

# DETECTION OF SCHIZOPHRENIA DISORDER IN BRAIN MR IMAGES USING SEGMENTATION METHOD

ABBISWARAN K.S<sup>1</sup>, HARI HARAN S<sup>2</sup>, HEMA RANI G<sup>3</sup>, IJAZ AHAMED A<sup>4</sup>, PANDIAN A<sup>5</sup>

<sup>1,2,3,4</sup> UG Students, Department of Electronics and Communication Engineering, SRM Valliammai Engineering College, Kattankulathur, Chengalpet-603203, Tamil Nadu, India.

<sup>5</sup> Assistant Professor, Department of Electronics and Communication Engineering, SRM Valliammai Engineering College, Kattankulathur, Chengalpet-603203, Tamil Nadu, India.

\*\*\*

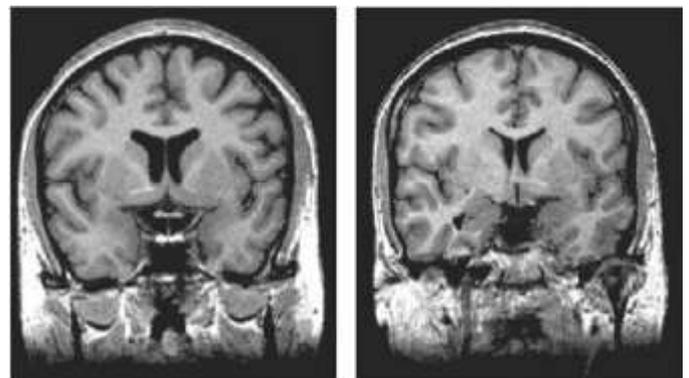
**Abstract** – Schizophrenia is a serious brain disorder in which a person feels weird. It is a psychiatric disorder that makes complicated to think clearly and generates often response to emotions. Schizophrenia otherwise termed as “split mind” and will scatter the normal balance of emotions and thinking. MR Images is used to detect schizophrenia disorder which is preferred for its high resolution. Pre-processing is done to remove noise and to stabilize the severity of brain functions. Image segmentation is done to analyze brain anatomical structure. This method is used to found abnormal symmetrical computation. Train Region Of Interest (ROI) for binary classification using Matrix Laboratory (MATLAB) algorithm.

disorder reveal a wide variety of clinical symptoms including hallucinations, delusions, formal thought disorder, and cognitive dysfunctions. Currently, diagnosing schizophrenia or determining the severity of the illness is determined based on clinical symptoms without using objective biomarkers. Here biomarker refers to the medical state observed from outside the patient, which can be measured accurately and uniformly [4].

**Key Words:** Psychiatric disorder, Split mind

## 1. INTRODUCTION

Schizophrenia is a brain disorder in which a person behaves strangely. The characteristic of schizophrenia is “dementia”. There are seven types of schizophrenia which are paranoid, hebephrenic, catatonic, undifferentiated, residual, simple, un-specified. People with schizophrenia disorder undergo with hallucinations and delusions. Persons with Schizophrenia disorder has been detected to have a steeper regression slope of age-related changes in brain capacity compared to healthy people [1]. A systematic view of long-term studies in schizophrenia reported continuous changes in both grey matter (GM) and white matter (WM) volume. The track of brain volume changes with ages in schizophrenia disorder which appears to be more severe before the age of 45, after which brain volume in patients appears to decrease at a normal rate. Further, dissimilarity in tracks of GM and WM overages reduce the WM, later than in GM [2]. Brain volume is strained by several genetic and environmental factors that produce impact with respect to age. During normal brain supuration, there is an increase of total brain capacity throughout childhood, with verification of gradual decrease after age 13, relative strength in middle-aged, and a slight decrease starts again in the mid-30s, which accelerates in late life, from around age 60. The timing of normal supuration varies between GM and WM, with a peak of GM volume in the mid-20s and of WM volume in the late-30s. The relationship between age and brain capacity in schizophrenia disorder is complex which includes environmental factors such as Antipsychotic Medication and cannabis use, also has independent effects on brain structure and functions [3]. Patients identified with schizophrenia



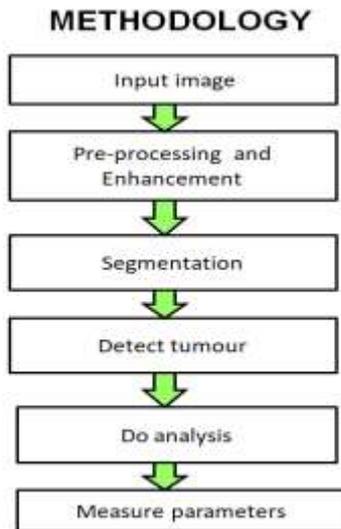
## 2. MATERIALS AND METHODOLOGY

A set of patients database are first segmented through Self-Organizing Mapping. This Self-Organizing Mapping is used to determine the probability density function of the model of the images. Each segmented image correlates its own pixels and clusters on the map. Vector Quantization is based on competitive learning and related closely to Self-Organizing Mapping. Vector Quantization is used for data compression. The features are density, texture, perimeter, a standard deviation which was generated using compressed data. These images are trained by the Region of Interest (ROI). The trained images are finally classified as normal or abnormal based on features extracted.

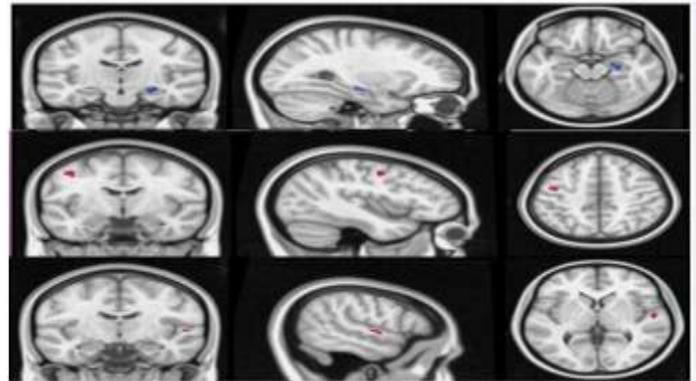
The proposed method of image segmentation is as follow

1. Read the image.
2. Perform preprocessing and enhancement.
3. Undergoes modified surface-based region growing segmentation.
4. Detect malignancy.

5. Examine the malignancy.
6. Compute the performance.



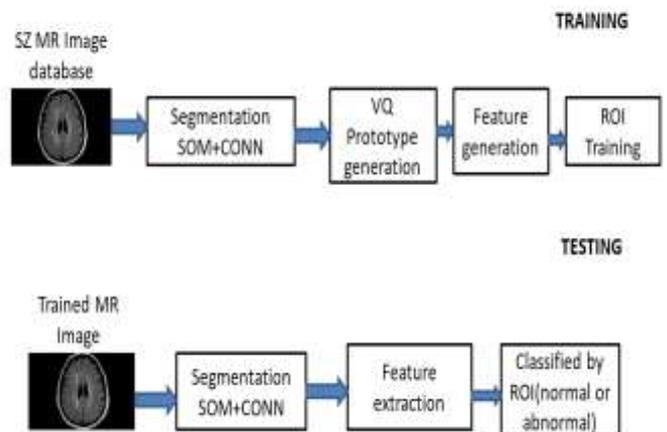
structure. Region Of Interest (ROI) is used to examine corporal variations. Volume Based Morphometry (VBM) is used to determine arithmetical differences in the volume of brain tissues such as white matter and grey matter.



**BLOCK DIAGRAM**

**Table -1:** Patient statistics

Sensitivity	0.00052856
Specificity	0.0853176
Accuracy	99.9989
Efficiency	99.9984
PSNR	161.415
MSE	0.272878

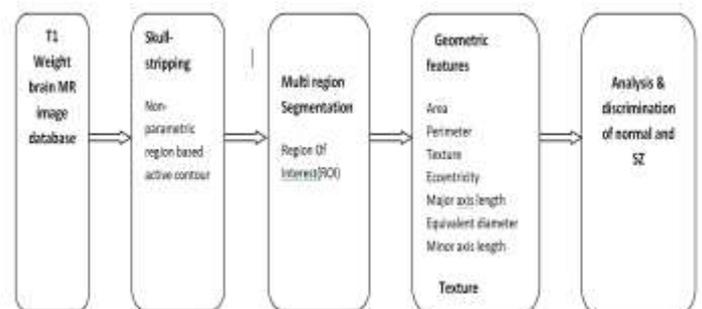


## OBJECTIVE

To study the sub anatomical regions of Schizophrenia affected brain and magnetic resonance imaging (MRI) based on Morphometry. To analyze the alteration in structures and texture patterns of the Schizophrenia brain images using the segmentation method. The Region of Interest (ROI) segmentation method is used. The aim of segmentation is to divide images into sub-regions (i.e.) Homogenous. The most commonly used homogeneity criteria are intensity, color, texture and surface curvature.

## PROPOSED SYSTEM

The MR Image can be pre-processed and segmented to detect the affected parameters. The structural irregularity of the brain is detected using Matrix Laboratory (MATLAB) algorithm. The PANSS (positive and negative syndrome scale) is one of the important clinical specifications of schizophrenia disorder. Schizophrenia disorder can be classified as acute and sub-acute based on the PANSS score, and the difference could be absorbed by the analysis of brain



### ARDUINO UNO



**Arduino** is an open-source widely used in electronics platform based on hardware and software. **Arduino** boards are used to interpret inputs in the form of light on a sensor, a finger on a button, or a Twitter message which produces an output of activating a motor, turning on an LED. The **Arduino Uno** is a single-board microcontroller that is interactive to its surroundings. The Arduino used here is based on the ATmega328. It has 14 digital input or output pins in which 6 can be used as PWM outputs, a 16 MHz ceramic resonator, an ICSP header, a USB connection, 6 analog inputs, a power jack, and a reset button. They are normally connected to a computer with USB Cable or with AC to DC adapter or battery to power up the Arduino. A boot loader is a program or code which runs on a microcontroller that receives new code information from communication and writes that code to the program memory of the processor.

- Microcontroller: ATmega328
- Operating Voltage: 5V
- Input Voltages: 7-20V
- Digital I/O Pins: 14 (of which 6 yield PWM output)
- Analog Input Pins: 6
- Flash Memory: 32 KB out of which 0.5 KB was used by the boot loader
- SRAM: 2 Kilobyte
- EEPROM: 1 Kilobyte
- Frequency speed: 16 MHz

### LIQUID CRYSTAL DISPLAY(LCD)



In 16x2 character LCD Display, There are 16 pins.

- First two pins -> VSS and VDD for providing power to display.
- 3<sup>rd</sup> pin -> Vo for adjusting display contrast.
- 4<sup>th</sup> pin -> Register (RS) pin to multiplex the data and command information send to Liquid Crystal Display.
- Do - D7 -> Data information to LCD.
- RS - High -> Data information.
- Rs - Low -> Command information.
- 5<sup>th</sup> pin -> To determine the data to read or write from LCD.
- 6<sup>th</sup> pin -> Enable pin of LCD.

### BUZZER

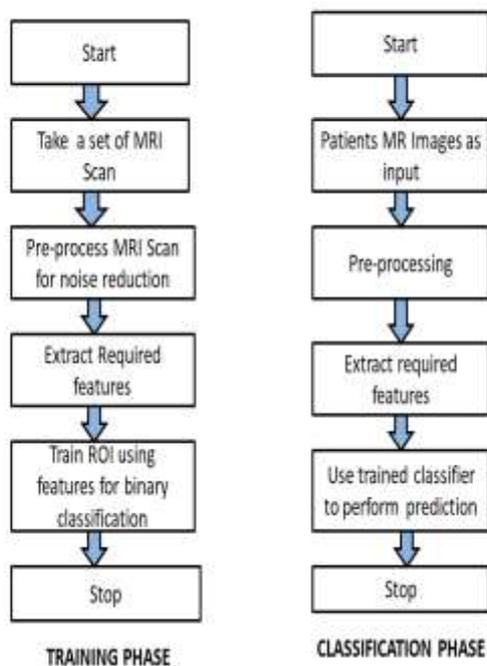


A buzzer is a device that produces sound. The working principle of the buzzer is mainly based on the theory that, whenever an electric voltage is applied across a piezoelectric material, a pressure is generated. A Piezo buzzer contains

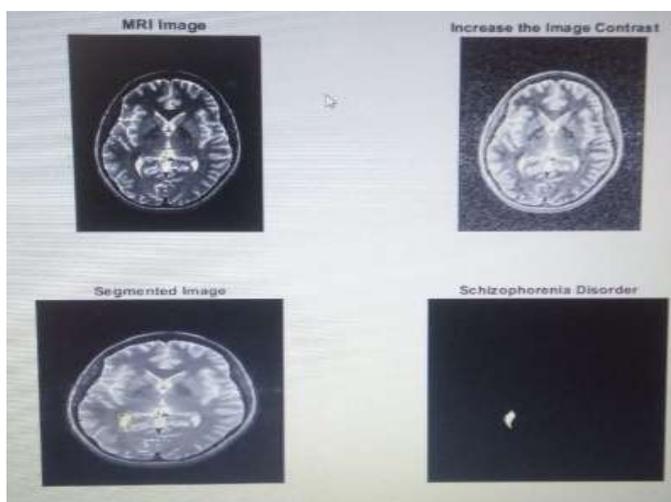
Piezo crystals between two conductors. When a voltage difference is applied across these crystals, they push one conductor and pull the other conductor by their internal characteristics. The pull and push operation generates a sharp sound wave continuously. A Piezo buzzer produces a loud & sharp sound. So, they are used in alarm circuits and also used to make an alert of an event, signal or sensor input. A unique characteristic of Piezo buzzer is, the sound level is not dependent on the voltage level i.e.) it works only in a specific voltage range. A Piezo buzzer can generate a sound in the range of 2 kHz to 4 kHz.

**DESIGN FLOW**

**FLOW CHART**



**RESULT**



**CONCLUSION**

Brain regions are segmented with higher similarity and accuracy. The geometric features of the brain show significant variations between the normal brain and schizophrenia affected brain. Features of the brain stem are correlated with positive and negative syndrome scale. This Region Of Interest (ROI) segmentation method helps in curing of “psychiatric disorder”.

**REFERENCES**

[1] Asmiya Naikodi, Nida Fatima, Shamili.P, Neha Gopal.N “Early detection of Schizophrenia Disease using image processing using MRI Scan”.International Journal for Technological Research in Engineering, Volume 3, Issue9, May 2019.ISSN:2347-4718.

[2] B.Karthikeyan, V.Vithyanathan, B.Venkataraman, M.Menaka “Analysis of image segmentation of radiographic images”. Indian Journal of Science and Technology “Volume 5, Issue 11, November 2019. ISSN-0974-6846.

[3] Nemirakpam Dhanchandra, Khumanthem Manglem, Yembem Jina Chanu “Image segmentation using the k-means clustering algorithm and Subtractive clustering algorithm”. Eleventh International multi-conference on Information processing - 2015 764-771(IMCIP-2018).ELSEVIER

[4] Information processing - 2015 764-771(IMCIP-2018).ELSEVIER

[5] Siqi Liu, Si Dong Liu, Student Member IEEE, Weidong Cai, Member IEEE, Sonia Pujol, Ron Kikinis, Dagan Feng, Fellow IEEE “Early Diagnosis of Schizophrenia disease with Deep Learning”2014 IEEE 11th international Symposium on Biomedical Imaging (ISBI).31st July 2019.ISSN-1945-8457.

[6] Rohini Paul Joseph, C.Senthil Singh, M.Manikandan,” Brain Tumor MRI Image Segmentation and Detection in Image Processing”. International Journal of Research in Engineering and Technology.eISSN:2319-1163|PISSN:2321-7308