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Covid19 Detection Techniques using X-ray Chest Images

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Abstract: Corona virus wellbeing (COVID-19), is one amongst the foremost infectious diseases that reshaped our everyday lives globally inside the twenty first century. Technology progressions have a speedy impact on every field of life, be it the medical domain or the opposite. Over 250 countries are affected by COVID in spite of your time. The Indian government is making the necessary steps to manage the spread of virus inside the society. Peopleall over the world are in danger of its consequences inside the longer term. Throughouta pestilence like this, folks typically worry whether or not or not they show an indication of COVID-19 or not. VariedAI methods are applied successfully in epidemic studies. Here, in this paper, we tend to design a model that may find and predict COVID-19 from X-ray of respiratory organ pictures.
Keywords: COVID-19 detection, deep learning, chest X-ray image, CNN

I. INTRODUCTION

The first COVID-19 case was discovered in Wuhan, China, during December 2019 and it rapidly spread in many International Countries. The virus spread around the world in a very short period which became an epidemic and collapsed the health systems of many countries. Over the last few months, the virus has impacted severely with a continuous increase in the number of confirmed cases and deaths. The virus is easily spread among entire human community, since the pathology is highly transmitted through contact with infected person either by touch, talking, sneezing or coughing [1]. Presently there is considerably less number of COVID-19 analysis kits available in hospitals which are not at all enough for the increasing cases and also due to non-awareness and fear, people undergo the test for confirming whether the result is positive or negative. Hence, it is needed to realize an automatic prediction system to effectively use the analysis kits and also to stop spreading among people by giving them proper treatment at the early stage. Machine Learning (ML) and Deep Learning are actually powerful tools in the fight against the COVID-19. It can be used to manage huge data and effectively predict the spread of the disease. It helps in diagnosis and predicts COVID-19. ML/DL techniques are useful in tracing COVID cases, predicting, creating dashboards, diagnose and give proper medications, generating alerts to support social distance and also for other potential control mechanisms of the spread of virus.

II. LITERATURE SURVEY

The deep learning technique extracts native features from images as much as potential, however it's additional appropriate for big datasets. Most of the published research that has relied on chest X-ray images in its work so far focuses either on the diagnosis the disease itself or the distinction between COVID-19 and other types of pneumonia, as in [1]–[5]. These studies depended on the Convolutional Neural Network (CNN) techniques and different pre-trained models like ResNet, DenseNet, CheXNet, Xception, VGG, and others. In [6], the authors used X-ray images to detect specific severity scores of COVID-19 as a regression problem with a pre-trained deep learning model called DenseNet where X-ray images were scored retrospectively by specialists in terms of the extent of respiratory organ involvement, that is named geographic extent score (range 0-8), additionally because the degree of opacity, that is called lung opacity score (range 0-6), and mean absolute error (MAE) was calculated to evaluate the model.

Unfortunately, sometimes deep learning models may suffer from over-fitting problems [7], cause high bias because they extract unknown and abstract features [8], and need high-dimensional datasets to obtain higher performance. To overcome such problems, some researchers used pre-trained transfer learning models to take advantage of the potential of deep learning techniques.

X-ray images have necessary characteristics wherever they're used because the initial step for disease detection and to observe the patient's condition in each the hospital and icu. For this reason, they're employed in most of this analysis work to discover and diagnose diseases, but, to our information, not employed in any analysis work for severity prediction. Therefore, in this study, a prediction model has been built to predict different types of severity risks of a patient based on a public dataset of X-ray images [9]. The proposed model can predict early the dangers of death and severity risks of the patient to determine the resources required to deal with the patient's condition. it should predict whether or not the patient can got to enter the intensive care Unit (ICU) or not, additionally as report his death. The model is intended to predict totally different levels of patient severity exploitation handcrafted and pre-trained Che XNet techniques to extract the options of pictures.

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III. WORKING OF EXISTING SYSTEM

This paper proposed a COVID 19 prediction model, in which we will predict the disease from X-ray images. There are some steps of Existing System and the description is given below:

1) *Data Acquisition:* As machine learning is based on available data for the system to make a decision hence the first step defined in the architecture is data acquisition. This involves data collection, preparing and segregating the case scenarios based on certain features involved with the decision making cycle and forwarding the data to the processing unit for carrying out further categorization. This stage is sometimes called the data preprocessing stage.
2) *Data Processing:* The received data in the data acquisition layer is then sent forward to the data processing layer where it is subjected to advanced integration and processing and involves normalization of the data, data cleaning, transformation, and encoding. The data processing is also dependent on the type of learning being used. The data processing layer defines if the memory processing shall be done to data in transit or in rest.
3) *Data Modeling:* This layer of the architecture involves the selection of different algorithms that might adapt the system to address the problem for which the learning is being devised, these algorithms are being evolved or being inherited from a set of libraries. The algorithms are used to model the data accordingly; this makes the system ready for the execution step.
4) *Execution:* This stage in machine learning is where the experimentation is done, testing is involved and tunings are performed. The general goal behind being to optimize the algorithm in order to extract the required machine outcome and maximize the system performance, The output of the step is a refined solution capable of providing the required data for the machine to make decisions.
5) *Deployment:* Like any other software output, ML outputs need to be operation analyzed or be forwarded for further exploratory processing. The output can be considered as a non-deterministic query which needs to be further deployed into the decision-making system.

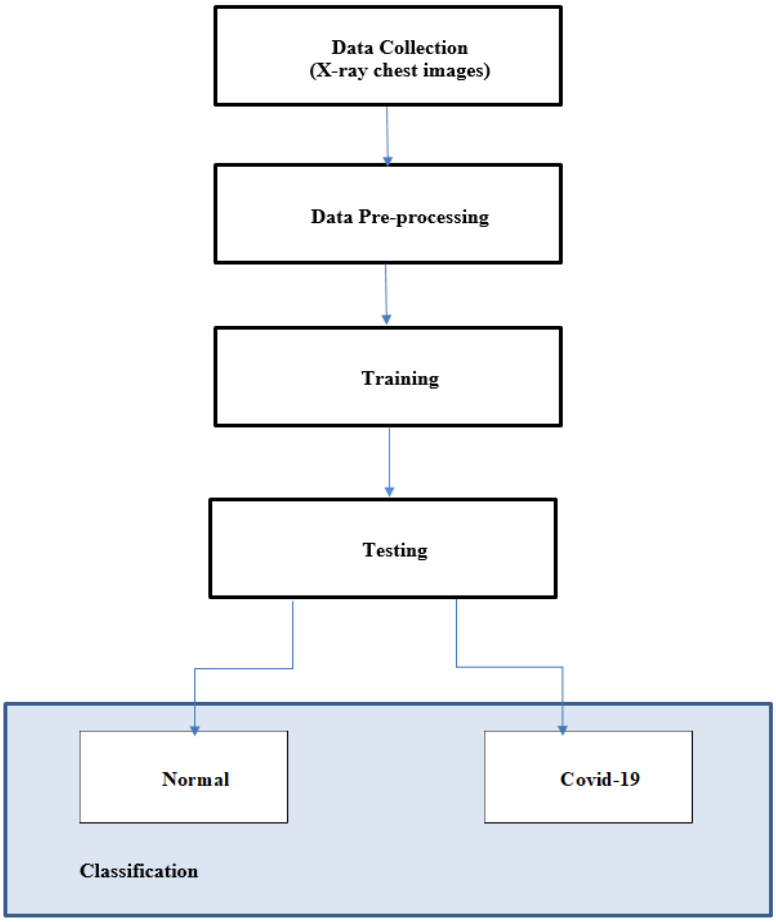


Fig 1. Covid-19 Prediction Flowchart

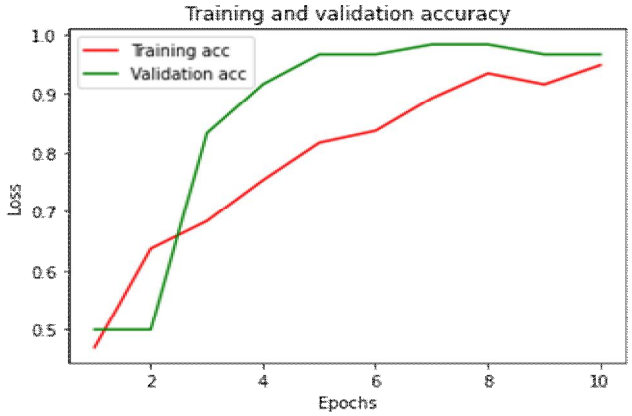
IV. RESULT AND DISCUSSION

The total chest x-ray images are divided into training and testing dataset and results are captured. In experiment, Logistic Regression model, Decision Tree model, KNN model, SVM Model and CNN model is trained over training image dataset. Accuracy is calculated for all models and CNN model shows the greatest accuracy. We tested all models on training and testing dataset which produced following results shown in tables below:

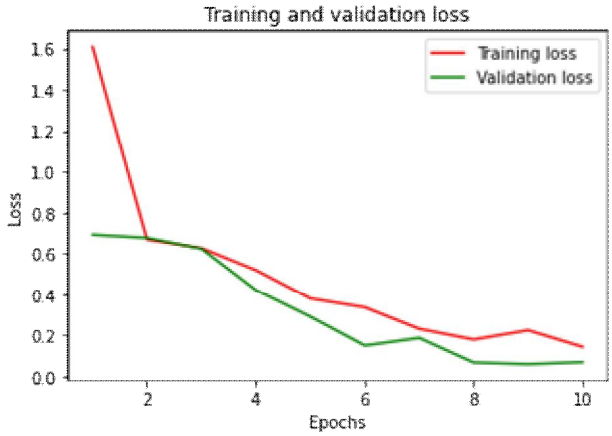
	Logistic Regression	Decision Tree	KNN	SVM	CNN
Training Dataset Accuracy	82.14	71.42	75	92.85	96.77
Testing Dataset Accuracy	88.33	66.66	80	93.33	96.66

Table 1: Training and testing accuracy of algorithms

The training loss is a metric used to assess how a deep learning model fits the training data. That is to say, it assesses the error of the model on the training set. Note that, the training set is a portion of a dataset used to initially train the model. Computationally, the training loss is calculated by taking the sum of errors for each example in the training set. On the contrary, validation loss is a metric used to assess the performance of a deep learning model on the validation set. The validation set is a portion of the dataset set aside to validate the performance of the model. The validation loss is similar to the training loss and is calculated from a sum of the errors for each example in the validation set. The graphs for training and validation loss and accuracy for CNN model is shown in Graph 1 and Graph 2.



Graph 1: Training and validation Accuracy



Graph 2: Training and validation Accuracy

V. CONCLUSION AND FUTURE SCOPE

Several medical specialty models are getting used round the world to project the number of infected people and therefore the mortality rates of the COVID-19 irruption. Advancing correct prediction models is of utmost importance to take correct actions. Because of the dearth of essential data and uncertainty, the medical specialty models are challenged relating to the delivery of higher accuracy for long prediction. As an alternate to the susceptible-infected-resistant (SIR)-based models, this dissertation presents a learning approaches to predict the COVID-19 disease. This paper presents COVID-19 disease prediction with Logistic Regression model, Decision Tree model, KNN model, SVM Model and CNN.In future, this generated model can be validated against new X-ray images data that is made public.

REFERENCES

[1] L. Wang, Z. Q. Lin, and A. Wong, ‘‘COVID-net: A tailored deep convolutional neural network design for detection of COVID-19 cases from chest X-ray images,’’ Sci. Rep., vol. 10, no. 1, Nov. 2020, Art. no. 19549.

[2] T. Ozturk, M. Talo, E. A. Yildirim, U. B. Baloglu, O. Yildirim, and U. Rajendra Acharya, ‘‘Automated detection of COVID-19 cases using deep neural networks with X-ray images,’’ Comput. Biol. Med., vol. 121, Jun. 2020, Art. no. 103792, doi: 10.1016/j.compbiomed.2020.103792.

[3] A. I. Khan, J. L. Shah, and M. M. Bhat, ‘‘CoroNet: A deep neural network for detection and diagnosis of COVID-19 from chest X-ray images,’’ Comput. Methods Programs Biomed., vol. 196, Nov. 2020, Art. no. 105581, doi: 10.1016/j.cmpb.2020.105581.

[4] M. Rahimzadeh and A. Attar, ‘‘A modified deep convolutional neural network for detecting COVID-19 and pneumonia from chest X-ray images based on the concatenation of xception and ResNet50 V2,’’ Informat. Med. Unlocked, vol. 19, Jan. 2020, Art. no. 100360, doi: 10.1016/j.imu.2020.100360.

[5] N. Habib, M. M. Hasan, M. M. Reza, and M. M. Rahman, ‘‘Ensemble of CheXNet and VGG-19 feature extractor with random forest classifier for pediatric pneumonia detection,’’ Social Netw. Comput. Sci., vol. 1, no. 6, pp. 1–9, Oct. 2020.

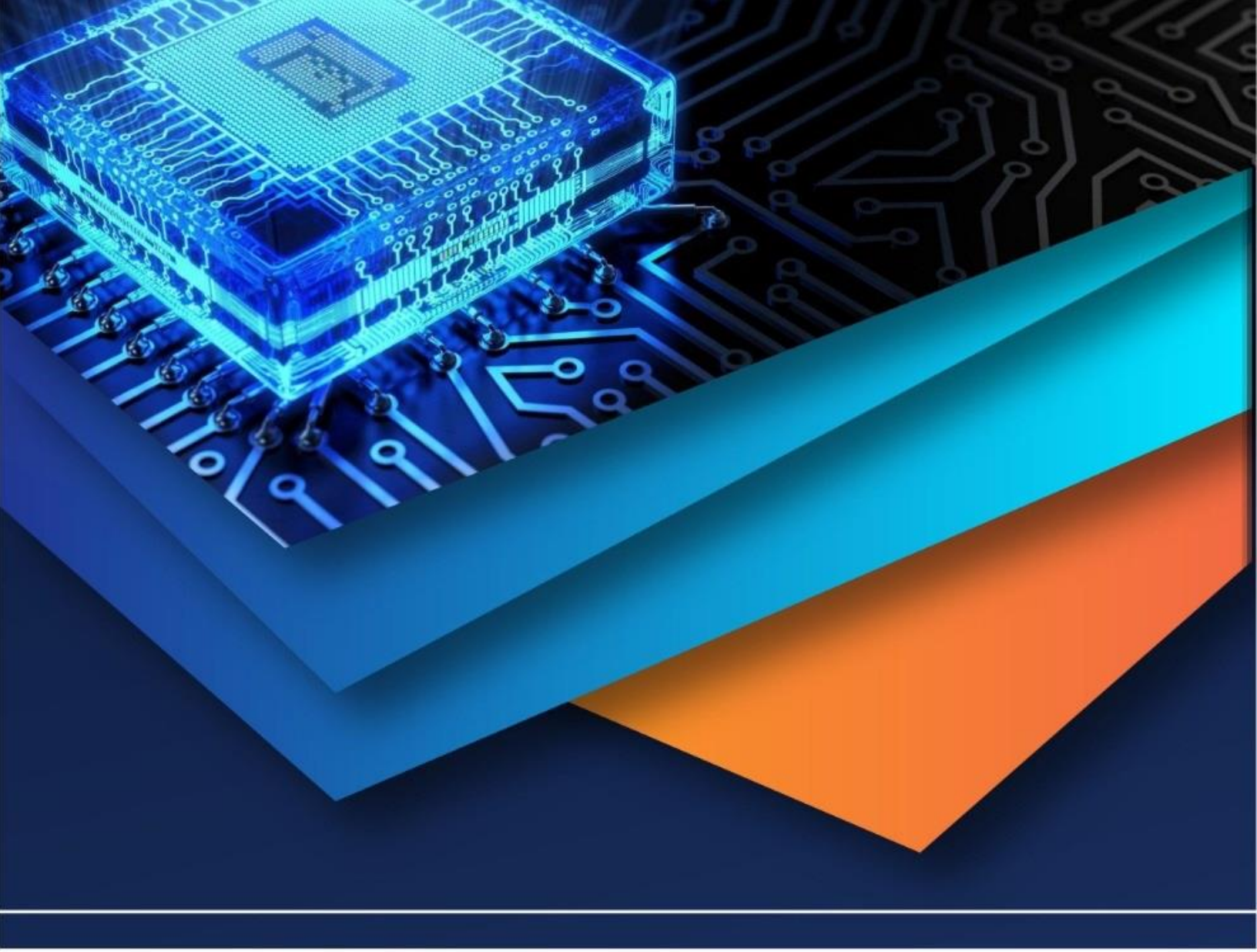
[6] P. R. A. S. Bassi and R. Attux, ‘‘A deep convolutional neural network for COVID-19 detection using chest X-rays,’’ Res. Biomed. Eng., vol. 2, pp. 1–10, Apr. 2021.

[7] J. P. Cohen, L. Dao, K. Roth, P. Morrison, Y. Bengio, A. F. Abbasi, B. Shen, H. K. Mahsa, M. Ghassemi, H. Li, and T. Duong, ‘‘Predicting COVID-19 pneumonia severity on chest X-ray with deep learning,’’ Cureus, vol. 12, Jul. 2020, Art. no. e9448, doi: 10.7759/cureus.9448.

[8] D.Camilleri and T. Prescott, ‘‘Analysing the limitations of deep learning for developmental robotics,’’ in Biomimetic Biohybrid System Cham, Switzerland: Springer, 2017, pp. 86–94, doi: 10.1007/978-3-319-63537- 8_8.

[9] M. Roberts, D. Driggs, M. Thorpe, J. Gilbey, M. Yeung, S. Ursprung, A. I. Aviles-Rivero, C. Etmann, C. McCague, L. Beer, and J. R. Weir-McCall, ‘‘Common pitfalls and recommendations for using machine learning to detect and prognosticate for COVID-19 using chest radiographs and CT scans,’’ Nature Mach. Intell., vol. 3, no. 3, pp. 199–217, 2021.

[10] J. Paul Cohen, P. Morrison, L. Dao, K. Roth, T. Q Duong, and M. Ghassemi, ‘‘COVID-19 image data collection: Prospective predictions are the future,’’ 2020, arXiv:2006.11988. [Online]. Available: http://arxiv.org/abs/2006.11988



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