JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

A CNN Deep Learning Technique for Prediction of Lung Cancer Diseases

Prof. Priyanka Soni
Assistant Professor
Department of Computer Science and Information Technology
Sagar Institute of Research & Technology, Bhopal, India

Abstract : Timely diagnosis and determination to the type of lung cancer diseases has important clinical significance. Generally, it requires multiple imaging methods to complement each other to obtain a comprehensive diagnosis. Various learning methods, such as conventional clustering and classification, have been applied in diagnosing diseases to categorize samples based on their features. Artificial intelligence based machine learning techniques provides accurate prediction model of the various biomedical diseases. This paper presents CNN deep learning technique for prediction of lung cancer diseases.

IndexTerms **– Machine, Features, Lung, Classification, Diagnosis, CNN, Deep Learning.**

I. INTRODUCTION

Lung diseases identification based on analysis and processing of medical images is important to assist medical doctors during the diagnosis process. In this context, this work proposes a new feature extraction method based on human tissue density patterns, namely Analysis of Human Tissue Densities in Lung Diseases [1]. To counter the outbreak of corona, the accurate diagnosis of suspected cases plays a crucial role in timely quarantine, medical treatment, and preventing the spread of the pandemic. Considering the limited training cases and resources (e.g, time and budget), we propose a Multi-task Multi-slice Deep Learning System (M^3 Lung-Sys) for multi-class lung pneumonia screening from CT imaging, which only consists of two 2D CNN networks, i.e., slice- and patient-level classification networks. The former aims to seek the feature representations from abundant CT slices instead of limited CT volumes, and for the overall pneumonia screening, the latter one could recover the temporal information by feature refinement and aggregation between different slices [2].

Automatic screening and diagnosis of lung abnormalities from chest X-ray images has been recently drawing attention from the computer vision and medical imaging communities. Previous studies of deep neural networks have predominantly demonstrated the effectiveness of lung disease binary classification procedures. However, large numbers of medical images-which can be labeled with a variety of existing or suspected pathologies-are, required be interpreting and reporting upon daily by an individual radiologist; this poses a challenge in maintaining consistently high diagnosis accuracy. In this work, we present a competitive study of knowledge distillation (KD) in deep learning for classification of abnormalities in chest X-ray images [3].

Figure 1: Lungs Sample (google image)

Chest computed tomography (CT) becomes an effective tool to assist the diagnosis of coronavirus disease. Due to the outbreak of corona worldwide, using the computed-aided diagnosis technique for lungs diseases classification based on CT images could largely alleviate the burden of clinicians. In this work, we propose an Adaptive Feature Selection guided Deep Forest (AFS-DF) for lungs diseases classification based on chest CT images. Specifically, we first extract location-specific features from CT images. Then, in order to capture the high-level representation of these features with the relatively small-scale data, we leverage a deep forest model to learn high-level representation of the features. Moreover, we propose a feature selection method based on the trained deep forest model to reduce the redundancy of features, where the feature selection could be adaptively incorporated with the lungs diseases classification model [4].

II. PROPOSED METHODOLOGY

Proposed work can be understand using followings flow chart-

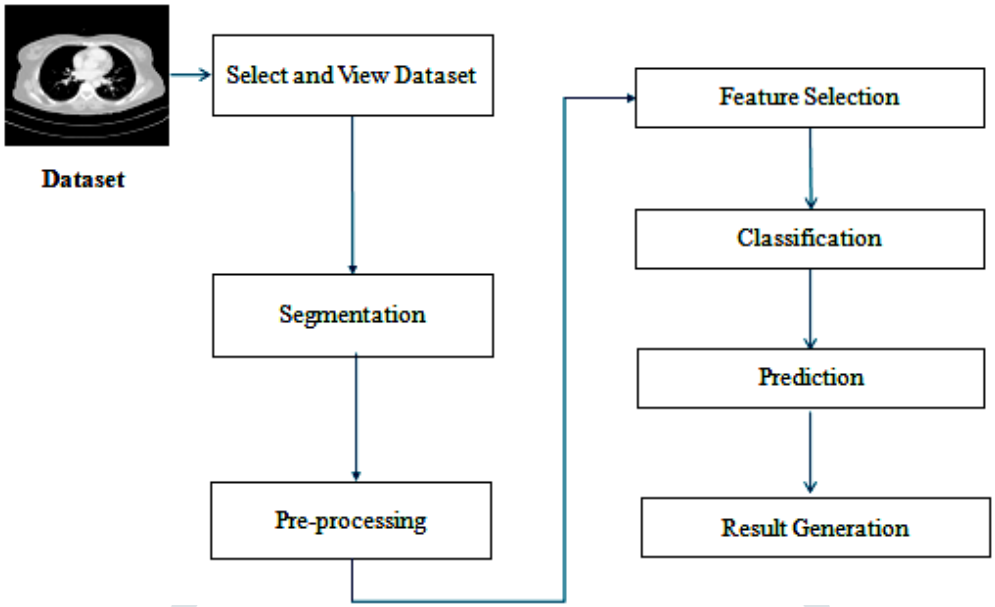

Figure 2: Flow Chart

The following steps are involved to complete the methodology-

- Data Selection and Loading
- Segmentation
- Preprocessing
- Feature Selection
- Classification
- Prediction
- Result Generation

The proposed model is introduced to overcome the disadvantages that arise in the existing system. It can be concluded that this system giving the accurate result. As we are using large dataset which will ensures the better performance. System will get output for the disease. The threshold segmentation process is the advantages of predicting tumor region in lung CT scan image. The classification using deep learning algorithm like convolution Neural Network is applied. Finally the deep learning algorithm is used to predict the lung cancer using CT scan images. The prediction result based on accuracy, precision, recall, and f1-measure.

III. SIMULATION AND RESULTS

The simulation work is performed using the python spyder IDE 3.7 software.

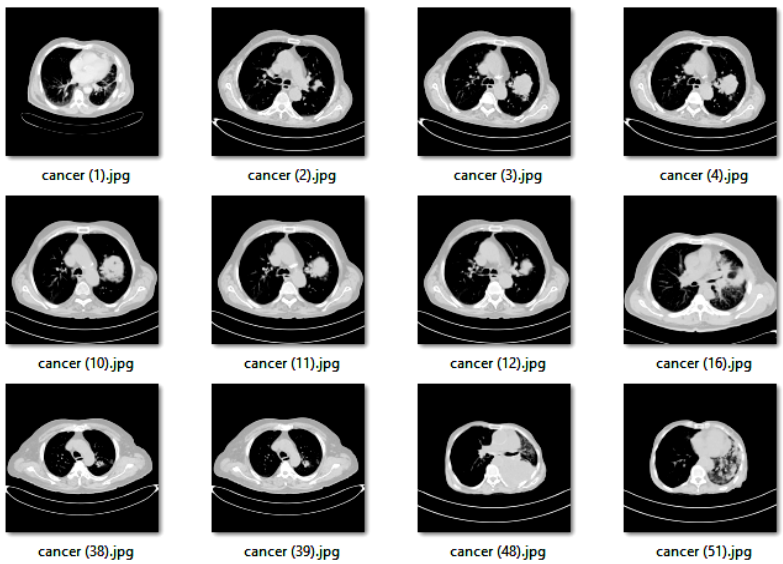

Figure 3: Dataset

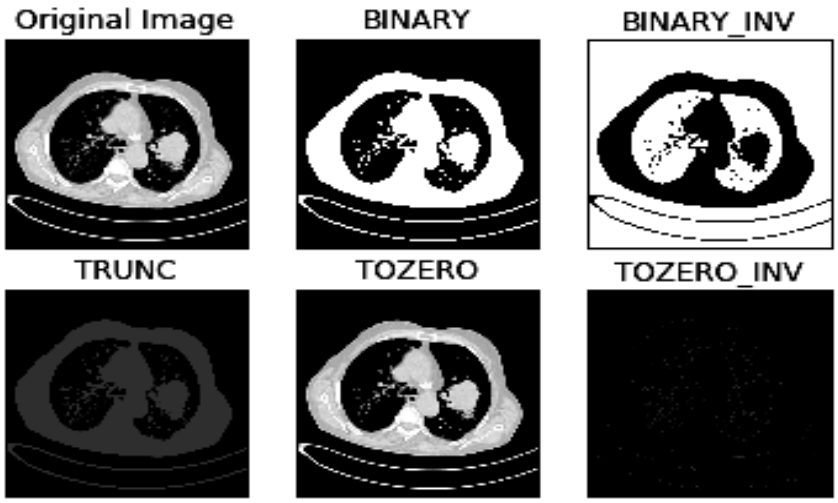

Figure 4: Image processing

Figure is 4 is showing input image processing, the original image is converted into the binary then binary inversion.

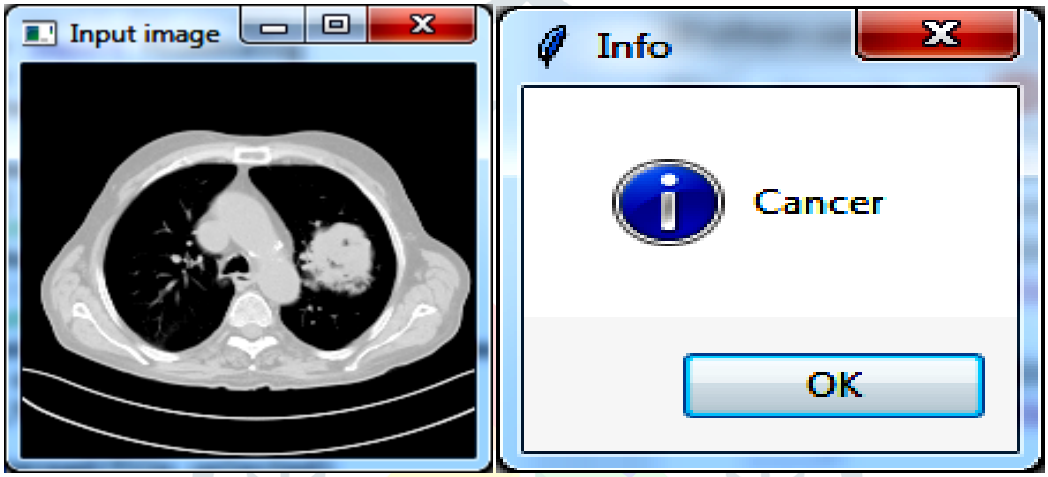

Figure 5: Input image and prediction

Figure is 5 is showing the selection of the input image and it is predicted accurately. The Cancer image is predicted through selection of this.

Table 1: Result Comparison

Sr. No.	Parameters	Previous Work [1]	Proposed Work
1	Classification Approach	Support vector Gray Level Co-occurrence	Convolution neural network
2	F_Measure	96%	99%
3	Accuracy	95.8 %	98.73 %
4	Error Rate	4.2 %	1.27 %

IV. CONCLUSION

Lung diseases or cancer remains the main source of disease related mortality for both men and women and its frequency is expanding around the world. Lung disease is the uncontrolled development of irregular cells that begin off in one or both Lungs. The earlier detection of cancer is not easier process but if it is detected, it is curable. This paper proposed a CNN deep learning technique for prediction of lung cancer diseases. The overall accuracy achieved by the proposed work is 98.73% while previous it is achieved 95.8%.

REFERENCES

1. S. S. Araújo Alves, E. de Souza Rebouças, S. A. Freitas de Oliveira, A. Magalhães Braga and P. P. Rebouças Filho, "Lung Diseases Classification by Analysis of Lung Tissue Densities," in IEEE Latin America Transactions, vol. 18, no. 09, pp. 1329-1336, September 2020, doi: 10.1109/TLA.2020.9381790.
2. X. Qian et al., "M^{3}Lung-Sys: A Deep Learning System for Multi-Class Lung Pneumonia Screening From CT Imaging," in IEEE Journal of Biomedical and Health Informatics, vol. 24, no. 12, pp. 3539-3550, Dec. 2020, doi: 10.1109/JBHI.2020.3030853.
3. T. K. K. Ho and J. Gwak, "Utilizing Knowledge Distillation in Deep Learning for Classification of Chest X-Ray Abnormalities," in IEEE Access, vol. 8, pp. 160749-160761, 2020, doi: 10.1109/ACCESS.2020.3020802.
4. L. Sun et al., "Adaptive Feature Selection Guided Deep Forest for COVID-19 Classification With Chest CT," in IEEE Journal of Biomedical and Health Informatics, vol. 24, no. 10, pp. 2798-2805, Oct. 2020, doi: 10.1109/JBHI.2020.3019505.
5. C. Baloescu et al., "Automated Lung Ultrasound B-Line Assessment Using a Deep Learning Algorithm," in IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control, vol. 67, no. 11, pp. 2312-2320, Nov. 2020, doi: 10.1109/TUFFC.2020.3002249.
6. J. -X. Wu, P. -Y. Chen, C. -M. Li, Y. -C. Kuo, N. -S. Pai and C. -H. Lin, "Multilayer Fractional-Order Machine Vision Classifier for Rapid Typical Lung Diseases Screening on Digital Chest X-Ray Images," in IEEE Access, vol. 8, pp. 105886-105902, 2020, doi: 10.1109/ACCESS.2020.3000186.
7. S. Roy et al., "Deep Learning for Classification and Localization of COVID-19 Markers in Point-of-Care Lung Ultrasound," in IEEE Transactions on Medical Imaging, vol. 39, no. 8, pp. 2676-2687, Aug. 2020, doi: 10.1109/TMI.2020.2994459.
8. S. Pang, Y. Zhang, M. Ding, X. Wang and X. Xie, "A Deep Model for Lung Cancer Type Identification by Densely Connected Convolutional Networks and Adaptive Boosting," in IEEE Access, vol. 8, pp. 4799-4805, 2020, doi: 10.1109/ACCESS.2019.2962862.
9. H. Yazdani, L. L. Cheng, D. C. Christiani and A. Yazdani, "Bounded Fuzzy Possibilistic Method Reveals Information about Lung Cancer through Analysis of Metabolomics," in IEEE/ACM Transactions on Computational Biology and Bioinformatics, vol. 17, no. 2, pp. 526-535, 1 March-April 2020, doi: 10.1109/TCBB.2018.2869757.
10. F. Yan, X. Huang, Y. Yao, M. Lu and M. Li, "Combining LSTM and DenseNet for Automatic Annotation and Classification of Chest X-Ray Images," in IEEE Access, vol. 7, pp. 74181-74189, 2019, doi: 10.1109/ACCESS.2019.2920397.
11. A. Rao, S. Chu, N. Batlivala, S. Zetumer and S. Roy, "Improved Detection of Lung Fluid With Standardized Acoustic Stimulation of the Chest," in IEEE Journal of Translational Engineering in Health and Medicine, vol. 6, pp. 1-7, 2018, Art no. 3200107, doi: 10.1109/JTEHM.2018.2863366.
12. O. P. Singh, R. Palaniappan and M. Malarvili, "Automatic Quantitative Analysis of Human Respired Carbon Dioxide Waveform for Asthma and Non-Asthma Classification Using Support Vector Machine," in IEEE Access, vol. 6, pp. 55245-55256, 2018, doi: 10.1109/ACCESS.2018.2871091.