COVID-19 IDENTIFICATION FROM CHEST X-RAY IMAGES USING LOCAL BINARY PATTERNS WITH ASSORTED MACHINE LEARNING CLASSIFIERS

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ABSTRACT

Coronaviruses (CoV) are a large family of viruses that cause illness ranging from the common cold to more severe diseases. A novel coronavirus (nCoV) is a new strain that has not been previously identified in humans. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a novel severe acute respiratory syndrome coronavirus. It was first isolated from three people with pneumonia connected to the cluster of acute respiratory illness cases in Wuhan. All structural features of the novel SARS-CoV-2 virus particle occur in related coronaviruses in nature.The novel coronavirus disease 2019 (COVID-19) constitutes a public health emergency globally. The number of infected people and deaths are proliferating every day, which is putting tremendous pressure on our social and healthcare system. Rapid detection of COVID-19 cases is a significant step to fight against this virus as well as release pressure off the healthcare system. One of the critical factors behind the rapid spread of COVID-19 pandemic is a lengthy clinical testing time. The imaging tool, such as Chest X-ray (CXR), can speed up the identification process. Therefore, our objective is to develop an automated system for the detection of COVID-19 samples from healthy using CXR images.This project Covid-19 identification from chest x-ray images using local binary patterns with assorted machine learning classifiers is a novel approach that helps to detect whether a person is infected with covid-19 or not. Detection of virus is done using a machine learning method Local Binary Pattern (LBP) algorithm and convolutional neural networks algorithm. Early detection of virus is crucial in the complete recovery of the patient but can be fatal if detected in the later stages. The training dataset which has human chestX-Rays of non-infected people as well as patients suffering from pneumonia and Covid-19 virus infection. Local binary patterns with variations in its input parameters are used for feature extraction. The resulting feature sets are classified using several machine learning algorithms and ensembles of these individual models.

INTRODUCTION

Covid19 also known as the novel corona virus is caused in humans by the SARS-CoV2 virus (Severe Acute Respiratory Syndrome Corona virus). This virus is predominantly found in animals, especially bats but due to its zoonotic nature, it can affect humans as well. Zoonotic nature of a virus means that this virus can affect other animals which in turn can affect humans. The Covid19 virus first emerged in the Wuhan region, China in December 2019 and has rapidly spread globally, causing deaths all over the world. By May 2020, over 5 million people had been infected by the virus which has caused more than three hundred thousand casualties globally. The symptoms for this disease include fever, fatigue, difficulty in breathing, sore throat, fever, cough and headache. The massive outbreak of the virus has caused it to be declared as a pandemic by the WHO. Studies show that early detection of the disease can lead to the complete recovery of the patient but it becomes difficult to treat in the later stages of detection. The symptoms of the virus are similar to that of flu and hence medical experts are heavily reliant on other methods of detection like medical images. Computer aided diagnosis has played a huge role in the diagnosis of the disease. X-Ray images of the chest are being used for the identification of the virus infection by healthcare professionals globally.There are only a few large open access datasets of COVID-19 X-ray images; most of the published studies use as a foundation the COVID-19 Image Data Collection, which was constructed with images from COVID-19 reports or articles, in collaboration with a radiologist to confirm pathologies in the pictures taken. Past approaches use different strategies to deal with small datasets such as transfer learning, data augmentation or combining different datasets.

OBJECTIVE

The main objective to efficiently predict the covid-19 from the dataset. Use numerous ml algorithms to construct prediction models, examine the accuracy and overall performance of those models. To increase the accuracy of the classification results.

PROBLEM STATEMENT

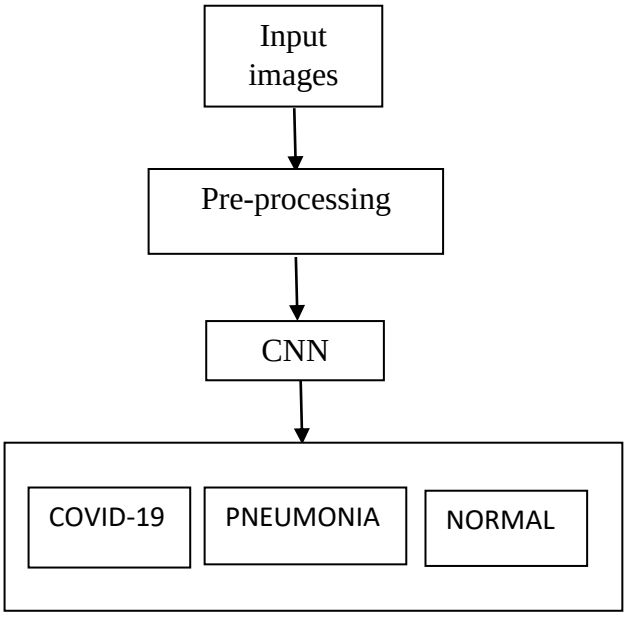
It is a disease that is rapidly spreading worldwide due to physical interactions.The virus can spread from an infected person's mouth or nose in small liquid particles when they cough, sneeze, speak, sing or breathe.Using traditional way of classifying whether a person is infected is not efficient when there occurs a huge data also it takes a lot of time to give results. The manual detection of COVID19 virus may not give accurate value and efficiency is less.

LITERATURE REVIEW

Theexistingsystem is a manual system in which human eye is used to predict whether the patient is suffering with covid-19 or not. This process consumes more amount of time and accuracy level is low. Because in this process a person has to first take the x-ray and then consult the doctor to know the result. In this system, if there exists a vast amount of data it is hard for a doctor to predict all the data within limited period of time. This may increase process time. If a covid infected person consults a doctor waiting in the queue he/she may affect the other patients appeared at that time and there will be a chance of spreading the virus.

PROPOSEDSYSTEM

The proposed system is built overcoming the disadvantages in existing system. This system will preprocess the data to extract the useful data. Then it classifies the data using convolutional neural networks algorithm. The proposed Covid 19 infection identification method uses the human chest X-Ray images of patients. There are two main phases in the identification; feature extraction and classification. Local Binary Patterns (LBP) are used for extracting feature sets from the input chest X-Ray images. Later, the feature sets are classified using supervised learning algorithms. The main objective of our proposed method is to use the DCGAN-CNN method for efficient classification of CXR images into three categories: normal, pneumonia, and COVID-19. A flow diagram of the proposed DCGAN-CNN model is depicted in the below Figure



IMPLEMENTATION (modules)

Category	Training set	Validation (test) set	Total
Normal	889	223	1112
COVID-19	2389	598	2987
Total	3278	821	4099

The modules that are included in this project are data selection, pre-processing, splitting dataset into train data and test data, classification and result generation.

DATA SELECTION

The dataset required in this system is chest x-ray images of patients infected with covid-19 and pneumonia and also normal people datasets. These are required to train the model.Chest imaging is commonly used in medicine, and it plays an important role in the detection of COVID-19.

DATA PRE-PROCESSING

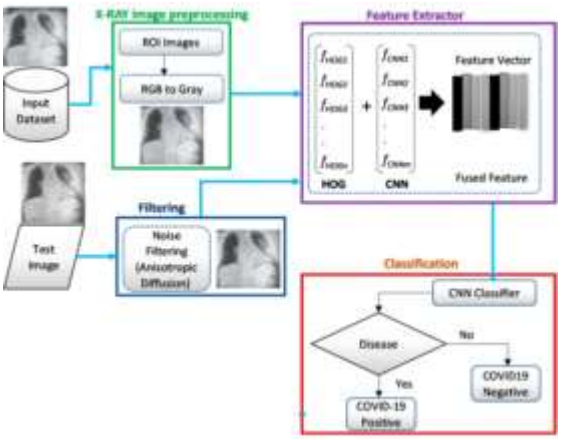
Data pre-processing is the process of extracting useful data from the raw data by removing unwanted data. The unwanted data includes noise data, missing data etc. In this system, image preprocessing is done. In this method, x-ray images are converted from ROI images to RGB and then to gray scale images.

SPLITTING DATASET INTO TRAIN AND TEST DATA

Data splitting is the act of partitioning to be had statistics into two portions, normally for cross-validatory purposes. One part of the data is used to increase a predictive model. And the opposite to assess the model's performance. Separating data into training and testing sets is an essential a part of evaluating data mining models. Typically, while you separate a data set right into a training set and testing set, maximum of the data is used for training, and a smaller part of the data is used for testing.

CLASSIFICATION

Classification is done using convolutional neural networks algorithm.CNNs are equipped with an input layer, an output layer, and hidden layers, all of which help process and classify images. The hidden layers comprise convolutional layers, ReLU layers, pooling layers, and fully connected layers, all of which play a crucial role. CNN is a machine learning algorithm for machines to understand the features of the image with foresight and remember the features to guess whether the name of the new image is fed to the machine.



RESULT GENERATION

The final result gets generated primarily based totally on the classification and

prediction. The performance of this proposed approach is evaluated using some measures like accuracy, precision, recall, F1-measure

SAMPLE SCREENS

The sample screens of this project are

CONCLUSION

In this study, the machine learning classifiers are used to predict covid-19 virus. Chest x-ray images are taken as input data and applied into pre-processing method. In pre-processing method, the process will actually be like cleaning the dataset and extract the useful data such like feature extraction. Then it processed into feature selection method, in this method the dataset is split into training dataset and testing dataset. Finally, the classification method machine learning algorithm is used to predict the covid-19 virus. By using this system, we can detect the virus at earlier stage to reduce the fatality rate of humans.

FUTURE SCOPE FOR FURTHER DEVELOPMENT

In future, it is possible to provide extensions or modifications to the proposedclassification algorithms to achieve further increased performance. It is also possible to use other machine learning algorithms and can implement a real-world application for the user experience in a simple manner, so that they can take precautions in the first stage. The future enhancement for this project will be adding more algorithms to improv accuracy. In the future, implementing IOT for monitoring the symptoms of covid-19 can improve the accuracy and helps to detect in initial stage which helps to reduce the fatal rate of patients.

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