Journal of Science, Computing and Engineering Research (JSCER)
Volume-3, Issue- 2, Mar - April 2022.
DOI: https://doi.org/10.46379/jscer.2022.030205

Analysis of Neuro-Imaging and Prediction of Alzheimer's Syndrome and Brian Tumor using Machine Learning Techniques

[1] Abirami K, [2]M.Renuga, [3]B.Lavanya, [3]K.Lakshmi priya , [3]K.Senthil Kumar

[2]Assistant Professor, Department of Electronics and Communication Engineering, PERI Institute of Technology, Chennai.

[1,3]Department of Electronics and Communication Engineering, PERI Institute of Technology, Chennai.

Article Information

Received : March 10 2022
Revised : April 11 2022
Accepted : April 20 2022
Published : April 28 2022

Corresponding Author:
Author Name: M.Renuga
Email: renugasri12@gmail.com

***Abstract*—** This paper discusses about the analysis and detection of brain tumor and Alzheimer's disease. A digital MRI scan is used for this purpose. Medical image processing and analysis tasks are complex and diverse at the technical level. There is an array of technologies including reconstruction, enhancement, restoration, classification, detection, segmentation and registration that are combined with multiple image modalities and numerous applications are formed and should be addressed. AI-based tools are developed to support the assessment of disease severity and recently there are tools for assessing treatment and predicting treatment success. Finally, numerous studies in fields like clinical neuroscience have shown that AI-based image evaluation can identify complex imaging patterns that are not perceptible with visual radiologic evaluation.

Keywords: Alzheimers disease, MRI, Feature Extraction, Breast Digital Image, Partioning, Image Processin.

Citation: M.Renuga and Abirami K. "Analysis of Neuro-Imaging and Prediction of Alzheimer's Syndrome and Brian Tumor using Machine Learning Techniques", Journal of Science, Computing and Engineering Research, 3(2), 253-255, 2022.

I. INTRODUCTION

The brain is the most important organ in our body, which controls the rest of our organs. Brain pathologies have been classified as the second cause of human death in the world, if people have not discovered them early and had the appropriate therapy in time. Computer vision has many applications which make human life much easier and safer. In the medical images field, image processing techniques and machine learning approach aim at facilitating medical diagnosis.

Analysis and evaluation of all MRI images which helps to decide whether it contains brain pathology or not is a time-consuming process. Computer Aided Diagnosis (CAD) of medical images makes early detection of brain pathology faster than the human specialist and is very helpful for them. Brain medical images can be taken by Magnetic Resonance Imaging (MRI), X-ray Computed Tomography (CT), and Positron Emission Tomography (PET) scan. While the MRI and CT expose the structure of the body and the location of the tumor, PET scan reveals body functions like oxygen level and blood supply.

The work presented in this proposal will focus on the MRI image. The MRI is a preferred brain scan image technique due to high resolution and safety. Magnetic Resonance Imaging (MRI) scan is safe for patient and is a painless, non-invasive test that produces high accuracy images of brain and brain stem. It can create two-dimensional (2D), or three-dimensional (3D) scan of the brain. It doesn't need many preparations; instead, it needs just removing all metal staff from the patient body due to the strong magnetic field that will the patient be exposed to. The brain tumor is abnormal growth of unwanted dead cells on the brain that causes confusion to other cells' functionality. Early detection and fast diagnosis of the tumor may help and save the life of the patient.

Alzheimer's disease (AD) is a common form of dementia. It causes memory loss, cognitive decline, and other disabilities that interfere with daily activities. Like other types of dementia, Alzheimer's is caused by dead cells on the brain. With the passage of time, the brain will shrink dramatically affecting approximately all its functions. Unfortunately, there's no therapy for the AD.

However, symptomatic treatments have helped in maintaining mental functions. In the next section, the literature review has been described. After that, the methodology will be explained. Afterwards, an overview of the system, bag of features and segmentation of tumor, results and discussion as well as references will be presented.

A. ALS –MRI Scan Image

An image is an array or a matrix of square pixels (picture elements) arranged in columns and rows. An image (from Latin: imago) is an artifact, for example a two-dimensional

picture, that has a similar appearance to some subject usually a physical object or a person.

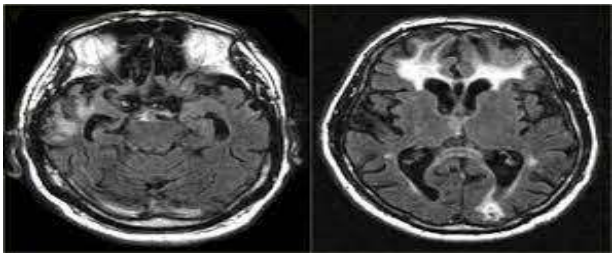

Figure1: An image – ALS –MRI SCAN IMAGE

II. PROBLEM DEFINITION

Except in very special circumstances, neighborhoods have odd numbers of rows and columns; this ensures that the current pixel is in the center of the neighborhood. An example of a neighborhood is given in figure. 2 If a neighborhood has an even number of rows or columns (or both), it may be necessary to specify which pixel in the neighborhood is the "current pixel".

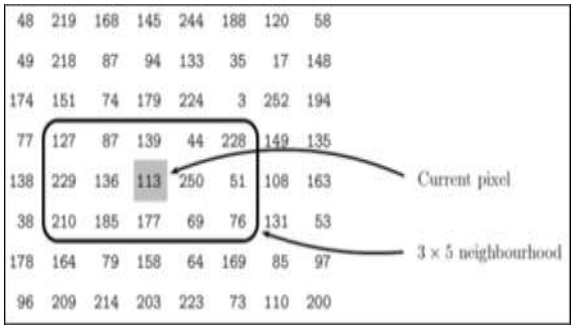

Figure 2: Pixel representation

III. PROPOSED SYSTEM

In the proposed system, the design of Alzheimer disease and Non-Alzheimer disease is done using a machine learning approach to make the system detect the Alzheimer disease automatically using advanced image processing techniques.

Image is prepossessed by studying various parameters extractions such as color conversion, re-sizing, and filtering.

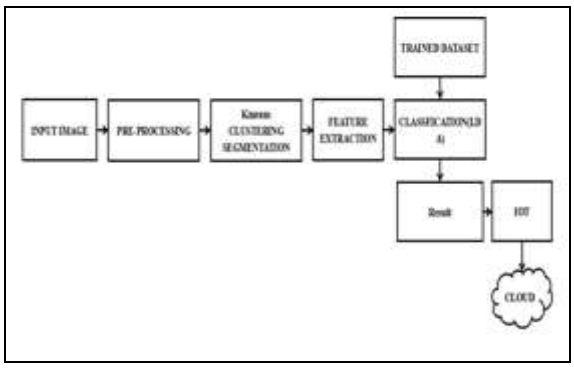

Figure3: Proposed Model

K-means algorithm is carried out by segmentation algorithms. This helps to identify the number of lesions scattered over the body. Feature extraction is by GLCM and finally, mammogram image classified using AdaBoost algorithm. Finally, the message box will be displayed whether it is normal, Alzheimer, brain tumor. Finally, the results have been updated in IoT which have been only accessible by the doctors with a user ID and password.

IV. ESP8266 MODULE

The ESP8266 is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by manufacturer Espressif Systems in Shanghai, China. The chip first came to the attention of western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at first there was almost no English-language documentation on the chip and the commands it accepted. The very low price and the fact that there were very few external components on the module, which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation

A. Features

Memory:

- 32 KiB instruction RAM.
- 32 KiB instruction cache RAM.
- 80 KiB user-data RAM.
- 16 KiB ETS system-data RAM.
- External QSPI flash: up to 16 MiB is supported (512 KiB to 4 MiB typically included).

IEEE 802.11 b/g/n Wi-Fi:

- Integrated TR switch, balun, LNA, power amplifier and matching network.
- WEP or WPA/WPA2 authentication, or open networks
- 16 GPIO pins
- SPI
- I²C (software implementation)[6]
- I²S interfaces with DMA (sharing pins with GPIO)
- UART on dedicated pins, plus a transmit-only UART can be enabled on GPIO2
- 10-bit ADC (successive approximation ADC)

ESP8266 is Wi-Fi enabled system on chip (SoC) module developed by Espressif system. It is mostly used for development of IoT (Internet of Things) embedded applications.

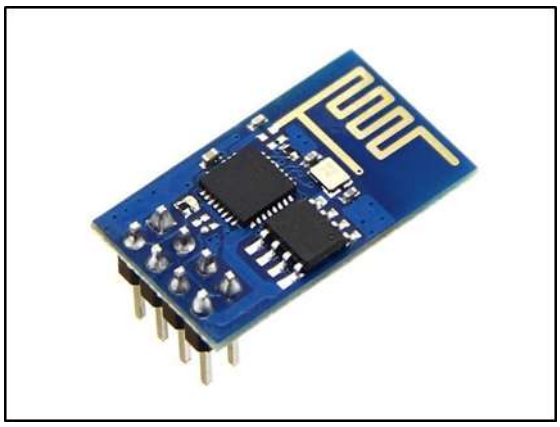

Figure 4: Wi-Fi enabled system on chip (SoC) module

V. RESULTS AND DISCUSSION

Advancement in high-speed computing techniques and an unprecedented improvement in the development of novel DL-based techniques and models opens up unique opportunity to predict and manage a number of neurological disorders including Alzheimer's disease, Parkinson's disease and schizophrenia. In this paper, the most popular DL techniques have been explored in detecting those three leading neurological disorders from the MRI scan data. DL methods for the classification of neurological disorders found in the literature have been outlined.

The pros, cons, and performance of these DL techniques for the neuro-imaging data have been summarized. Up to this we have referred the Literature survey and selecting the algorithm with high accuracy. And we developed the code for IoT with secured communication between the center and doctor.

REFERENCES

[1]. Cahoon, Tobias Christian, Melanie A. Sutton, and James C. Bezdek."Breast cancer detection using image processing techniques." In Ninth IEEE International Conference on Fuzzy Systems. FUZZ-IEEE2000 (Cat. No. 00CH37063), vol. 2, pp. 973-976.IEEE, 2000.

[2]. Guzmán-Cabrera, R., J. R. Guzmán-Sepúlveda, M. Torres-Cisneros, D. A. May-Arrioja,J. Ruiz-Pinales, O. G. Ibarra-Manzano, G. Aviña-Cervantes, and A. González Parada." Digital image processing technique for breast cancer detection." International Journal of Thermo physics 34, no. 8-9 (2013): 1519-1531.

[3]. Abdallah, Yousif MY, Sami Elgak, HosamZain, Mohammed Rafiq, Elabbas A. Ebaid, and Alaeldein A. Elnaema. "Breast cancer detection using image enhancement and segmentation algorithms." Biomedical Research 29, no. 20 (2018): 3732-3736.

[4]. Huang, Min-Wei, and et al. "SVM and SVM ensembles in breast cancer prediction," in PlOS one, Vol. 12, Issue 1, 2017.

[5]. W.K.Moon, and etal., "Computer-aided tumor diagnosis using shear wave breast elastography,"in Journal of Ultrasonics, Vol.78,pp.125-133,2017.