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PNEUMONIA DETECTION USING CNN FROM CHEST X RAYS

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Abstract

Pneumonia is a respiratory infection caused by bacteria or viruses that affects many people, particularly in developing and impoverished countries with high levels of pollution, unsanitary living conditions, and overcrowding, as well as inadequate medical infrastructure. Pneumonia produces pleural effusion, a disease in which fluids fill the lung and cause difficulties breathing. Early detection of pneumonia is critical for curative therapy and increasing survival rates. The most often used approach for detecting pneumonia is chest X-ray imaging. However, examining chest X-rays is a difficult task that is vulnerable to subjective variability. We created a computer-aided diagnosis system for automatic pneumonia detection utilizing chest X-ray pictures in this study. To deal with the lack of accessible data, we used deep transfer learning and created a Convolutional Neural Network (CNN) model together with the four transfer learning methods: CovXNet, RNN, and VGG16. Whereas in the existing methods, ResNet 50 is employed, which does not have the required accuracy and might be improved. As a result, the current strategy, along with other transfer learning methods, is offered. The proposed method was tested using a public ally available pneumonia X-ray dataset.

learning, image processing, CNN, VGG-16, and squeeze net are some of the related terms.

Keywords: Pneumonia, Chest X-ray images. Deep Learning, CNN, CovXNet, RNN, VGG16.

1. INTRODUCTION

1.1 Introduction

Pneumonia is a lung inflammatory disease that mostly affects the small air sacs known as alveoli. Typical symptoms include a productive or dry cough, chest pain, fever, and difficulty breathing. The degree of severity of the illness varies. Infection with viruses or bacteria, and less commonly with other microbes, causes pneumonia. Identifying the pathogen responsible can be tricky. Symptoms and physical examination are frequently used to make a diagnosis. Chest X-rays, blood tests, and sputum culture may be used to confirm the diagnosis. The condition can be defined based on where it was obtained, such as community- or hospital-acquired pneumonia, or pneumonia connected with healthcare. A history of smoking, a poor ability to cough (such as following a stroke), and a weak immune system. There are vaccines available to prevent specific types of pneumonia (such as those caused by Streptococcus pneumonia bacterium, which is connected to influenza) or COVID-19. Other preventive measures include hand washing to avoid infection, not smoking, and social isolation. Treatment is determined by the underlying cause. Antibiotics are used to treat pneumonia caused by bacteria. If the pneumonia is severe, the patient is usually hospitalized. If oxygen levels are low, oxygen therapy may be employed. Each year, pneumonia affects approximately 450 million people worldwide (7% of the population) and kills

approximately 4 million people. Survival has considerably improved since the introduction of antibiotics and vaccines in the twentieth century. Nonetheless, pneumonia continues to be a primary cause of death in underdeveloped nations, as well as among the very old, very young, and chronically unwell. Pneumonia is known as "the old man's friend" because it often shortens the length of suffering for individuals who are already near death. Cystic fibrosis, chronic obstructive pulmonary disease (COPD), sickle cell disease, asthma, diabetes, and heart failure are all risk factors for pneumonia.

2. Literature Survey

• **[1] Lal S., Rehman S., Shah J., Meraj T., Rauf H., and Damasˇevičius R:**, Because artificial intelligence (AI) and deep learning (DL) approaches are rapidly expanding, the security and resilience of the deployed algorithms must be ensured. The DL algorithms' vulnerability to adversarial cases has been extensively established. The artificially generated examples will result in many cases that are negatively detected by the DL models but are considered benign by humans. Their characteristics are demonstrated by practical application in genuine physical circumstances with antagonistic dangers. Thus, adversarial attacks and defense, including machine learning and its reliability, have piqued the interest of researchers in recent years. In this section, we offer a system that provides a defensive model against the adversarial speckle-noise attack, adversarial training, and a feature fusion technique that retains classification. And a feature fusion technique that maintains categorization with correct labeling. We assess and analyze adversarial attacks and defenses on retinal fundus images for the Diabetic Retinopathy detection problem, which is regarded as cutting-edge research. Summary: This paper introduces a system that provides a defensive model against an adversarial speckle-noise assault, an adversarial training method, and a feature fusion strategy that preserves classification with proper labeling. We assess and analyze adversarial attacks and defenses on retinal fundus images for the Diabetic Retinopathy detection problem, which is regarded as cutting-edge research.

[2] Rauf H., Lali M., Khan M., Kadry S., Alolaiyan H., Razaq A: The newly discovered human coronavirus illness COVID-19 is the sixth known pandemic following the 1918 flu pandemic. COVID-19 was discovered in Wuhan, China, and quickly spread throughout the world. Almost every country on the planet is facing this natural disaster. We offer forecasting models for the COVID-19 outbreak in Asia Pacific countries, focusing on Pakistan, Afghanistan, India, and Bangladesh. To quantify the severity of the pandemic in the near future, the newest deep learning techniques like as Long Short-Term Memory networks (LSTM), Recurrent Neural Networks (RNN), and Gated Recurrent Units (GRU) are used. When using neural networks, we take into account the time variable and data non-linearity. The key aspects of each model have been analyzed in order to forecast the number of COVID-19 cases in the coming year. 10 days. The predicting performance of the used deep learning models presented up to July 1, 2020, is more than 90% correct, demonstrating the study's dependability. In this study, the most recent deep learning techniques, such as Long Short-Term Memory networks (LSTM), Recurrent Neural Networks (RNN), and Gated Recurrent Units (GRU), are used to estimate the severity of a pandemic soon. When using neural networks, we consider the time variable and data non-linearity. The key aspects of each model have been analyzed in order to forecast the number of COVID-19 cases in the next 10 days. The predicting performance of the used deep learning models presented up to July 1, 2020, is more than 90% correct, demonstrating the study's dependability.

3. OVERVIEW OF THESYSTEM

3.1 Existing System

This model focuses an existing method that is created utilizing some deep learning methods. The technique is carried out here utilizing the ResNet50, which is a transfer learning method, however it does not achieve great accuracy.

3.1.1 Disadvantages of Existing System

- Less feature compatibility
- Low accuracy.

3.2 Proposed System

In our suggested method, we use Convolution Neural Network (CNN) deep learning coupled with CNN transfer learning methods VGG16, CovXNet, and RNN to determine whether a person is sick with pneumonia or not. Pneumonia produces pleural effusion, which is a disease in which fluids fill the lung and cause respiratory problems. Early detection of pneumonia is critical for curative therapy and increasing survival rates. As a result, appropriate classification is essential for the proper therapy that will be feasible with our

proposed strategy. The proposed method's block diagram is illustrated below.

3.3 Methodology

In this project work, I used five modules and each module has own functions, such as:

1. System Module
2. User Module

3.3.1 Dataset Collection:

The dataset containing images of the chest X-ray images with the pneumonia affected and without pneumonia i.e., normal are to be classified is split into training and testing dataset with the test size of 30-20%.

3.3.2 Preprocessing:

Resizing and reshaping the images into appropriate format to train our model.

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3.3.3 *Training:*

Use the pre-processed training dataset is used to train our model using CNN algorithm along with some of the transfer learning methods..

3.3.4 Classification

The results of our model is display of X-ray images are either with pneumonia or normal..

3.3.5 User Module

Upload Image

The user must upload an image which needs to be classified.

View Results

The classified image results are viewed by user.

+

4 Architecture

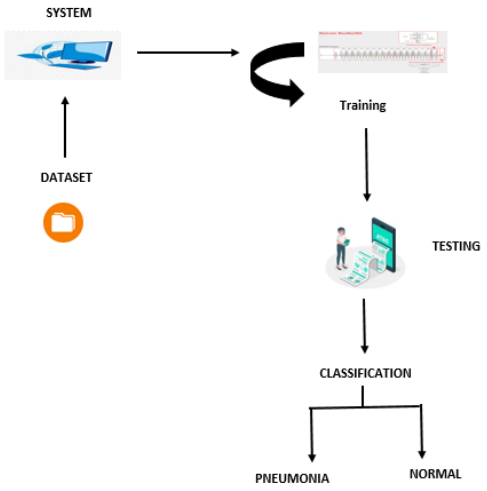

Fig 1: Frame work of proposed method

Above architecture diagram shows three stages of data flow form one module to another module. Data collection, preprocessing, and algorithm training.

5 RESULTS SCREEN SHOTS

Home Page:

Upload image:

Choose options:

Predict Result:

7. CONCLUSION

✓ Using deep learning, we correctly identified the photos of a person's chest X-ray images as either pneumonia or normal in this study. We used a dataset of chest X-ray pictures of two types (pneumonia afflicted and normal) and trained it using CNN as well as some transfer learning methods. Following the training, we tested the system by uploading a picture and classifying it.

Future Enhancement

- ✓ This can be used in the future to readily define the sorts of different infections, making it easier to identify infections in their early stages and cure them.

8. References

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ig5: Classified output

Fig1: Home

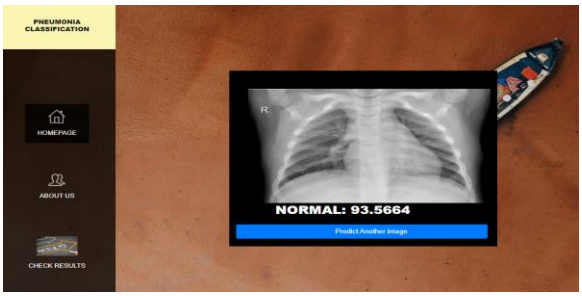


Fig6: Classified output

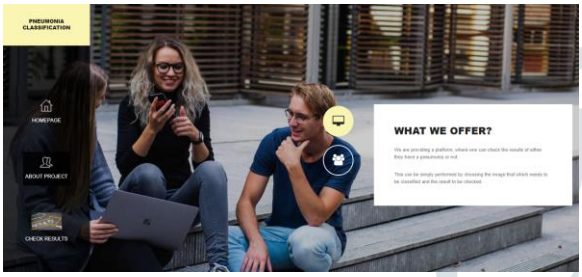
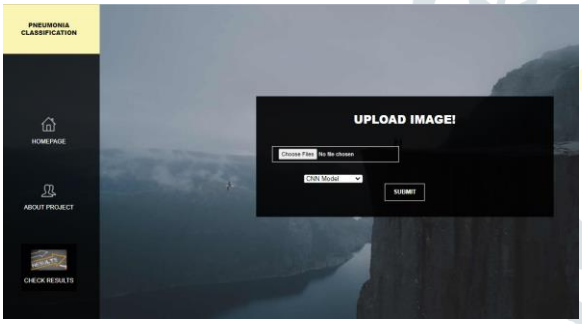


Fig2: About Project



ig3: Image Uploading

Fig4: Model choosing