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DETECTION OF PNEUMONIA FROM X-RAY IMAGES USING DEEP LEARNING

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Abstract (10): Technology is being advanced day by day. As we are tech enthusiasts, we are always keen to learn the updated once. Technology is used to solve many problems in modern world, and introducing new features into the world. Many remote areas are lack at hospitals, as doctors always have minute to minute cases. As doctors are busy at their cases, they are unable to attend or visit the remote areas where there is lack of transportation too. Due to these problems, people from remote areas are suffering from diseases which are known and unknown. This might also spread the unknown diseases to animals and plants too. Our project "Health Analyzer", predicts the disease from input symptoms said by the patient, predicts the disease with prescribed medicines.

We designed this for remote areas, where people unable to visit hospitals in the city and due to lack of transportation too. So, we help them in detecting the disease and prevent it from early stage.

Keywords: Pneumonia , Chest X-ray Images , Covolutional Neural Network

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1.INTRODUCTION

Pneumonia is an infection that inflames the air sacs in one or both lungs. The air sacs may fill with fluid or pus (purulent material), causing cough with phlegm or pus, fever, chills, and difficulty breathing. A variety of organisms, including bacteria, viruses and fungi, can cause pneumonia. Pneumonia can range in seriousness from mild to life-threatening. It is most serious for infants and young children, people older than age 65, and people with health problems or weakened immune systems. Chest X-ray, blood tests, and culture of the sputum may help confirm the diagnosis. The disease may be classified by where it was acquired, such as community- or hospital-acquired or healthcare-associated pneumonia.

The Worla Health Organization estimates that over 4 million premature deaths occur annually from household air pollution-related diseases including pneumonia. Over 150 million people get infected with pneumonia on an annual basis especially children under 5 years old.

The disease can be caused by bacteria, viruses, or fungi. Bacterial pneumonia is common type mostly in adults. The disease Pneumonia causes inflammation in the air sacs in your lungs, which are called alveoli. The alveoli filled with fluid will lead to difficulty breathing. The Symptoms of pneumonia will be like a cough with phlegm or pus , chills, fever, and difficult breathing. Detecting pneumonia is a tedious task, it is possible only for expert radiologists. So, we are building this for automatically detect pneumonia at a level exceeding practicing radiologists. It makes easy for every radiologis t so that the prediction is mad e easy and therefore could reduce the mortality rate due to pneumonia. To predict pneumonia from chest X-ra y first the input is taken from the directory where the image is stored and then the deep learning steps are followed and then data is fitted into the model and from the predictions the output is generated. Convolution Neural Networks is used to get more accuracy and get results fast.

2. DESIGN

Systems design is the method by which the architecture, elements, modules, interfaces and information of a system are defined to meet specific requirements. It could be viewed as applying the system theory to product development. Object-oriented evaluation and design methods become the most widely used computer system design techniques. The project contains following modules:

GATHERING DATASET: Dataset is the heart of this project. We gathered dataset from the website called Kaggle.com in which there will be already existing pneumonia x-ray of the patients. By using those v we predict the PNEUMONIA.

DATA PREPROCESSING**:** Rescaling of an image is done by the dividing image by 255.Images are re-sized to 128 by 128 pixels. Rotation of images performed by 20 degrees horizontal rotation. Width and Height shifted by 0.2 fractions of the total width and with the input flipped horizontally

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DATA AUGMENTATION:In order to avoid overfitting problem, we need to expand artificially our dataset. We can make your existing dataset even larger. The idea is to alter the training data with small transformations to reproduce the variations. Approaches that alter the training data in ways that change the array representation while keeping the label the same are known as data augmentation techniques

PREDICTING THE PNEUMONIA: When user enters the values of their health information, the values are compared with the existing dataset. When compared we can finally get the prediction whether it is positive (0) or negative(1)

ALGORITHM PROPOSED:

A convolution extracts tiles of the input feature map, and applies filters to them to compute new features, producing an output feature map, or convolved feature (which may have a different size and depth than the input feature map). Convolutions are defined by two parameters:

Size of the tiles that are extracted (typically 3x3 or 5x5 pixels).

The depth of the output feature map, which corresponds to the number of filters that are applied

3.. MECHANISM

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4. FEASIBILITY ANALYSIS

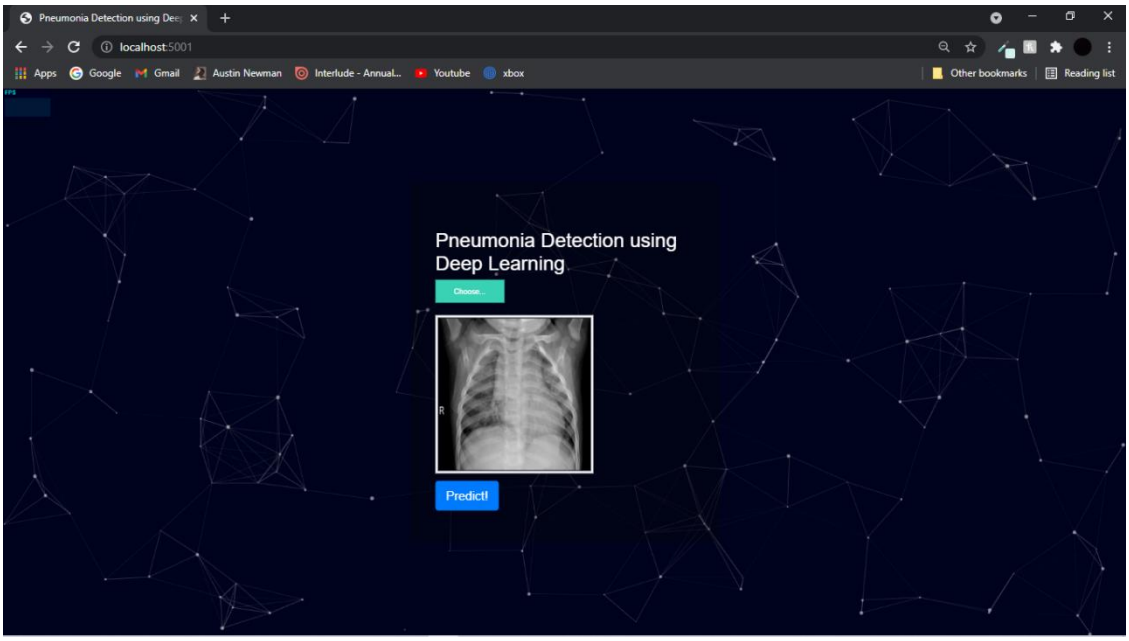
An important outcome of preliminary investigation is the determination that the system request is feasible. This is possible only if it is feasible within limited resource and time. The different feasibilities that have to be analyzed are

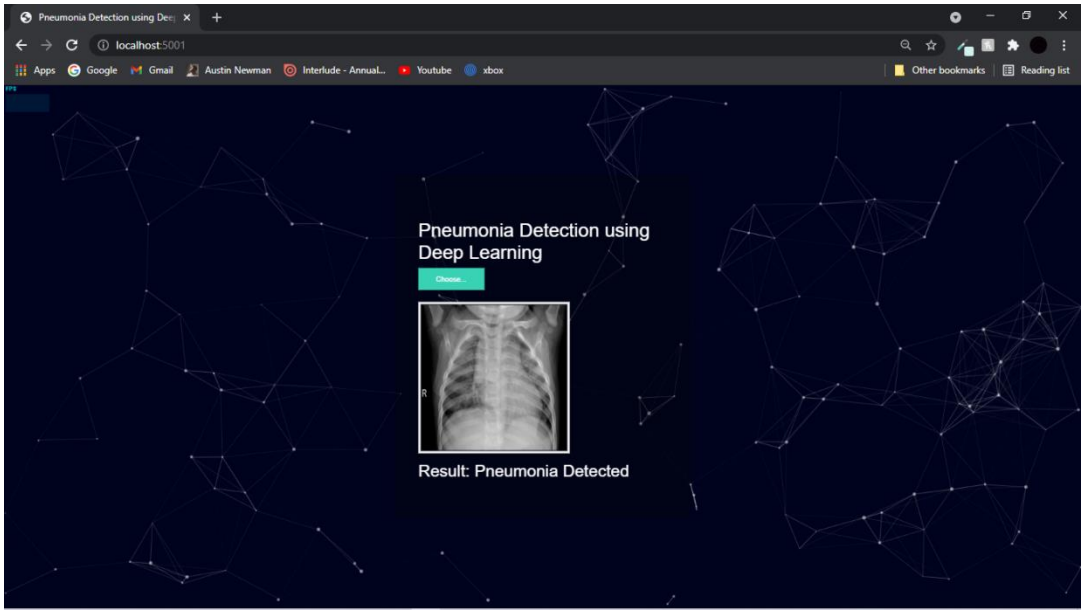
OPERATIONAL FEASIBILITY Operational Feasibility deals with the study of prospects of the system to be developed. This system operationally eliminates the manpower and effectively tracking the project progress. This kind of automation will surely reduce the time and energy, which previously consumed in manual work. Based on the study, the system is proved to be operationally feasible.

ECONOMIC FEASIBILITY Economic Feasibility or Cost-benefit is an assessment of the economic justification for a computerbased project. As hardware was installed from the beginning & for lots of purposes thus the cost on project of hardware is low. Since the system is an ML based .so the project is economically feasible.

TECHNICAL FEASIBILITY Technical Feasibility is the assessment of the technical resources of the organization. The organization needs MIT App inventor online tool which consist languages of blocks code. The technical feasibility has been carried out. The system is technically feasible for development and can be developed with the existing facility.

5. RESULT





6. CONCLUSION

The validation accuracy, recall and F1 score of CNN classifier model 3 with three convolutional layers are 92.31%,98% and 94%, respectively, which are quite high compared to other models that were trained. CNN classifier model 4 with four convolutional layers also comes very close in performance with 91.67% validation accuracy, 98% recall and 94% F1 score. Both of these models have the same recall and F1 scores. The paper by Chakraborty achieved the overall accuracy of 95.62% and recall of 95% trained on the same dataset. The paper by Liang achieved recall of 96.7% on the same dataset. The models presented by us at best could achieve 92.31% accuracy which is lower, but 98% recall has been achieved. High recall values will ensure that the number of false-negative instances is lower, hence lowers the risk to the patient's life. Thus, it is concluded that CNN classifier model 3 and model 4 can, therefore, be effectively used by medical officers for diagnostic purposes for early detection of pneumonia in children as well as adults. A large number of X-ray images can be processed very quickly to provide highly precise diagnostic results, thus helping healthcare systems provide efficient patient care services and reduce mortality rates. These convolutional neural networks' models were successfully achieved by employing various methods of parameter tuning like adding dropout, changing learning rates, changing the batch size, number of epochs, adding more complex fully connected layers and changing various stochastic gradient optimizers

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