DEEP LEARNING AND ARTIFICIAL INTELLIGENCE APPROACHES TO IMPROVE COVID-19 CARE

Mrs. Dr Gomathy[1], Abitha.P[2],Diofrin.J[2], Ishwarya Muthu Valli.S[2]

[1]Assistant Professor, [2]UG Students

Department of Computer Science and Engineering,

Francis Xavier Engineering College, Vannarpettai, Tirunelveli.

Abstract:

Machine learning has a vital role in Dataset Analysis and Computer Vision field. Troubles range beginning dataset segmentation, dataset check to structure-from-motion, object recognition and view thoughtful use machine learning technique to investigate in a row starting visual data. The incidence of COVID-19 in strange part of the humanity is a most important suffering intended for every one the managerial unit of personality country. India is as well incompatible this extremely rough mission used for calculating the disease incidence along with have manage its improvement velocity from side to side a numeral of stringent events. During my job this paper on predict the corona virus is contain significance or not hand baggage in continuing region support up as health monitoring systems. The increasing difficulty in healthcare creates not as high-class as by a mature resident, punishment in lush executive most significant to harmful possessions resting on mind excellence as well as escalate think about expenses. Accordingly, present be a require designed for elegant decision support systems to facilitate tin can approve clinician's to generate improved data's care decision. A talented go forward be in the direction of power the continuing digitization of healthcare with the intention of generate unparalleled amount of medical information stored in Patients Health Records (PHRs) and pair it through contemporary Machine Learning (ML) toolset intended for medical decision support, along with concurrently, develop the proof stand of current datasets. The datasets are composed at KAGGLE; it is an online datasets used my paper work. The specific classifications algorithms are applied in SVM, NB and supervised learning (Decision Tree) are used. Today, gigantic measure of information is gathered in clinical databases. These databases may contain significant data embodied in nontrivial connections among manifestations and analyses. Removing such conditions from recorded information is a lot

can be utilized in future clinical dynamic.

I. INTRODUCTION

The world has been gathering clinical information throughout the long periods of their activity. A colossal measure of this information is put away in databases and information distribution centers. Such databases and their applications are not quite the same as one another. The essential ones store just some data about patients, for example, name, age, address, blood classification, and so forth. The further developed ones can record patients' visits and store definite data identified with their wellbeing condition. A few frameworks likewise are applied to patients' enlistment, units' funds and as of late new sorts of a clinical framework have developed which begins in the business insight and encourages clinical choices, clinical choice emotionally supportive network. This information may contain important data that anticipates extraction. The information might be embodied in different examples and regularities that might be covered up in the information. Such information may end up being invaluable in future clinical dynamic. The referenced circumstance is the purpose behind a nearby coordinated effort between clinical staff and PC researchers. Its motivation is creating the most appropriate strategy for information handling, which can find conditions and nontrivial rules in information. The outcomes may decrease the hour of a conclusion conveyance or danger of a clinical misstep just as improve the procedure of treatment and diagnosing. The examination territory, which researches the strategies for information extraction from information, is called information mining or information disclosure. It applies different information mining calculations to investigations databases. The reason for this examination is to survey the most well-known information mining methods executed in medication. Various exploration papers have assessed different information mining strategies yet they center around few clinical datasets, the calculations utilized are not adjusted (tried distinctly on one boundaries' settings) or the calculations looked at are not basic in the clinical choice emotionally supportive networks. Likewise, despite the fact that an enormous number of strategies have been

simpler to done by utilizing clinical frameworks. Such information

examined they were not assessed with the utilization of various measurements on various datasets. This makes the aggregate assessment of the calculations unimaginable. COVID, at least 19 famously known as Novel Corona Virus, is related with the respiratory issue in people which has been announced as a worldwide scourge and pandemic in the principal quarter of the year 2020 by the World Health Organization. India is being viewed by different countries now as a World Leader and even WHO recognized that world is looking towards Indian techniques to contain the flare-up of this pandemic. India is yet to get into the third period of COVID-19 flare-up for example the network flare-up as observed by different nations around the globe, yet the cases have been rising persistently. India's lockdown period has been affected by two significant occasions in the ongoing days which were identified with the mass migration of workers and laborers from one state to different states.

Predictive modeling using comprehensive Personal Health Records (PHRs) is envisioned to improve quality of care, curb unnecessary expenditures and simultaneously expand clinical knowledge. This chapter motivates the big data on why the application of machine learning on EHRs should no longer be ignored in today's complex healthcare system. As promising as it sounds, clinical data come through a huge number of data-science challenge with the intention of obstruct well-organized knowledge of predictive models. The challenges relate to data representation, temporal modeling and data bias impact which, in turn, drive the research presented in this thesis. In particular, one contribution of this work is a cost-sensitive Long-Short-Term-Memory (LSTM) network for outcome prediction by means of specialist features and related embeds of medical concept. The complexity of modern medicine is primarily driven by the multipart human being environmental science which is topic to almost stable modify inside physiological pathways because of a progression of quality/condition connections. As a result, medical knowledge is expanding rapidly. For instance, COVID-19 specified over 68,000 diagnoses (five times the size of COVID-19, the lockdown continues developing as we anticipate COVID-19. So as to fix or ease quiet sufferings, clinicians practice a large number of medications and treatments. Thus, adding another wave of information including comprehensive patient-specific factors which may easily number in thousands. While the present digital era has equipped modern medicine with effective tools to store and share information, the ability to assimilate and effectively apply the unprecedented amount of knowledge generated in medicine far exceeds the capacity of an un-aided human mind.

Early identification, recognition, and acknowledgement of patients with unexpected clinical deterioration are a matter of serious concern. Early intercession on a patient whose wellbeing is falling apart will probably improve the patient result, and deferred mediation has been related with expanded dreariness and mortality. The modified early warning score (MEWS) can be utilized on totally hospitalized patients to permit early location of clinical weakening and of expected requirements for more elevated level of care. In any case, the essential methodology of information assortment and the board has remained to a great extent unaltered in the course of recent years. Besides, an examination on automated physiological checking frameworks found that clinical and nursing staff experienced issues distinguishing the beginning of unfriendly patterns as they grow however could recognize when a pattern had initiated when they reflectively took a gander at them. This outcome recommends that depending on the staff to recognize progressive crumbling without certain types of help, for example, a track and trigger framework may imply that patients whose wellbeing is falling apart will be remembered fondly. Artificial Intelligence (AI) is a field that creates insightful calculations and machines. A large portion of the specialists today concur that no insight exists without learning. Along these lines, AI is one of the significant parts of AI, and it is one of the most quickly creating subfields in AI research. Artificial intelligence in medication has additionally become a significant field in PC supported clinical exploration, which covers different fields (e.g., computerized analysis and treatment suggestion, dataset acknowledgment and understanding, quiet administration, and telemedicine / telehealth, among others). Mix of large information and AI is accepted to definitely change from traditional practice. When all is said in done, more information are required for these ways to deal with get important outcomes. Be that as it may, a large portion of the information created in the clinical consideration process have verifiably been underused because of the trouble in getting to, sorting out, and utilizing the information entered on paper graphs. Conversely, a few business and noncommercial emergency unit databases have been created. The significant level of checking in an ICU gives an extraordinary chance to AI to give new bits of knowledge. AI based ways to deal with foresee clinical crumbling may help all the more absolutely decide irregularities in physiological boundaries; along these lines, many calculations have been proposed around there.
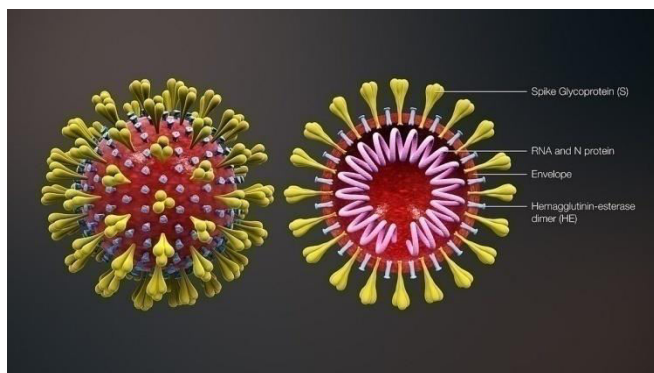
Fig 1: Coronovirus Lab view

III. Literature Survey

As per different papers available in literature, there are a few studies that focus on the trend analysis and forecasting for Indian region. The studies on Indian region presents long term and short term trend, respectively. These studies use time series data from John Hopkins University database and present forecasting using ARIMA model, Exponential Smoothing methods, SEIR model and Regression Model. However network modeling and pattern mining are not attempted in these versions of the studies and that too at the regional level, hence the current study attempts to do that. Also, the studies in Indian region from the past are more focused on presenting time series analysis based on the overall data for Indian region rather than covering other sources of information apart from just considering the number of infected patients, so the need to analyze the patients background and information is required for the authorities to get better insight about the situation. Similarly, there are other mathematical models that were developed for analyzing the trends of COVID-19 outbreak in India. A model for studying the impact of social distancing on age and gender of the patients in India was presented. It compared the country demographics amongst India, Italy and China and suggested the most vulnerable age categories and gender groups amongst all the nations. The study also predicted the rise of infected cases in India with different lockdown periods. Similarly, a network structure approach was used by one of the study to see whether any specific node clusters were getting formed. But only travel data nodes were considered by the authors to check which the prominent regions are affecting Indian travelers coming back to the India. Also, the study presented the SIR model to see the rate of spread of the Corona Virus amongst patients in India. Analysis on the testing labs and infrastructure was also presented by earlier authors. Work of medical doctors and frontline health workers was also presented by some studies. It was found that in India, the role of health workers was less stressed as

the spread stage of corona virus was still in phase two or the phase of local transmission rather than the community transmission as compared to other nations like Italy, Spain and USA. However, it was also claimed that Indian healthcare infrastructure is not very strong as per the WHO guidelines and in case of community spread, the Indian government may find it difficult to manage the spread. Some detailed discussion on the nature of the Corona Virus was also presented by some studies. Apart from India, a few models are also available for other countries primarily for China, Italy and USA as the number of infected patients was high. Studied like worked on various mathematical models to determine the spread of the disease, predict the number of infected patients, commenting on the preparedness for each country in tackling COVID-19

IV. Proposed Methodology

A. Dataset Pre Processing

The intensity version of the dataset may be very excessive. To balance this non uniform depth variant approach is used, the dataset be collected in www.kaggle.com // www.ipxdep.org . The problem of correcting for intensity non uniformity is substantially simplified if its miles modeled as a smooth multiplicative subject. Nonparametric statistics aren't necessary toward suit a usual allocation. Nonparametric information makes utilize of statistics this is frequently ordinal, which resources it do now not rely upon statistics, but rather a rating or order of sorts. For this reason, N4ITK Library is used. It is residential in the direction of give a hand radiologists otherwise medical supervisor in classify covid-19 cases. The proposed machine utilizes fundamental steps, which incorporates pre-processing of corona data's pix, improvement in assessment and brilliantness enhancement to data's, it is a category based totally on Greedy algorithm. The subsequent section talks the completion of the set of rules. The pleasant of the raw dataset is improved the usage of pre-processing level. In addition, pre-processing allows improving sure parameters of fever and coughing including civilizing the sign-to-noise ratio, casting off the immaterial noise as well as undesired elements inside the history, smooth the internal fraction of the area in addition to retaining its limits. In our proposed machine, to get better the signal-to-noise ratio, as well as a consequence the readability of the underdone data's, we carried out Adaptive Contrast Enhancement Based on changed Sigmoid Function.

ii. Filter Techniques
GREEDY ALGORITHM

The Greedy Algorithm (GA) is a model of machine mastering which derives its behavior from a metaphor of the approaches of evolution in nature. The goal is to beautify the High-quality of the photograph and to transform the dataset into segments to get greater significant photograph

and it'll be clean to analyze the photo the usage of Greedy algorithm. Greedy algorithm is the unbiased optimization approach. It is beneficial in data enhancement and segmentation. GA becomes verified to be the most powerful optimization method in a massive answer area. This explains the growing popularity of GAs packages in photo processing and other fields. Greedy Algorithms (GAs) are increasingly more being explored in many regions of dataset evaluation to resolve complicated optimization issues. This paper gives a quick review of the canonical Greedy set of rules and it also evaluations the tasks of photo pre-processing. The predominant task of machine imaginative and prescient is to enhance photograph satisfactory with recognize to get a required photo consistent with-reception. The GAs has been adopted to obtain better outcomes, faster processing times and extra specialized applications. This paper introduces various techniques primarily based on Greedy algorithm to get photograph with exact and natural comparison. The data enhancement is the most fundamental photo processing responsibilities. And Dataset Segmentation may be very tough mission. This paper includes the definition of dataset enhancement and photograph segmentation and additionally the need of Dataset Enhancement and the data may be more desirable the use of the Greedy Algorithm and the Dataset Segmentation the usage of Greedy Algorithm.

—————————————————————————
Algorithm: Greedy Algorithm
—————————————————————————

1t = 0;=

2: Initialize   population   (Feature   vector) f_i =
$(m_{1,i}, m_{2,i} \ldots m_{n,i})$

3: Parent selection

4: Evaluate solution

5: Find fitness of population

6: Check for optimal solution

7: **if** Termination criteria is reached (optimal solution) **then**

8:    STOP and EXIT

9: **else**

10:    Select an individual $m_{t+1,i}$ from f_t

11:    Create offspring by crossover cross $m_{t+1,i}$ with
$m_{t+1,i+1}$

12:    Mutate some individual mutate $m_{t+1,i}$

13:    $t = t + 1$;

14:    Compute new generation

15:    Survivor selection

16:    repeat steps 3 to 13

17:    find and return best

18: **endif**

Greedy set of rules (GA) is a meta-heuristic arrangement of rules which is propelled through home grown determination. This home grown choice further has a place with superset of evolutionary algorithms (EA). Greedy algorithms give answers for search and advancement and issues. These algorithms rely on bio-enlivened administrators. These administrators are hybrid, change, and decision, etc separated from characterizing the improvement trademark. The Greedy calculation begins offevolved with instatement of people which is an iterative strategy. The age is alluded to as an age and in each such period; the health is assessed comparing to each individual. In a difficult situation, the wellness shows the charge of the objective feature inside the advancement bother.

Segmentation:

Segmentation is a usually used procedure in processing and analysis to segment a data into various parts or regions, regularly based on the characteristics of the size in the datasheet. The segmentation could include separating forefront from foundation, or clustering regions of size based on similarities in rows and columns. For instance, a typical use of segmentation in medical data's is to identify and mark data in a patient's organs.

As examined before, picture edge strategies are sorted as bi-level or staggered thresholding. In this work, ideal edge esteems are gotten utilizing a well known staggered strategy, to be specific Kapur's entropy, which decides the ideal edge esteems dependent on the entropy of the portioned areas here and there with an adjusted morphology and fringe lung dispersion. Thus, COVID-19 conclusion can be spoken to as a picture division issue to extricate the primary highlights of the ailment. This division issue can be settled by building up a calculation that can extricate the littler comparable districts that can show contamination with the COVID-19 infection.

(1).Threshold Segmentation

Threshold segmentation is the based totally on a simple segmentation method is first converted into a binary format. This segmentation approach is accomplished on a threshold cost which varies as per the functions for even as being transformed right into a binary data layout. The selection of a threshold fee for segmentation is the prime challenge. Dataset utilizing histogram enables us in finding an unmarried threshold cost for the identical. Utilizing Histogram is a type of histogram this is based as a graphical representation for the tonal distribution in a enhance

data's. Many researchers contain work in addition to advanced strategies intended for fixing disease issues with the aid of the usage of scientific dataset segmentation. The planned technique be worn to find several covid-19 information's in one of a kind clinical previews and lead estimation examinations of those anticipate the perish. The objective of the proposed procedure is to yield valuable realities for disease limit through clinical dataset division and be proficient in characterizing malignant growth. This analyzes additionally attempts to join various systems to make a ground-breaking division, our thresholding proposed set of rules.

Input: Covid 19 Datas.

Output: Extracted the part with disease after which segmented.

Step 1: Read clinical training data.

Step 2: Create a loop for analyzing the medical Datasets.

Step 3: Initiate counter searching of a clinical data. If the temprature is fine (F =1), then the counter must be from inside the data. If the force is terrible (F=−1), then the temprature has to be outdoor the counter.

Step 4: Evaluate the function by way of the numerical degree set.

Step 5: If the characteristic is about zero in a boundary is affected stage, then proceed to the following equation to pick out the part with the value 1 means not affected most tissue variety.

Step 6: Define the 3 parameters (temp, cough level, body degree) for fuzzy entropy membership capabilities,

Step 7: Calculate double thresholding to discover the decrease and top limits.

Step 8: Extract the part with most tissues and section the scientific dataset in accordance with extract values divided by sixteen.

Step 9: End.

B. Feature Extraction

The characteristic extraction is a procedure to symbolize the photo in its compact and particular shape of single values or matrix vector. Low stage characteristic extraction entails computerized extraction of features from an without doing any processing method. The Feature Extraction Techniques The feature sets formed by using GLCM, LDP, GLRLM, GLSZM and DWT were used for classification of corona virus. The SVM classifier was used to classify the extracted features, because the SVM is a strong binary classifier.

The feature extraction methods used in this study are as follows:

- Grey Level Co-occurrence Matrix

- Local Directional Pattern
- Grey Level Run Length Matrix
- Grey Level Size Zone Matrix
- Discrete Wavelet Transform

Classification

Data classification alludes to a procedure in computer vision that can order a image as indicated by its visual substance. For instance, an order calculation might be intended to tell if a contains a human figure or not. While distinguishing an item is unimportant for people, strong picture grouping is as yet a test in computer vision applications.

Classification and evaluation
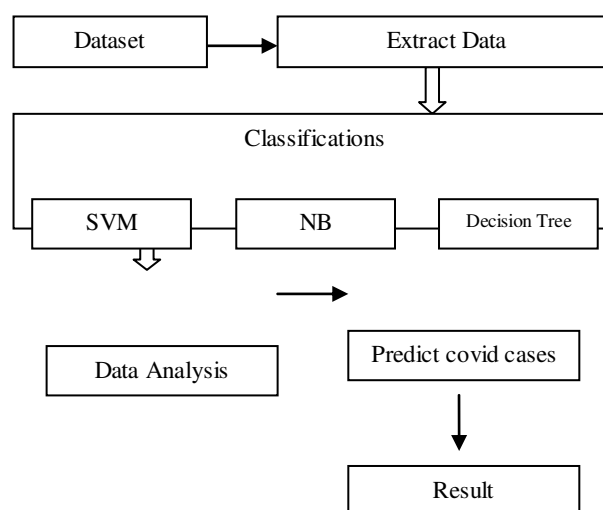
Support Vector Machine

A support vector machine (SVM) is a directed learning calculation dependent on measurable learning hypothesis. Given an information test, marked informational index (preparing set), a SVM attempts to register a planning y work f with the end goal that f(x) = y for all examples in the informational index. This planning capacity depicts the connection between the information tests and their particular class marks; and is utilized to order new obscure information. Classification with regards to SVMs is finished utilizing the accompanying classification choice capacity. Classification distinguishes the nearness of tumor in MRI image and groups the tumor as considerate or dangerous or typical. In this module Support Vector Machine (SVM) is utilized to order the COVID-19.SVM Support vector machines are principally two class classifiers, direct or non-straight class limits. The thought behind SVM is to frame a hyper plane in the middle of the informational indexes to communicate which class it has a place with. The assignment is to prepare the machine with known information and afterward SVM locate the ideal hyper plane

which gives greatest separation to the closest preparing information purposes of any class. Hyper plane that fulfill the arrangement of focuses x can be composed as w.x+b=0, Where b is scalar and w is p-dimensional vector. A corona virus classification in two stages. In the first stage, the classification process was implemented on four different subsets without feature extraction process. The subsets were transformed into vector and classified by SVM. In the second stage, five different feature extraction methods such as Grey Level Co occurrence Matrix (GLCM), Local Directional Patterns (LDP) , Grey Level Run Length Matrix (GLRLM) , Grey Level Size Zone Matrix (GLSZM), and Discrete Wavelet Transform (DWT) extracted the features and the features were classified by SVM. During the classification process, 2-fold, 5-fold, and 10-fold cross-validation methods were used. The mean classification results after cross-validations were obtained.

Pre-prepared profound highlights are removed from completely associated layer and feed to the classifier for preparing reason. The profound highlights got from each CNN systems are utilized by SVM classifier. From that point forward, the characterization is performed, and the exhibitions of all arrangement models are estimated. The profound highlights models are extricated from a specific layer and highlight vector is acquired. The highlights are taken care of to the SVM classifier for characterization of COVID-19, pneumonia tolerant and solid individuals. The multilayer structures arrange, and each layer delivers a reaction. The layers extricate the basic picture highlight and go to the following layer. The component layer and highlight vector utilized a few models are point by point. The actuation is in GPU with a minibatch size of 64 and GPU memory have space enough to fit picture dataset. The enactment yield is as the segment to fit in direct SVM preparing. The item identification and arrangement are the two principle undertakings where profound learning is applied. The progression of AI has an incredible advantage for clinical dynamic and improvement computer-aided systems

Decision Tree Classifier:

Decision tree is one of the classification strategies, which arrange the covid-19 named prepared data into a tree or rules. When the tree or rules are inferred in learning stage to test the accuracy of a classifier test data is taken haphazardly from preparing data. After Verification of accuracy, unlabeled data is characterized utilizing the tree or rules got in learning stage. The structure of a decision tree is like the tree with a root hub, a left sub tree and right sub tree. The leaf hubs in a tree speak to a class mark. The bends starting with one hub then onto the next hub signify the conditions on the properties. The Tree can be worked as:

The determination of characteristic as a root hub is done dependent on property parts

• The decisions about the hub to speak to as terminal hub or to proceed for parting the hub.

• The task of terminal hub to a class. The characteristic parts rely upon the polluting influence estimates, for example, Information gain, gain proportion, gain file and so forth.

When the tree is constructed then it is pruned to check for over fitting and commotion. At last the tree is an upgraded tree .The upside of tree organized methodology is straightforward and deciphers, handles unmitigated and numeric traits, vigorous to exceptions and missing qualities. Decision tree classifiers are utilized broadly for finding of sickness, for example, covid-19 data's,

C. **Algorithm Models**

SVM Algorithm Steps:

Step 1: Choose a value for the parameter k.

Step 2: Input: Give a sample of N examples and their classes.

The classes of sample x are c(x).

Step 3: Give a new sample y.

Step 4: Determine the k-nearest neighbors of y by calculating the distances.

Step 5: Combine classes of these y examples in one class c.

Step 6: Output: The class of y is c(Y) = c.

Naive Bayes classifier calculates the probability of an event in the following steps:

Step 1: Calculate the prior probability for given class labels

Step 2: Find Likelihood probability with each attribute for each class

Step 3: Put these value in Bayes Formula and calculate posterior probability.

Step 4: See which class has a higher probability, given the input belongs to the higher probability class.

Decision Tree Algorithm Steps:

- Start with all preparation occasions related with the root hub

- Use information increase to pick which ascribe to name every hub with
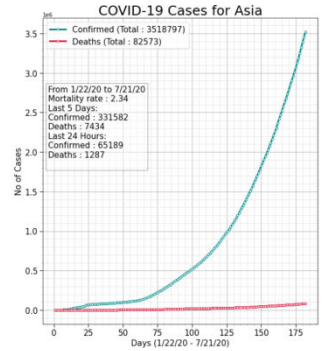
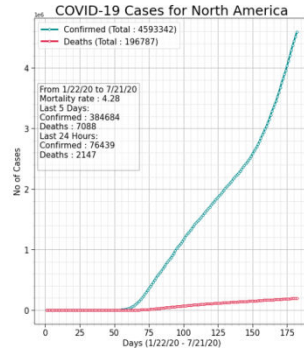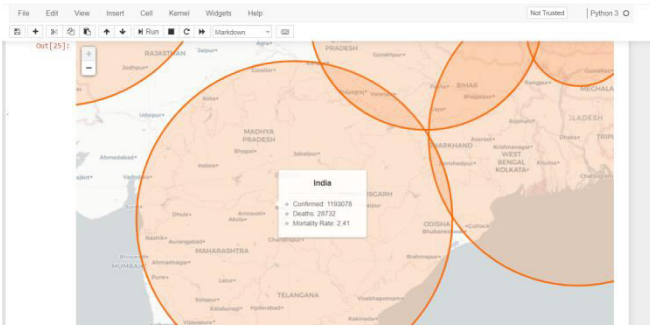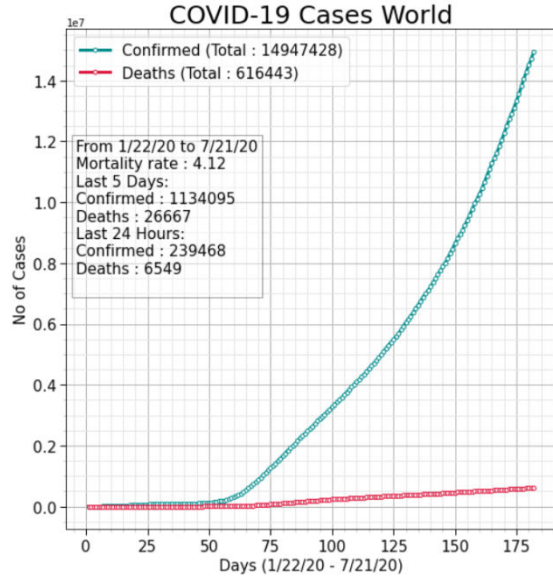- Note: No root-to-leaf way ought to contain the equivalent

discrete characteristic twice

- Recursively develop each subtree on the subset of preparing cases that would be grouped down that way in the tree.
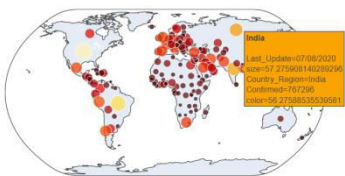
IV.   Results and Discussions

Layer (type)	Output Shape	Param #
input_18 (InputLayer)	(None, 1)	0
Dense_l1 (Dense)	(None, 80)	160
LRelu_l1 (LeakyReLU)	(None, 80)	0
Dense_l2 (Dense)	(None, 80)	6480
LRelu_l2 (LeakyReLU)	(None, 80)	0
Dense_l3 (Dense)	(None, 1)	81
Output (LeakyReLU)	(None, 1)	0

Total params: 6,721
Trainable params: 6,721
Non-trainable params: 0

Table Comparison

Algorithm	SVM	NB	DT
Accuracy **Units of Temperature**	75%	78%	**90%**
Accuracy CT based thermometer	79%	81%	**99%**

Classifier	Accuracy	Sensitivity	Specificity	AUC
SVM	75%	0.020	1	0.03
Navie Bayes	49%	0.128	1	0.15
Decision Tree	92%	0.030	1	0.8

Table 4: Datasets Results

Conclusions

The experiments reveal the persons of different age groups are suffered with COVID-19. The correlation matrices are built to understand the relationship between the features of the datasets. The feature importance is computed for the classifiers built. Along with the classifiers and repressors are also built for prediction. The results show that the Decision tree Repressor, SVM and NB Classifier has outperformed other models in terms of Accuracy. In future, more ML classifiers and Repressors are evaluated on the evolving COVID-19 datasets.

References

1) Menni, C., Valdes, A.M., Freidin, M.B. et al. Real-time tracking of self-reported symptoms to predict potential COVID-19. Nat Med (2020). https://doi.org/10.1038/s41591-020-0916-2. \

2) What are the symptoms of COVID-19?, https://www.who.int/emergencies/diseases/novelcoronavirus-2019/question-and-answers-hub/q-adetail/q-a-coronaviruses#:~:text=symptoms (Last Accessed: 11.05.2020)

3) Symptoms of Corona virus, https://www.cdc.gov/ corona virus/2019-ncov/ symptoms-testing/ symptoms.html (Last Accessed: 11.05.2020)

4) Yang, P., Wang, X. COVID-19: a new challenge for human beings. Cell Mol Immunol 17, 555–557 (2020). https://doi.org/10.1038/s41423-020-0407-x

5) Corona virus disease 2019 (COVID-19), https://www.mayoclinic.org/diseasesconditions/coronavirus/diagnosis-treatment/drc20479976, (Last Accessed 12.05.2020)

6) Advice on the use of point-of-care immunodiagnostic tests for COVID-19, https://www.who.int/newsroom/commentaries/detail/advice-on-the-use-of-pointof-care-immunodiagnostic-tests-for-covid-19, (Last Accessed 12.05.2020)

7) Viral Testing Data in the U.S., https://www.cdc.gov/coronavirus/2019-ncov/casesupdates/testing-in-us.html, (Last Accessed 12.05.2020)

8) COVID-19 in India, https://www.kaggle.com/ sudalairajkumar/covid19-inindia?select=AgeGroupDetails.csv, (Last Accessed 12.05.2020)

9) COVID-19 in India, https://www.kaggle.com/sudalairajkumar/covid19-inindia? select=covid_19_india.csv, (Last Accessed 12.05.2020)

10) Novel Corona Virus 2019 Dataset, https://www.kaggle.com/sudalairajkumar/novelcorona-virus-2019-dataset?select=covid_19_data.csv, (Last Accessed 12.05.2020)

11) Balika J. Chelliah, S. Kalaiarasi, Apoorva Anand, Janakiram G, Bhaghi Rathi, Nakul K. Warrier, Classification of Mushrooms using Supervised Learning Models, IJETER, Vol 6(4), April 2018, ISSN 2454-6410, pp 229-232.

12) D. Shona, A.Shobana, Fast and Effective Network Intrusion Detection Technique Using Hybrid Revised Algorithms, IJETER, Vol 4(11), November 2016, ISSN 2454-6410, pp 42-46.

13) Detecting Central Nervous System Disorder Using Machine Learning Technique (XGB Classifier), Sri Lasya Dharmapuri, Pavan Kumar Dandamudi, Vinoothna Manohar Botcha and Bhanu Prakash Kolla, IJETER, Vol 8(4), April 2020, ISSN 2454-6410, pp 1142-47.