IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 12, Issue 7, July 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | A Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 7, July 2024 ||

| DOI: 10.15680/IJIRCCE.2024.1207034 |

Liver Cancer Prediction using Machine Learning Techniques

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ABSTRACT: Liver cancer is a life-threatening illness and one of the fastest-growing cancer types in the world. Consequently, the early detection of liver cancer leads to lower mortality rates. This work aims to build a model that will help clinicians determine the type of tumor when it occurs within the liver region by analyzing images of tissue taken from a biopsy of this tumor. Working within this stage requires effort, time, and accumulated experience that must be possessed by a tissue expert to determine whether this tumor is malignant and needs treatment. Thus, a histology expert can make use of this model to obtain an initial diagnosis. This study aims to propose a deep learning model using convolutional neural networks (CNNs), which can transfer knowledge from pre-trained global models and decant this knowledge into a single model to help diagnose liver tumors from CT scans.

KEYWORDS: Liver Cancer; convolutional neural networks (CNNs); liver tumors; CT scans;

I. INTRODUCTION

Cancer is a general term that includes a wide range of diseases that can affect any part of the body. Cancer is considered a leading cause of death worldwide, claiming nearly 10 million lives in 2020, or approximately 1 in 6 deaths. One of the most common types of cancer is liver cancer. The American Cancer Society estimates that about 30,520 people (20,420 men and 10,100 women) will die of liver cancer at the end of 2022. Liver cancer causes more deaths than other types of cancer, and the disease is usually diagnosed when it is in its advanced stages. Therefore, diagnosing this disease at an early stage leads to better treatment options. This paper proposes an efficient method for the early detection of liver cancer. Non-invasive procedures such as CT scans, MRI, and ultrasound are used to identify liver cancer. The CT scan is a type of X-ray that produces detailed images of your body. This scan can provide information on the size, shape, and location of any type of liver or abdominal tumor, as well as the blood arteries that surround them. CT scans can also be used to precisely direct a biopsy needle into a potentially cancerous tumor. MRI scans produce comprehensive images of the soft tissues of the body. In addition, they employ radio waves and powerful magnets rather than X-rays. MRI scans can be very useful in the investigation of liver tumors. They can also be used to detect blockages in the blood arteries in and around the liver, as well as to determine whether liver cancer has migrated to other parts of the body. Ultrasound is usually used as the initial diagnosis when examining the liver. It generates an image on a computer screen by using sound waves.

II. OBJECTIVE

This project proposes to develop a system for Liver cancer using image processing techniques.

1. To classify the type of Liver and detect abnormalities of the Liver using an image.
2. To study thermal image processing feasible to detect Liver cancer.
3. applying the deep learning algorithms to predict the better result
4. Comparison study

III. LITERATURE SURVEY

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8. Insha Arshad, Chiranjit Dutta, "Liver Disease Detection Due to Excessive Alcoholism Using Data Mining Techniques"
9. N. Ramkumar, S. Prakash, S. Ashok Kumar, K Sangeetha, "Prediction of liver cancer using Conditional probability Bayes theorem"
10. Mafazalyaqeen Hassoon, Mikhak Samadi Kouhi, Mariam Zomorodi Moghadam, Moloud Abdar, "Rule Optimization of Boosted C5.0 Classification Using Genetic Algorithm for Liver disease Prediction"

IV. METHODOLOGY

The project's methodology encompasses the following key steps:

- **Data Collection:** The system will utilize a dataset consisting of medical images of the liver, including both normal liver images and images showing different stages or types of liver cancer. The dataset should be diverse, representative, and sufficiently large for training and testing the CNN algorithms.
- **Data Preprocessing:** The system will include image preprocessing techniques to enhance the quality and standardize the input images. This may involve noise reduction, image normalization, resizing, and other relevant preprocessing steps.
- **Data Modelling:** The software will facilitate the training and validation of the CNN models using the provided dataset. It will include functionalities for model training, hyperparameter tuning, and performance evaluation using appropriate metrics such as accuracy, sensitivity, specificity, and area under the curve (AUC).
- **Prediction and Classification:** The developed software system will allow users to input new liver images and classify them as normal or cancerous. It will provide real-time predictions using the trained CNN models and display the classification results to the users.
- **Performance Evaluation and Reporting:** The software should provide detailed performance evaluation metrics for the trained models. It should generate reports summarizing the classification accuracy, precision, recall, F1 score, and other relevant metrics to assess the performance of the liver cancer classification system.
- **Deployment and Integration:** The software system should be deployable on various platforms and operating systems. It should be compatible with different image formats and have the ability to integrate with existing medical imaging systems, if applicable.

V. TOOLS AND TECHNOLOGIES USED

Hardware Requirements

- RAM (2 GB)
- Hard disk (100 GB)
- Process (32/64 Pentium)

Software Requirements

- IDE (FLASK)
- Language (Python)
- Tool (Jupyter Notebook)
- Software (Anaconda)
- Front End (HTML, CSS)
- Libraries (Tensorflow, keras, numpy,pandas)

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VI. CONCLUSION

we used CNN and deep learning methods for the feature extraction and classification of liver disease species. The different machine learning algorithms are ANN, SVM, KNN and Naive Bayes (NB). We have considered the Flavia dataset in this method. This data sets used for both and training and testing purpose. It has been achieved an accuracy of 98%. All the performance metrics like precision, recall, F1-score and support are calculated. Also, the achieved training and validation accuracies are nearly equal. Images used in the training purpose are small and gray scale images. As a future work it is possible to implement the color image classification for liver disease recognition.

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