Class Diagram:



Sequence Diagram:



Activity Diagram:



System Requirements:

Hardware Requirements:

- Ø System : Intel Core i9
- Ø Hard Disk : 1TB.
- Ø Monitor : 15'' LED
- Ø Input Devices : Keyboard, Mouse
- Ø Ram : 32GB

Software Requirements:

- Ø Operating system : Windows 10
- Ø Coding Language : Python
- Ø Tool : PyCharm, Visual Studio Code
- Ø Database : SQLite

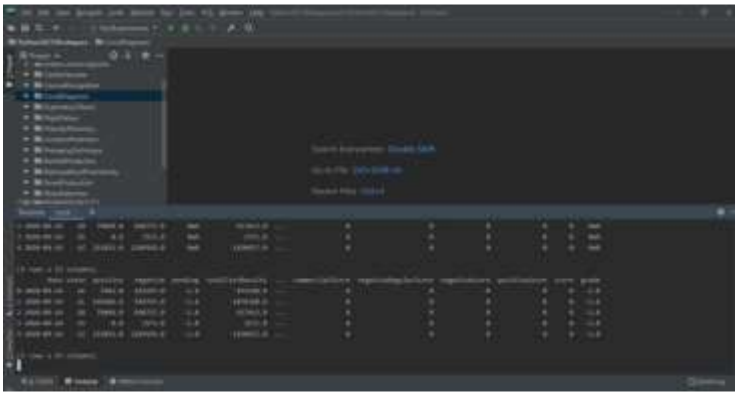
III. RESULT

Sample Test Cases:

S.no	Test Case	Excepted Result	Result	Remarks(IF Fails)
1.	User Register	If User registration successfully.	Pass	If already user email exist then it fails.
2.	User Login	If User name and password is correct then it will getting valid page.	Pass	Un Register Users will not logged in.
3.	Get Current Covid Data from USA	The covid Data we are getting from "http://covidtracking.com/api/states/daily.csv " if server available then we ill get data	Pass	If server not run then we are not able to get the data
4.	Test Confirmed plots	Covid NY Confirmed Dataset processed and generated plots	Pass	If csv file not available the failed
5.	Test Clinical data	Processing Clinical Data and bar graph generated	Pass	If dataset not available then it failed
6.	Train the models with ct scan images	Train the model using x.pickle and y.pickle	Pass	If pickle file not avaible then failed
7.	LSTM Model executed and processed results	LSTM Model object defined and executed	Pass	It take more epoch to executes
8.	Test the CT Scan image	We can test ct scan image with weather the person get covid or not	Pass	If model not available the it failed
9.	Admin login	Admin can login with his login credential. If success he get his home page	Pass	Invalid login details will not allowed here
10.	Admin can activate the register users	Admin can activate the register user id	Pass	If user id not found then it won't login.

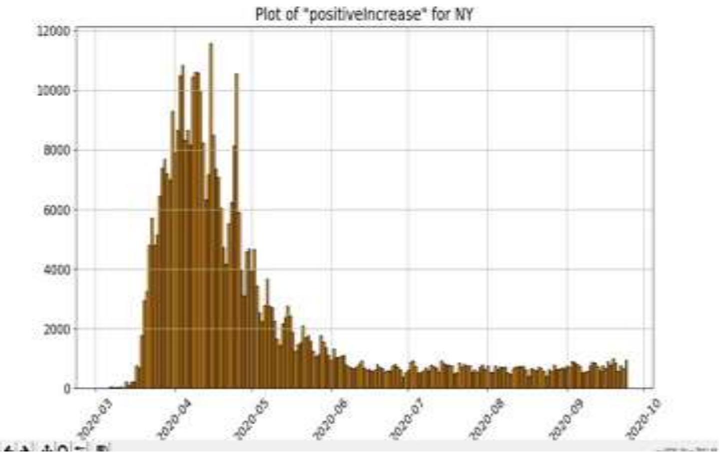
The above table represents the sample test cases of the user with 10 different cases and the expected result and explained with the remarks if the test case has been failed. If the server is unable to run then we cant get the data from the covid tracking data website from the data set. The data shown above inculcates or gives the login information when entered, it shows if it invalid login or invalid username.

Current Data:



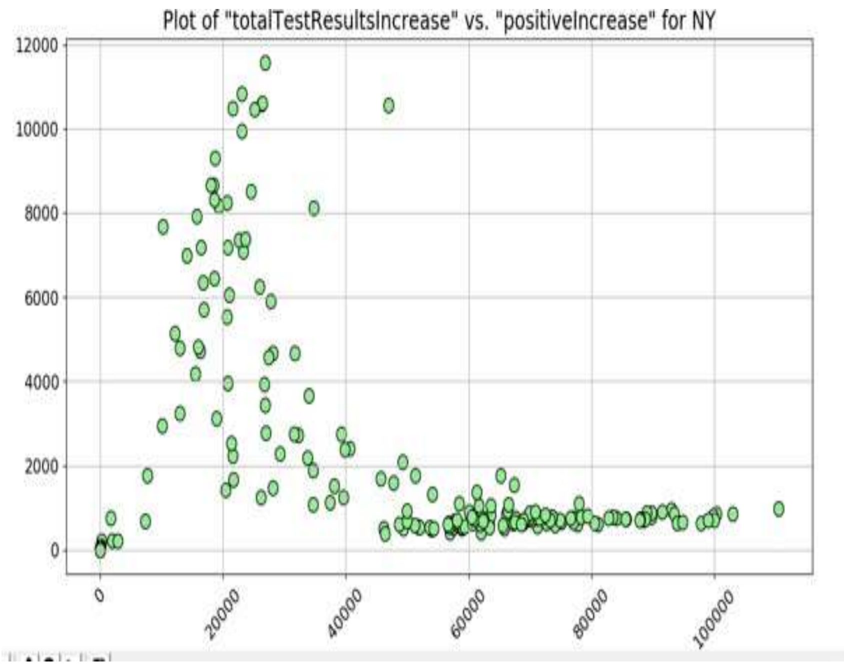
This picture shows the diagnosis report technically and shows the Date, Time, State, Result of COVID-19 either positive or negative and commercial score, negative score, positive score, overall score and the overall grade of the result.

Current Status:



The above graph represents the status of positive increase. In x-axis it represents the Number of cases in particular month and in y-axis, total Number of cases in particular month.

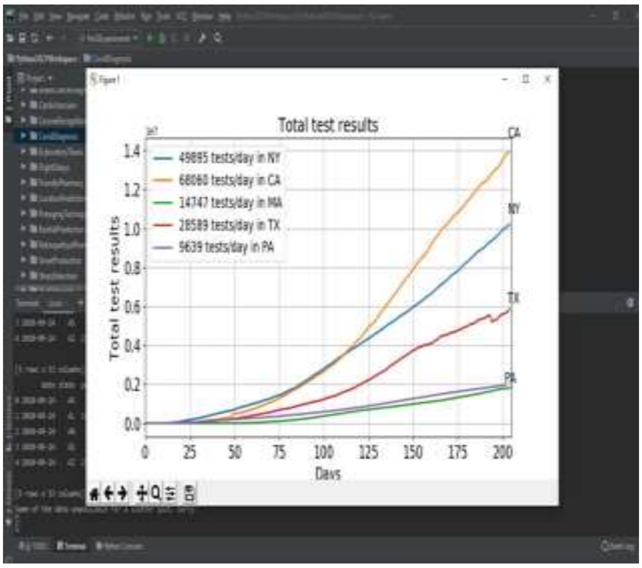
Test Results Current:



The above graph represents the status of total Test Result Increase vs Positive Increase. In x-axis it represents thetotal Test Result Increase and in y-axis, Number of Positive cases increased.

Total Test Results:

The below graph represents the status of total test results. In x-axis it represents the Number of cases in particular day and in y-axis, total test results of cases in particular city. For instance, Orange line represents the total test results per day in California (CA) with 68060 per day, Blue line represents the total test results per day in New York (NY) with 49895per day, Red line represents the total test results per day in Texas (TX) with 28589per day,Violet line represents the total test results per day in Pennsylvania (PA) with 9639 per day. Green line represents the total test results per day in Massachusetts(MA) with 14747 per day.

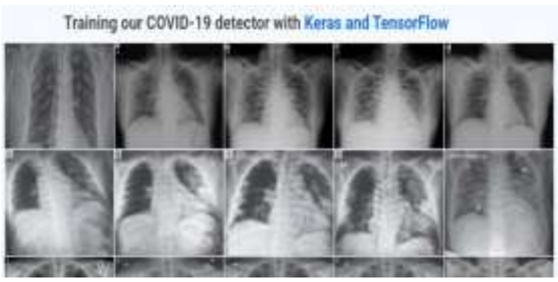


Clinical Data:

Coronavirus Disease 2019 (COVID-19) Clinical Data Repository

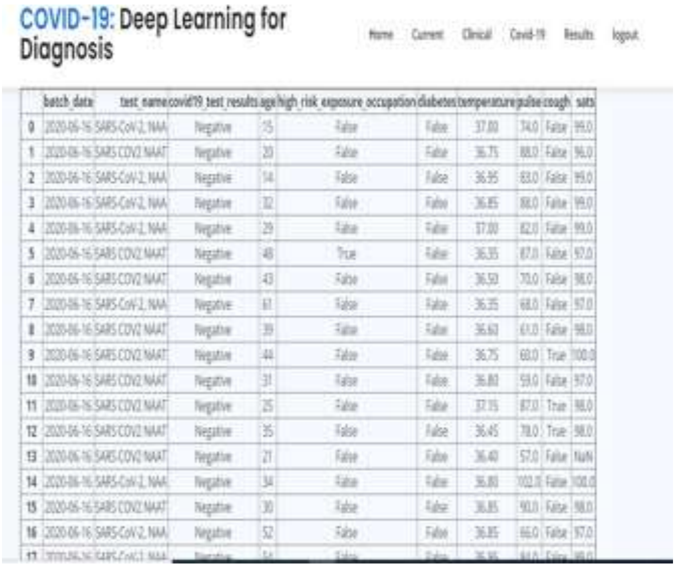
	batch_date	test_name	covid19_test_results	age	high_risk_exposure_occupation	diabetes	temperature	pulse	cough	sats
0	2020-06-16	SARS-CoV-2, NAA	Negative	15	False	False	37.00	74.0	False	99.0
1	2020-06-16	SARS COV2 NAAT	Negative	20	False	False	36.75	88.0	False	96.0
2	2020-06-16	SARS-CoV-2, NAA	Negative	14	False	False	36.95	83.0	False	99.0
3	2020-06-16	SARS-CoV-2, NAA	Negative	32	False	False	36.85	88.0	False	99.0
4	2020-06-16	SARS-CoV-2, NAA	Negative	29	False	False	37.00	82.0	False	99.0
5	2020-06-16	SARS COV2 NAAT	Negative	48	True	False	36.35	87.0	False	97.0
6	2020-06-16	SARS COV2 NAAT	Negative	43	False	False	36.50	70.0	False	98.0
7	2020-06-16	SARS-CoV-2, NAA	Negative	61	False	False	36.35	68.0	False	97.0
8	2020-06-16	SARS COV2 NAAT	Negative	39	False	False	36.60	61.0	False	98.0
9	2020-06-16	SARS COV2 NAAT	Negative	44	False	False	36.75	60.0	True	100.0
10	2020-06-16	SARS COV2 NAAT	Negative	31	False	False	36.80	58.0	False	97.0
11	2020-06-16	SARS COV2 NAAT	Negative	25	False	False	37.15	87.0	True	98.0
12	2020-06-16	SARS COV2 NAAT	Negative	35	False	False	36.45	78.0	True	98.0
13	2020-06-16	SARS COV2 NAAT	Negative	21	False	False	36.40	57.0	False	NaN

Chest X-Ray:



It represents the Training CT scan results of the dataset of a person having Covid19.

Clinical COVID Data:


COVID-19: Deep Learning for Diagnosis

Home Current Clinical Covid-19 Results logout

	batch_date	test_name	covid19_test_results	age	high_risk_exposure_occupation	diabetes	temperature	pulse	cough	sats
0	2020-06-16	SARS-CoV-2, NAA	Negative	15	False	False	37.00	74.0	False	99.0
1	2020-06-16	SARS COV2 NAAT	Negative	20	False	False	36.75	88.0	False	96.0
2	2020-06-16	SARS-CoV-2, NAA	Negative	14	False	False	36.95	83.0	False	99.0
3	2020-06-16	SARS-CoV-2, NAA	Negative	32	False	False	36.85	88.0	False	99.0
4	2020-06-16	SARS-CoV-2, NAA	Negative	29	False	False	37.00	82.0	False	99.0
5	2020-06-16	SARS COV2 NAAT	Negative	48	True	False	36.35	87.0	False	97.0
6	2020-06-16	SARS COV2 NAAT	Negative	43	False	False	36.50	70.0	False	98.0
7	2020-06-16	SARS-CoV-2, NAA	Negative	61	False	False	36.35	68.0	False	97.0
8	2020-06-16	SARS COV2 NAAT	Negative	39	False	False	36.60	61.0	False	98.0
9	2020-06-16	SARS COV2 NAAT	Negative	44	False	False	36.75	60.0	True	100.0
10	2020-06-16	SARS COV2 NAAT	Negative	31	False	False	36.80	59.0	False	97.0
11	2020-06-16	SARS COV2 NAAT	Negative	25	False	False	37.15	87.0	True	98.0
12	2020-06-16	SARS COV2 NAAT	Negative	35	False	False	36.45	78.0	True	98.0
13	2020-06-16	SARS COV2 NAAT	Negative	21	False	False	36.40	57.0	False	NaN
14	2020-06-16	SARS-CoV-2, NAA	Negative	34	False	False	36.80	102.0	False	100.0
15	2020-06-16	SARS COV2 NAAT	Negative	30	False	False	36.85	90.0	False	98.0
16	2020-06-16	SARS-CoV-2, NAA	Negative	52	False	False	36.85	66.0	False	97.0
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

IV.DISCUSSION

Clinical Features of Patients Infected With 2019 Novel Coronavirus In WuhanC. Huang et alCoronaviruses are positive-sense RNA viruses that are circular and non-segmented and found in humans and other animals. They are coronaviruses in the coronavirus family and nidoviruses in the nidovirus order. 1 Although most human coronavirus infections are minor, both beta-coronavirus infections produce severe acute respiratory syndrome. Coronaviruses 2, 3, 4, and the Middle East Respiratory Syndrome Coronavirus (SARS-CoV) (MERS-CoV) 5 and 6 10,000 cases have been documented in the last two decades, with SARS-CoV andMERS-CoV fatality rates of 10% and 7.37 percent, respectively. 8 Because more particular and devastating zoonotic occurrences have been uncovered, coronaviruses may merely be the tip of the iceberg. In December 2019, multiple pneumonia cases of unknown origin were reported in Hubei, Wuhan, China, with clinical signs that were similar to viral pneumonia. 2019-nCoV). More than 800 verified cases, including those of health personnel, have been discovered in Wuhan so far, with further export cases confirmed in Thailand, Japan, South Korea, and the United States.An Anfis Approach to Modeling A Small Satellite Power Source Of NasaM. B. Jamshidi, N. Alibeigi, A. Lalbakhsh, and S. Roshani. et.al Before being put into space, satellites must go through a series of practical and thorough testing on its components. This is because the cost of developing and manufacturing satellites is substantially greater than the study's estimates. The power source is one of these gadgets' distinguishing qualities. The study presents a black-box approach based on neuro-fuzzy theory for simulating a lithium-ion battery used in a tiny NASA spacecraft. NASA scientists gathered information from a series of experiments with 18650 lithium-ion batteries. An Adaptive Neuro-Fuzzy Infection System (ANFIS) model with a dimmer induction system (FIS) created utilising the subtraction clustering approach to estimate and estimate cell capacity over the following few cycles would be the suggested method. The findings demonstrated that the suggested approach for computing battery parameters was both efficient and precise.A Novel Multiobjective Approach for Detecting Money Laundering with A Neuro-Fuzzy TechniqueM. B. Jamshidi, M. Gorjiankhanzad, A. Lalbakhsh, and S. Roshaniet.al: To limit the diversity of crimes in the area, the practical strategy is to employ computationally inconsistent ways to handle financial data. The new intelligent multi-lens for money laundering detection in banks and exchange offices is described in this article. The suggested method is based on the MATLAB software's Adaptive Neuro-Fuzzy Infection System (ANFIS). The suggested methodology would replace traditional approaches for detecting the possibility of money laundering in dubious financial activities. This technology may also be used to evaluate client account data in banking systems using an online interface. Furthermore, each exchange's risk of money laundering is maintained and monitored. One of its key characteristics is user categorisation for a variety of users. The findings suggest that this system's accuracy in identifying money laundering infected accounts is satisfactory.Fault Diagnosis and Remaining Useful Life Estimation Of Aero Engine Using Lstm Neural NetworkM. Yuan, Y. Wu, and L. Lin et.al:Aircraft engines are a high-tech, high-priced industrial item. Estimating the precise incorrect position and remaining usable life (RUL) for aircraft engines will help to the adoption of suitable management procedures to avoid catastrophe failures and reduce financial losses. This study proposes that long-term memory neural networks (LSTMs) be utilised to enhance diagnostic and evaluation performance in settings including complicated processes, hybrid mistakes, and loud noise. The suggestion is shown and discussed using tests on the NASA Aircraft Turbophone Engine Health Surveillance Dataset. The LSTM algorithm's performance, as well as certain modifications of it, has been examined and compared. Regular LSTM outperforms the competitors, according to experiments.

V.CONCLUSION

This study reviews current conceptual frameworks and platforms in the area of COVID-19 issue resolution using AI-based approaches. RNN, LSTM, GAN, and ELM are some of the ways for integrating COVID-19 diagnostic systems. COVID-19 focuses on geographical difficulties, high-risk populations, and important identification and radiological issues. Using a variety of clinical and non-clinical datasets, we also offer technology for choosing relevant models to assess and evaluate the needed parameters. Using these platforms, AI professionals may help analyse big data sets, train computers to treat diseases quicker and more precisely, design algorithms, and streamline research data. Doctors and other experts may collaborate. Although AI-based techniques for combating COVID-19 have been established, additional study is required to fully understand the benefits and limits of AI-based methods for COVID-19, and novel approaches have yet to be developed. Various tools are required at vital stages of these problems. The ultimate objective of combatting Kovid-19 is to develop a set of platforms, methodologies, approaches, and technologies that can all work together to accomplish the desired outcomes and save more lives.

Further Enhancement:

Contactless Interactions and Interfaces We used to be awestruck by touch displays and all that they could do for us. COVID-19 makes most of us hypersensitive to any disease-transmitting surface. As a result, we anticipate to see fewer touch panels and more speech and computer vision interfaces in the post-Kovid-19 era. We observed the emergence of contactless payment methods via mobile devices prior to the outbreak. However, if the number of individuals who wish to minimise their touch grows, the alternative of paying for products and services that do not involve physical contact may gain popularity. Machine Vision interfaces are already being utilised in certain establishments to apply social media filters and allow self-checkout. To reduce physical interaction, expect to see an increase in speech and image processing interfaces that detect faces and movements across many sectors.

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