Chest X-ray data for binary classification using CNNs.

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Abstract:
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.The author have applied convolution neural network approach and achieved the accuracy of 88 %on trainig datasets whereas transfer learning(Inception V3) approach acheived an accuracy of 97% comprised of approximately 5300 images.

Keywords: Deep Learning, Convolutional Neural Network, Pneumonia.

Introduction:-

Pneumonia is an infection that inflames the air sacs in one or both lungs.The signs and symptoms of pneumonia vary from mild to severe, depending on factors such as the type of germ causing the infection, and your age and overall health. Mild signs and symptoms often are similar to those of a cold or flu, but they last longer.Newborns and infants may not show any sign of the infection. Or they may vomit, have a fever and cough, appear restless or tired and without energy, or have difficulty breathing and eating.Many germs can cause pneumonia. The most common are bacteria and viruses in the air we breathe. Your body usually prevents these germs from infecting your lungs. But sometimes these germs can overpower your immune system, even if your health is generally good.

Pneumonia can affect anyone. But the two age groups at highest risk are:

- Children who are 2 years old or younger
- People who are age 65 or older

To help prevent pneumonia:

- **Get vaccinated.** Vaccines are available to prevent some types of pneumonia and the flu. Talk with your doctor about getting these

shots. The vaccination guidelines have changed over time so make sure to review your vaccination status with your doctor even if you recall previously receiving a pneumonia vaccine.

- **Make sure kid get vaccinated.** Doctors advocate a different pneumonia vaccine for teenager younger than age 2 and for children ages 2 to 5 years who are at particular risk of pneumococcal disease. Children who attend a group child care center should also get the vaccine. Doctors also recommend flu shots for children older than 6 months.
- **Practice good hygiene.** To protect yourself against respiratory infections that sometimes lead to pneumonia, wash your hands regularly or use an alcohol-based hand sanitizer.
- **Don't smoke.** Smoking damages your lungs' natural defenses against respiratory infections.
- **Keep your immune system strong.** Get enough sleep, exercise regularly and eat a healthy diet.

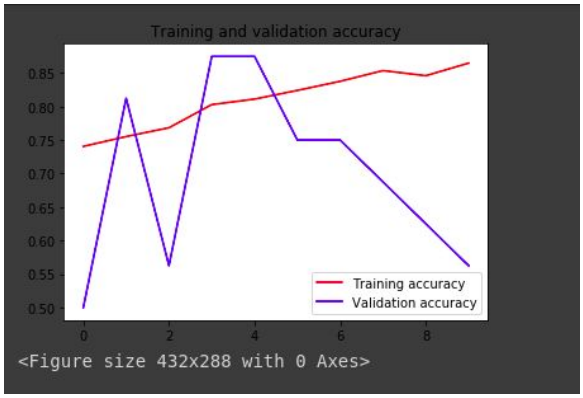
2. APPROACH AND IMPLEMENTATION

This paper uses Python 3,Keras and TensorFlow in the backend to write the program for implementing the proposed approach.TensorFlow is an open source framework created by Google for performing deep learning and the weights of INCEPTION V3 was download and used . The authors have trained the computer to recognize images and classify them into one category.The authors have used dropouts to reduce overfitting and data augmentation technique to make up for any datasets which is not present.

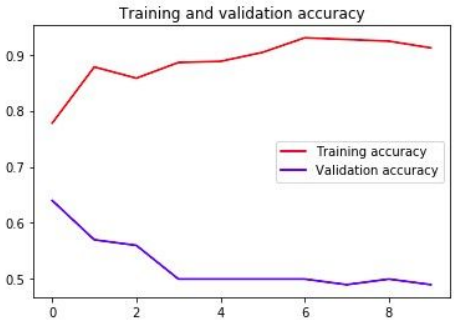
1. Image of dataset

3. RESULTS:-

The experiment was carried out on a well-conditioned dataset for validation and test for any immanent bias in the datasets.



2. image of neural network



3.Image of visualization of Transfer learning

4. CONCLUSION

To conclude ,accuracy of 88% was acheived on fairly large datasets but presence of less validation data the accuracy of validation data sets was not so good.the accuracy on test datasets however was very good on 600 images datasets the highest accuracy acheived for NORMAL ches xray was 80% and for pneumonia was 92% .whereas fro transfer learning approach the accuracy was highly increase with train accuracy of 97% and test accuracy of 95% .so it can be concluded that transfer learning approach was much better than simple CNNs.

5. References

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