Pneumonia diagnosis system

Artificial Intelligence Departement

Sherif Ashraf Ahmed Roshdy , Yahia Zakaria Ibrahim , Sobeh Salah Sobeh , Mohamed Hosny Mosad , Abdelrahman Mohamed Khalil , Abdelkhalek Ashraf Shams , Aya Adel Mohamed , Abdalla Wahuman

Dr/Ibrahim Zaghloul

Faculty of Computers & Artificial Intelligence

Benha University

Abstract

Pneumonia is a common disease which occurs in the lungs caused by a bacterial infection.

Early diagnosis is an important factor in terms of the successful treatment process.

In recent years, artificial intelligence (AI) and deep learning techniques have shown great promise in accurately diagnosing and classifying different types of pneumonia.

In this project, we propose a medical diagnosis system that utilizes deep learning algorithms to classify whether or not a patient has pneumonia and identify the type of pneumonia. It will use a state-of-the-art deep learning algorithms to analyze chest X-ray images and extract relevant features for accurate classification.

The system will be trained on a large dataset of chest X-ray images that have been labeled by experts. The dataset will include a diverse range of X-ray images (normal, pneumonia, and COVID-19).

The system will be designed to be accessible through a website that can be utilized by both doctors and patients. The website we propose will have a simple user interface that is easy to navigate, providing an excellent user experience.

Objective

The objective of Covid-19 and Pneumonia diagnosis using chest X-rays based on deep learning is to develop a fast and accurate method for detecting these diseases from radiographic images. Chest X-ray is a widely available and low-cost imaging modality that can provide useful information about the condition of the lungs and the respiratory system. However, interpreting chest X-ray images requires expert knowledge and experience, and can be challenging due to the variability and complexity of the images. Deep learning is a branch of artificial intelligence that can learn from enormous amounts of data and perform complex tasks such as image recognition and classification. By applying deep learning techniques to chest X-ray images, the objective is to create a system that can automatically identify the presence and severity of Covid-19 and Pneumonia and assist medical professionals in making diagnosis and treatment decisions.

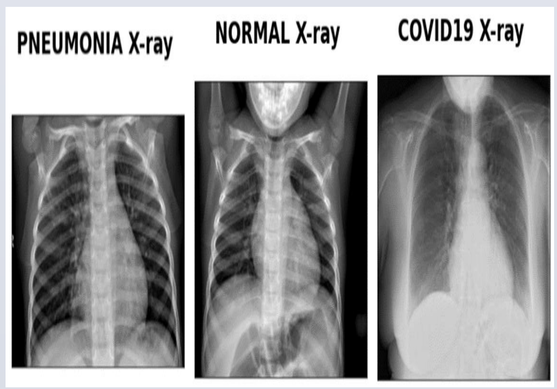
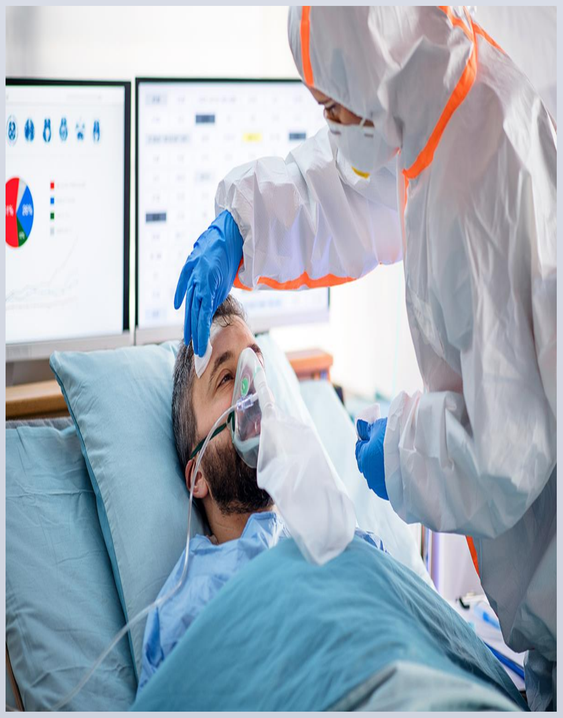


Figure 1:Samples of Chest X-ray Images in dataset



Methods

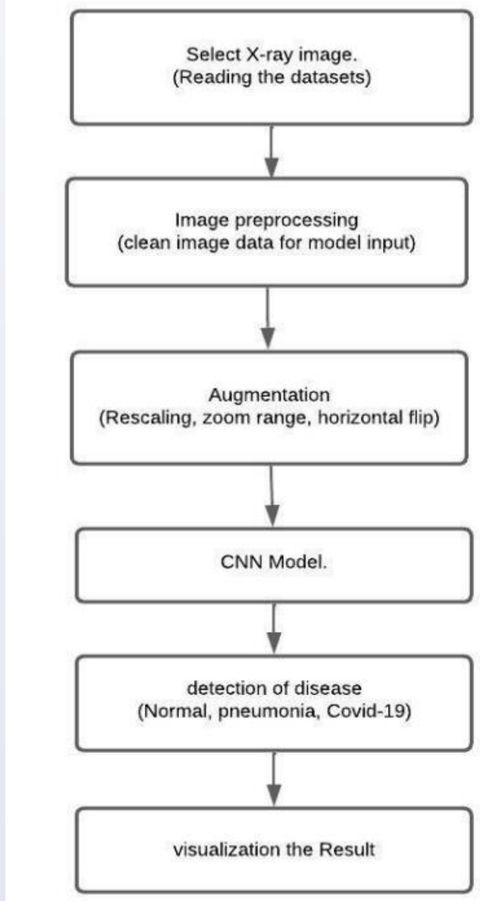


Figure 2:Block Diagram of the System

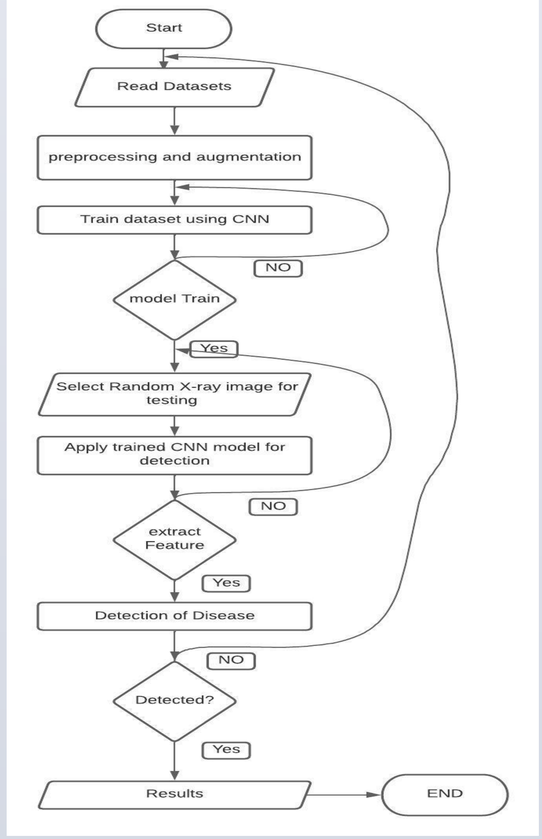
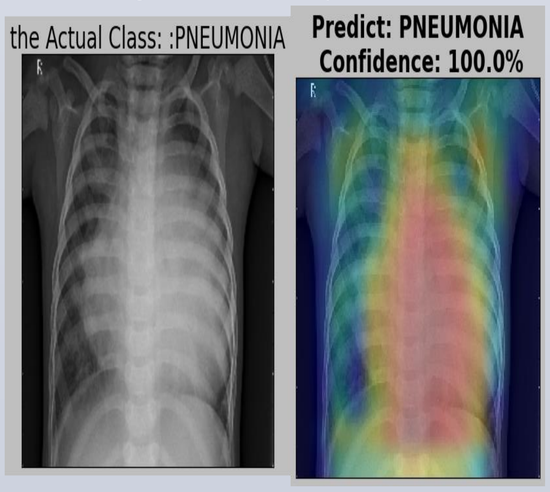


Figure 6:Flowchart of the System

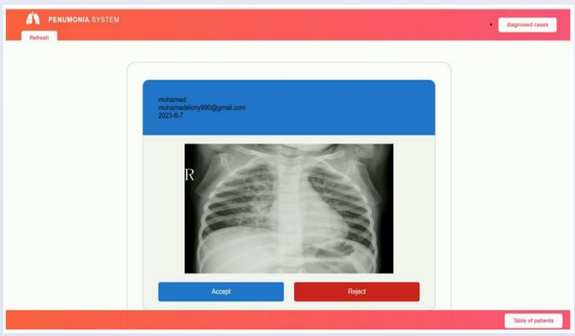


Results

On this page, you can upload your X-ray image to the system to be examined by pressing the select image button, and then a window will appear for you to go to your X-ray path on your device and select it, and then press the send image button to send the image to be examined and about it, a message will appear with details The date of sending your photo and the date of the examination, and that you will be contacted via e-mail to receive the results of the examination.

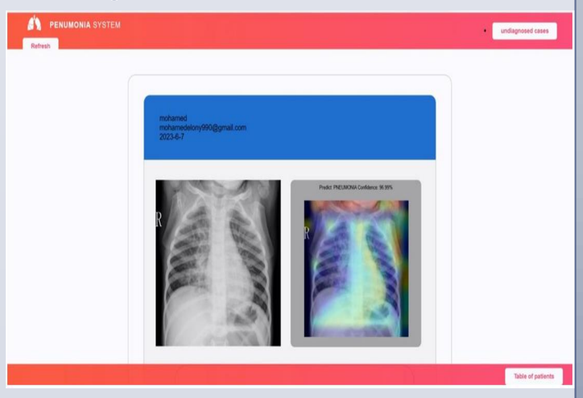
Upload Page

On this page, the controller is the admin, and this page can be called the undiagnosed cases page, because when the x-rays are uploaded, they go to this page for the admin to determine whether the x-rays are scannable, and therefore the x-rays are accepted, but if they are not scanned, the x-rays are rejected. In each x-ray on the system, the patient's name, his e-mail, and the date the x-rays were sent to the system will be indicated on the x-ray frame.



Admin Page

On this page, the x-rays that have been examined are saved to be sent to the patient's e-mail, and the e-mail, the patient's name, and the date of the examination are indicated on the x-ray frame. This page is also called Diagnosed Cases and they are arranged in order of screening.



Diagnosed Cases Page

Summary	
Model	Accuracy
CNN1 hidden layer	96%
CNN2 hidden layer	95%
CNN1 with k fold	96%
CNN2 with k fold	95.7%
VGG19	94.9%
VGG19 with k fold	92.97%
MobileNetV2	97.3%
MobileNetV2 with k fold	92.73%
ReseNet152V2	95.1%
ReseNet152V2 with k fold	95.8%
DenseNet201	95.4%

Conclusion

Pneumonia is a contagious illness that has plagued mankind for millennia. Despite substantial technological advancements, pneumonia remains one of the top ten causes of mortality worldwide. To treat pneumonia, it is vital to act quickly and accurately.

One of the cheapest and most regularly used diagnostic tools for detecting pneumonia and other lung problems is a chest X-ray. We have proposed a novel tool that can assist enhance the diagnosis accuracy of pulmonary problems from chest radiographs thanks to startling breakthroughs in modern deep-learning algorithms.

We used the most prevalent deep learning method known as a convolutional neural network to implement computer-aided diagnostics of pneumonia throughout this study (CNN).

References

1- G. d. Melo, S. O. Macedo, S. L. Vieira and L. G. Leandro Oliveira, "Classification of images and enhancement of performance using parallel algorithm to detection of pneumonia," 2018 IEEE International Conference on Automation/XXIII Congress of the Chilean Association of Automatic Control (ICA-ACCA), 2018, pp. 1-5

2- S. Mahajan, U. Shah, R. Tambe, M. Agrawal and B. Garware, "Towards Evaluating Performance of Domain Specific Transfer Learning for Pneumonia Detection from X-Ray Images," 2019 IEEE 5th International Conference for Convergence in Technology (I2CT), 2019, pp. 1-6

3- M. Aledhari, S. Joji, M. Hefeida and F. Saeed, "Optimized CNN-based Diagnosis System to Detect the Pneumonia from Chest Radiographs," 2019 IEEE International Conference on Bioinformatics and Biomedicine (BIBM), 2019, pp. 2405-2412

4- D. Varshni, K. Thakral, L. Agarwal, R. Nijhawan, and A. Mittal, "Pneumonia Detection Using CNN-based Feature Extraction," 2019 IEEE International Conference on Electrical, Computer and Communication Technologies (ICECCT), 2019, pp. 1-7

5- A. Tilve, S. Nayak, S. Vernekar, D. Turi, P. R. Shetgaonkar and S. Aswale, "Pneumonia Detection Using Deep Learning Approaches," 2020 International Conference on Emerging Trends in Information Technology and Engineering (ic-ETITE), 2020, pp. 1-8

6- A. Pant, A. Jain, K. C. Nayak, D. Gandhi and B. G. Prasad, "Pneumonia Detection: An Efficient Approach Using Deep Learning," 2020 11th International Conference on Computing, Communication and Networking Technologies (ICCCNT), 2020, pp. 1-6

7- S. Singh, "Pneumonia Detection using Deep Learning," 2021 4th Biennial International Conference on Nascent Technologies in Engineering (ICNTE), 2021, pp. 1-6

8- Datasets: https://www.kaggle.com/datasets/prashant268/chest-xray-covid19-pneumonia

Acknoledgements

We want to thank all those who helped us with their knowledge and experience. We will always appreciate their efforts.

we want also to acknowledge all the support we have received from our faculty "Faculty of Computers & Artificial Intelligence" while working on this project.

Also, We Would Like To Thank Benha University For Supporting Us.

Project Team