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Pneumonia Detection Using Machine Learning

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ABSTRACT: Chest X-ray images are extremely difficult to interpret due to the fact that they are produced using a projection imaging modality. This is largely owing to the fact that anatomical structure and disease are closely intertwined. A large number of chest X-rays helps radiologists develop their knowledge and diagnostic abilities after they have mastered the principles of chest X-ray analysis. Droplets fill the lungs and make breathing difficult as a result of pericardial effusion caused by pneumonia. Pneumonia can be treated more effectively and with a higher chance of survival if caught early. Chest X-ray imaging is the most routinely used diagnostic technique for pneumonia. Examining chest X-rays, on the other hand, is a tough task with a high degree of subjectivity. In this study, we employed chest X-ray pictures to develop a computer-aided specialized diagnostic system capable of identifying pneumonia. We constructed a Convolutional neural network model from scratch to extract features from a given chest Xray image and classify it to determine if a person is infected with pneumonia. This model could help mitigate the reliability and interpretability challenges often faced when dealing with medical image.

KEYWORDS: Pneumonia, Machine learning, medical imaging, Chest X-rays Deep learning, Convolutional neural networks (CNNs)Classification algorithms, Real-time detection.

I. INTRODUCTION

Pneumonia is an infection in one or each lung. Bacteria, viruses, and fungi cause it. The infection causes inflammation within the air sacs in your lungs, creating it troublesome to breathe. To diagnose pneumonia, a chest X-ray is used by the medical practitioners as the best imaging modality, and it can be managed effectively with medicines and proper treatment. the current system to detect pneumonia is not very précised, so we propose a system that will give more accuracy and the type of pneumonia. the medical field is predicted to be the most benefitted field, after finance from the new age concepts of artificial intelligence. we aim at applying these concepts to the field of medical science and make use of these concepts to unleash new horizons in medical diagnosis. we aim at processing x-ray images of chest to predict if the patient is diagnosed with pneumonia. we have a set of 5,863 x-ray images which will be used to predict if x-ray of chest is suffering from pneumonia or no. in summary of the system, the system consists of modules, were each module has smaller submodules that build-up to the whole system. the image processing component is for obtaining the data set and converting each image into a matrix of data using various algorithms. this is because machine learning algorithms can only accept numerical values. a component of this tabulated data will be used to train the machine learning algorithm. once the algorithm has been trained, the more a component of the data set will be used to test the algorithm and obtain the system's level of efficiency and accuracy. however, each component has more in-depth steps which will be explained in further.

II. LITERATURE SURVEY

1.PAPER NAME: PNEUMONIA DETECTION USING IMAGE PROCESSING AND DEEP LEARNING
Abstract: Pneumonia is the leading cause of death all around the world. On average, it kills 700,000 children per year on average and affects 7% of the world's population. This condition is diagnosed mainly using X-rays. We have devised a novel Image processing-based Deep Learning approach to detect Pneumonia using the concept of Transfer Learning and Image Augmentation. We were able to achieve a recall score of 97.44% and an accuracy of 96.00%.

2.Paper Name: A Combined Approach Using Image Processing and Deep Learning to Detect Pneumonia from Chest X-Ray Image.

Author. Mehedi Hasan, Mir Md. Jahangir Kabir, Md. Rakib Haque, Mohiuddin Ahmed

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Abstract: Pneumonia is an epidemic disease that is needed to be detected in the earl stage to prevent unfortunate deaths. Traditional methods take a lot of time to detect the disease. With the introduction of Medical Imaging, the detection of disease has been accelerated by using chest x-ray image. But it also requires the availability of an expert and experienced radiologist in order to interpret the x-ray image accurately. Sometimes, manual interpretation is affected by various kinds of artifact in X-ray or Optical Coherence Tomography (OCT) images. For this reason, in our paper, we have proposed a combined approach using Image Processing and either VGG-16 or VGG-19, variants of Deep Convolutional Neural Network for automatic detection of pneumonia from Chest X-ray image. We have used Mendeley OCT and Chest X-Ray dataset to evaluate our model. We have achieved an accuracy of 96.2% using VGG-16 and 95.9% using VGG-19, both of which outperform transfer learned InceptionV3 benchmark model used on this dataset which has an accuracy of 92.8%.

3.Paper Name: Detection of pneumonia infection
in lungs from chest X ray images using deep convolutional neural network and content-based image retrieval techniques

Author: T. Rajasenbagam1, S. Jeyanthi, J. Arun Pandian

Abstract: In this research, A Deep Convolutional Neural Network was proposed to detect Pneumonia infection in the lung using Chest X-ray images. The proposed Deep CNN models were trained with a Pneumonia Chest X-ray Dataset containing 12,000 images of infected and not infected chest X-ray images. The dataset was preprocessed and developed from the Chest X-ray8 dataset. The Content-based image retrieval technique was used to annotate the images in the dataset using Metadata and further contents. The data augmentation techniques were used to increase the number of images in each of class. The basic manipulation techniques and Deep Convolutional Generative Adversarial Network (DCGAN) were used to create the augmented images. The VGG19 network was used to develop the proposed Deep CNN model. The classification accuracy of the proposed Deep CNN model was 99.34 percent in the unseen chest X-ray images. The performance of the proposed deep CNN was compared with state-of-the-art transfer learning techniques Such as Alex Net, VGG16Net and Inception Net. The comparison results show that the classification performance of the proposed Deep CNN model was greater than the other techniques.
4.Paper Name: Pneumonia Detection on Chest X-ray Images Using Ensemble of Deep Convolutional Neural Networks.

Author: Alhassan Mabrouk, Rebeca P. Díaz Redondo, Abdelghani Dahou, Mohamed Abd Elaziz and Mohammed Kayed

Abstract: Pneumonia is a life-threatening lung infection resulting from several different viral infections. Identifying and treating pneumonia on chest X-ray images can be difficult due to its similarity to other pulmonary diseases. Thus, the existing methods for predicting pneumonia cannot attain substantial levels of accuracy. This paper presents a computer-aided classification of pneumonia, coined Ensemble Learning (EL), to simplify the diagnosis process on chest X-ray images. Our proposal is based on Convolutional Neural Network (CNN) models, which are pretrained CNN models that have been recently employed to enhance the performance of many medical tasks instead of training CNN models from scratch. We propose to use three well-known CNNs (DenseNet169, MobileNetV2, and Vision Transformer) pre trained using the Image Net database. These models are trained on the chest X-ray data set using fifine-tuning. Finally, the results are obtained by combining the extracted features from these three models during the experimental phase. The proposed EL approach outperforms other existing state-of-the-art methods and obtains an accuracy of 93.91% and a F1-score of 93.88% on the testing phase.

5.Paper Name: Detection of Pneumonia clouds in Chest X-ray using Image processing approach.

Author: Abhishek Sharma, Daniel Raju, Sutapa Ranjan

Abstract: Finding ways to automate diagnostics from medical images, has continuously been one of the most interesting areas of software development. This article presents a novel approach for detecting the presence of pneumonia clouds in chest X-rays (CXR) by using only Image processing techniques. For this, we have worked on 40 analog chest CXRs pertaining to Normal and Pneumonia infected patients. Indigenous algorithms have been developed for cropping and for extraction of the lung region from the images. To detect pneumonia clouds, we have used Otsu thresholding which will segregate the healthy part of lung from the pneumonia infected cloudy regions. We are proposing to compute the ratio of area of healthy lung region to total lung region to establish a result. The task has been performed using Python and OpenCV as they are free, open-source tools and can be used by all, without any legality issues or cost implication.

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III. METHODOLOGY

CNN models have been created from scratch and trained on Chest X-Ray Images (Pneumonia) dataset on Kaggle. Kera's neural network library with TensorFlow backend has been used to implement the models. Dataset consists of 5216 training images, 624 testing images and 16 validation images. Data augmentation has been applied to achieve better results from the dataset. The four models have been trained on the training dataset, each with different number of convolutional layers. Each model was trained for 20 epochs, with training and testing batch sizes of 64 and 1, respectively. The following sub-headings further explain the above stages in depth.

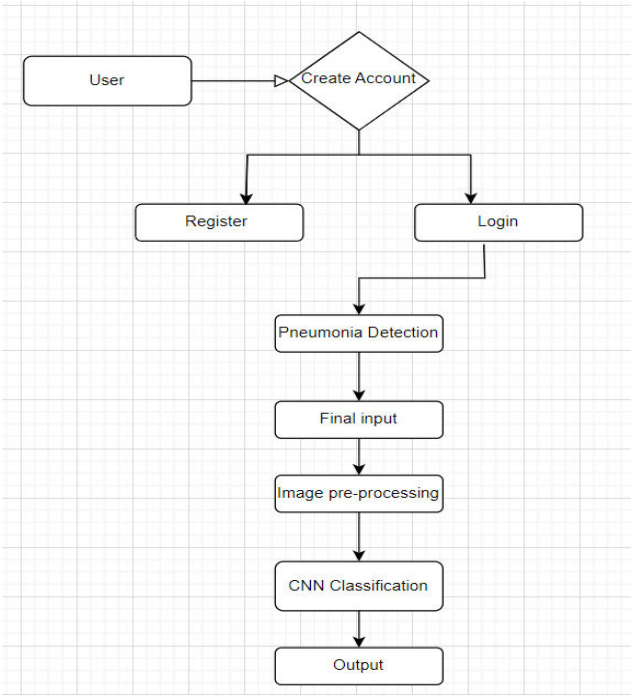

Fig 1: System Architecture

IV. IMPLEMENTATION

A dataset of chest X-ray images is required to train and test the machine learning model. The images in the dataset need to be preprocessed before they can be used to train the machine learning model. Preprocessing steps can include resizing, normalization, and augmentation. And dataset used an image is 5268.The machine learning model needs to extract features from the preprocessed images. Several approaches exist for feature extraction, including using handcrafted features and using convolutional neural networks (CNNs) to learn features automatically.

Step for Implementation:

Step 1: - Front End is designed with the help of python.

Step 2: - The Different options are displayed on website to pneumonia detection, Select image, image pre-processing.

Step 3: - For Select the image input first it converts image pre-processing and then provides it to the ML model for processing.

Step 4: - Step 6: And at last,the output is displayed on the output window in the webpage.

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OUTPUT:

Fig 1: Home page

Fig 2: Registration page

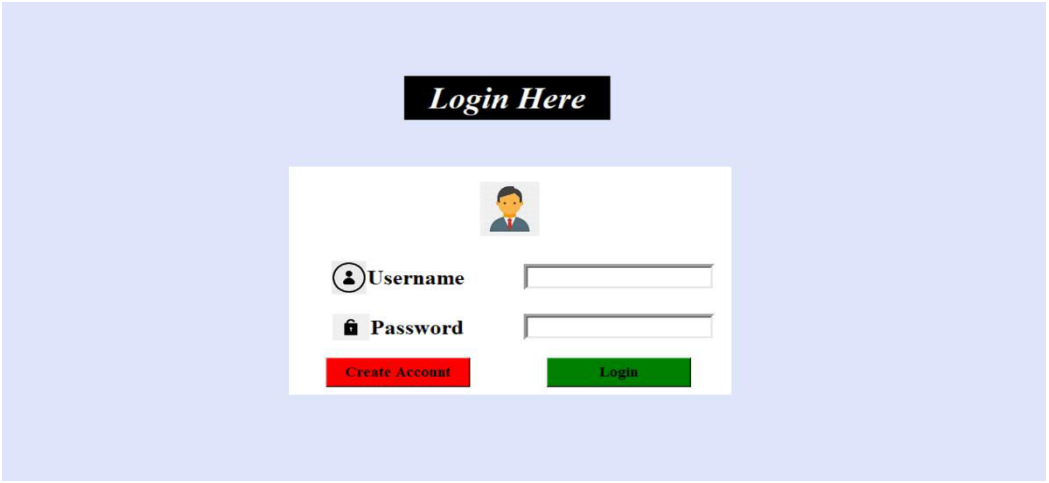

Fig 3: Login page

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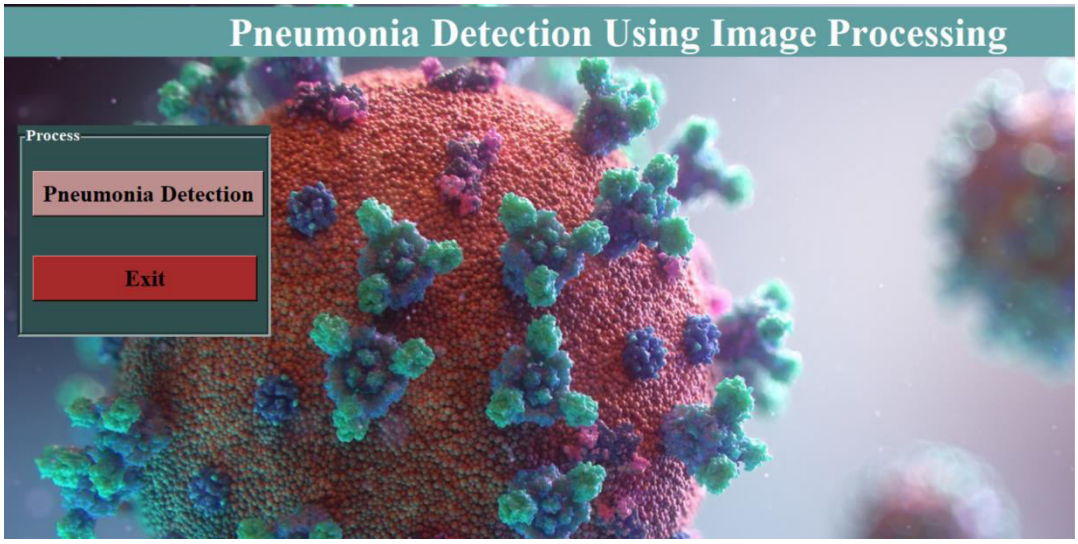

Fig 4: Detection page

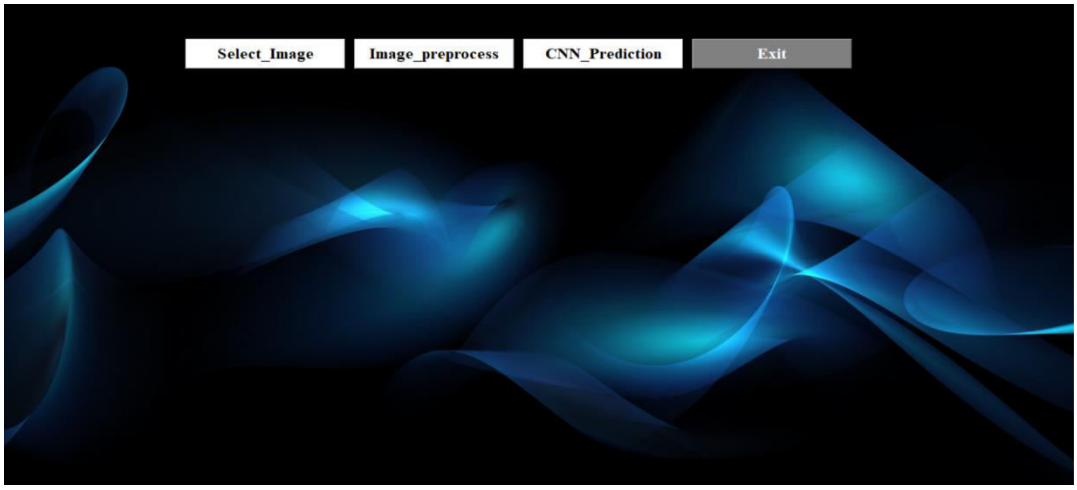

Fig 5: Select the image.

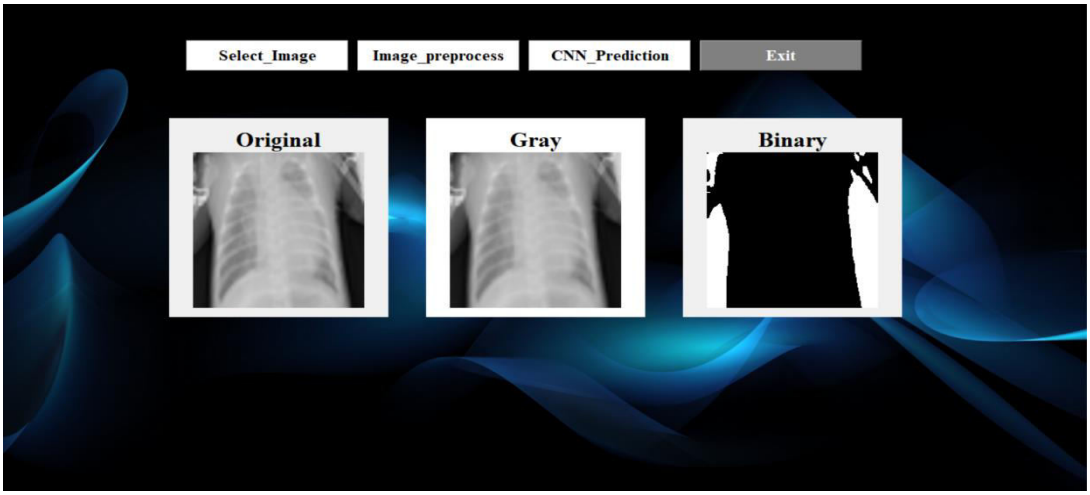

Fig 6: CNN Prediction

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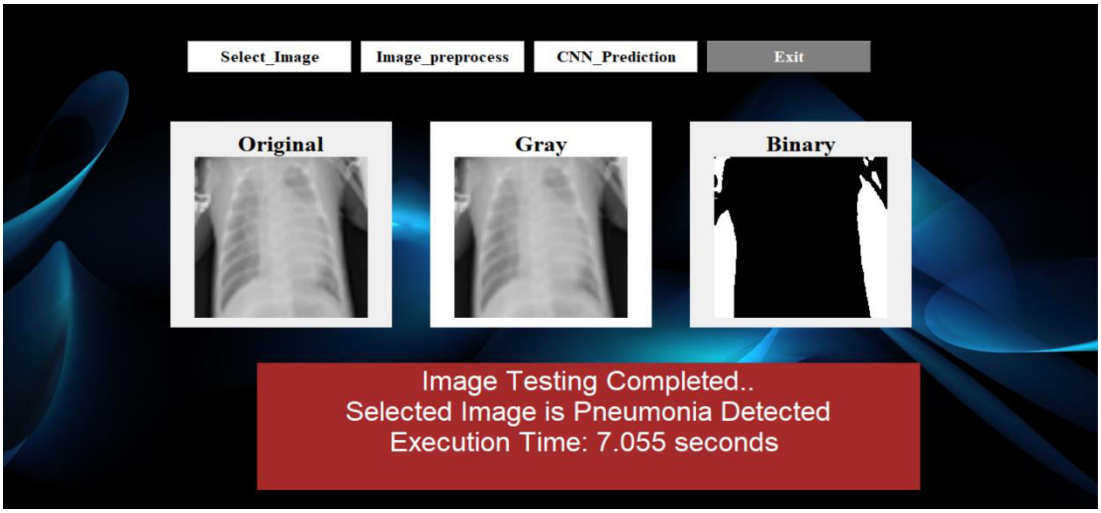

Fig 7: Output

V. CONCLUSION

increasing the accuracy and trustworthiness of machine learning models by including more data sources, like as patient histories or clinical notes. Enhancing the model's capability to identify between pneumonia and other respiratory disorders and better capture complex patterns in medical images by using deep learning algorithms, such as convolutional neural networks (CNNs).building algorithms that can quickly identify pneumonia, allowing for a more accurate and timely diagnosis and course of treatment. To boost the tool's versatility and value to healthcare professionals, models that can handle a variety of medical images, including CT scans and ultrasounds, are being developed. Healthcare practitioners would feel more confident in the results if machine learning models were made easier to understand and interpret.

REFERENCES

[1] Gaurav Labhane, Rutuja Pansare, Saumil Maheshwari, Anupam Shukla,Ritu Tiwari" Detection of Pediatric Pneumonia from Chest X-Ray Images using CNN and Transfer Learning" IEEE 2020

[2] Tatiana Gabruseva, Dmytro Polanski, Alexandra Kalinin" Deep Learning for Automatic Pneumonia Detection" IEEE 2020

[3] V. Shirish Kaushik, Anand Nayyar, Gaurav Kataria and Rachna Jain "Pneumonia Detection Using Convolutional Neural Networks (CNNs)" ResearchGate 2020

[4] Sheikh Rafiul Islam, Santi P. Maity, Ajay Kumar Ray and Mrinal Mandal "Automatic Detection of Pneumonia on Compressed Sensing Images using Deep Learning" IEEE(CCECE) 2019

[5] Zebinjiang "Chest Xray pneumonia detection based on convolutional neuralnetwork" (ICBAIE) 2019

[6] Arthur, F., Hossein, K.R.: Deep learning in medical image analysis: a third eye for doctors. J. Stomatology Oral Maxillofacial. Surg. Rubin, J., Sanghvi, D., Zhao, C., Lee, K., Qadir, A., Xu-Wilson, M.: Large Scale Automated Reading of Frontal and Lateral Chest X-Rays Using Dual Convolutional Neural Networks (2018). arXiv preprint arXiv:1804.07839

[7]. Lakhani, P., Sundaram, B.: Deep learning at chest radiography: automated classification of pulmonary tuberculosis by using convolutional neural networks. Radiology 284(2), 574–582 (2017)

[8]. Guan, Q., Huang, Y., Zhong, Z., Zheng, Z., Zheng, L., Yang, Y.: Diagnose Like a Radiologist: Attention Guided Convolutional Neural Network for Thorax Disease Classification (2018). *arXiv preprint* arXiv:1801.09927

[9]. Rajpurkar, P., Irvin, J., Zhu, K., Yang, B., Mehta, H., Duan, T., Ding, D., Bagul, A., Langlotz, C., Shpanskaya, K., Lungren.: Chexnet: Radiologist-Level Pneumonia Detection on Chest X-rays with Deep Learning (2017). axis preprint arXiv:1711.05225

[10] Krizhevsky, A., Sutskever, I., Hinton, G.E: ImageNet classification with deep convolutional.

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