Department of Electronics and Communication Engineering

Delhi Technological University

(Formerly Delhi College of Engineering)

CERTIFICATE

This is to certify that the project entitled, "**A NOVEL APPROACH FOR FINDING BRAIN ABNORMALITIES USING FCM**", submitted by **Ms. HIMANI VAROLIA**, University Roll No. 2K11/SPD/26, student of Master of Technology (Signal Processing and Digital Design) in Electronics and Communication Engineering department from Delhi Technological University (Formerly Delhi college of Engineering), is a dissertation work carried out by her under my guidance during session 2012-2013 towards the partial fulfilment of the requirements for the award of the degree of Master of Technology in Power system.

I wish her all the best in her endeavours.

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Associate Professor

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Dated:————— Delhi Technological University-42

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Finally my greatest thank to my family and friends for their continuous support.

Himani Varolia

2K11/SPD/26

Date : July 2013 M.Tech (SPDD)

DECLARATION BY THE CANDIDATE

Date: _____

I hereby declare that the work presented in this dissertation entitled "**A NOVEL APPROACH FOR FINDING BRAIN ABNORMALITIES USING FCM**" has been carried out by me under the guidance of Mr. M.S. Choudhary, Associate Professor, Department of Electronics & Communication Engineering, Delhi Technological University, Delhi and hereby submitted for the partial fulfillment for the award of degree of Master of Technology in Signal Processing & Digital Design at Electronics & Communication Department, Delhi Technological University, Delhi.

I hereby declare whatever has been stated above is true to the best of my knowledge.

I further undertake that the work embodied in this major project has not been submitted for the award of any other degree elsewhere.

Himani Varolia

2K11/SPD/26

M.Tech (SPDD)

ABSTRACT

MRI brain image processing is a vast area of research, several methods and approaches have been used to segment these images (thresholding, region, contour, clustering). In the proposed methodology, we propose a novel segmentation approach, which is based on fuzzy c-means clustering and morphological operation. Clustering approach is widely used in biomedical applications particularly for brain tumour detection in abnormal magnetic resonance (MRI) images. Fuzzy clustering using fuzzy C-means (FCM) algorithm proved to be superior over the other clustering approaches in terms of segmentation efficiency. Also the enhancement methods proposed here improved the contrast of the input images drastically and also midrange stretch enhancement improves the image quality for segmentation. To validate the proposed methodology, it is tested successfully on several datasets of approximately 400 MRI images.

Keywords : MRI, Fuzzy C-means Clustering, Tumour, Segmentation, Enhancement

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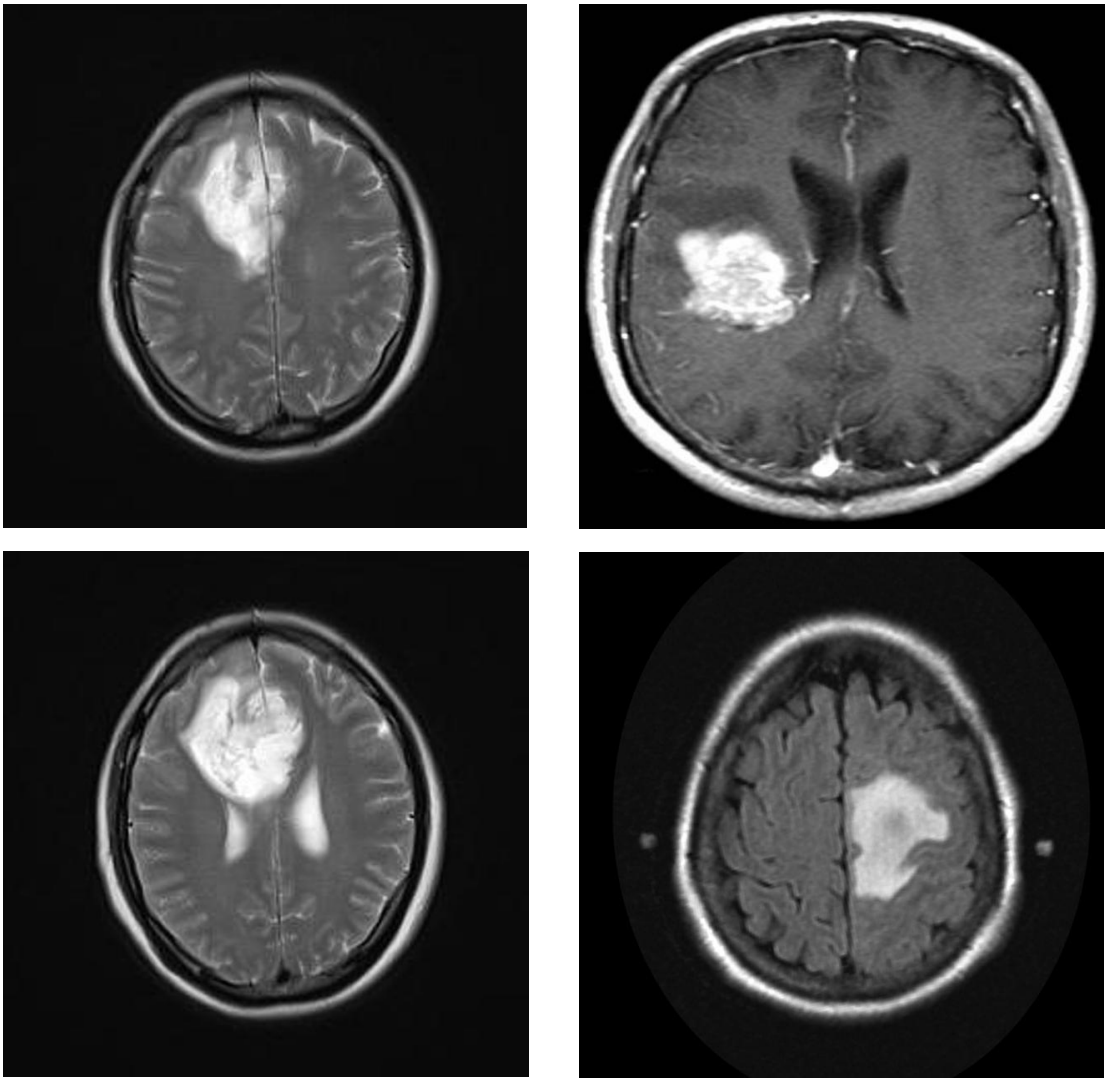

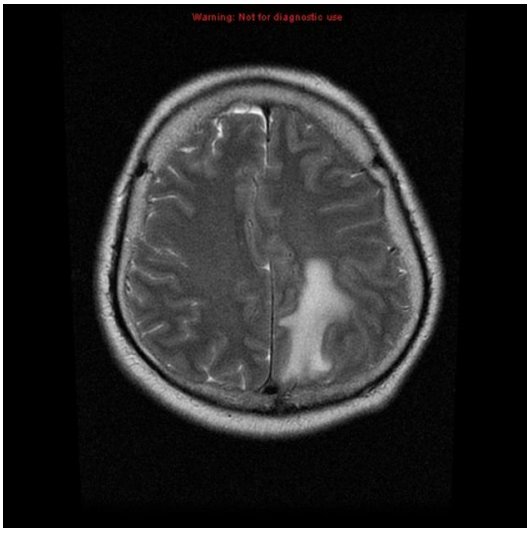
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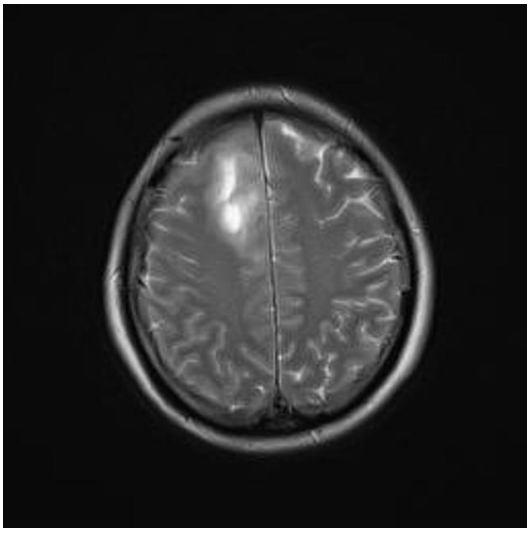
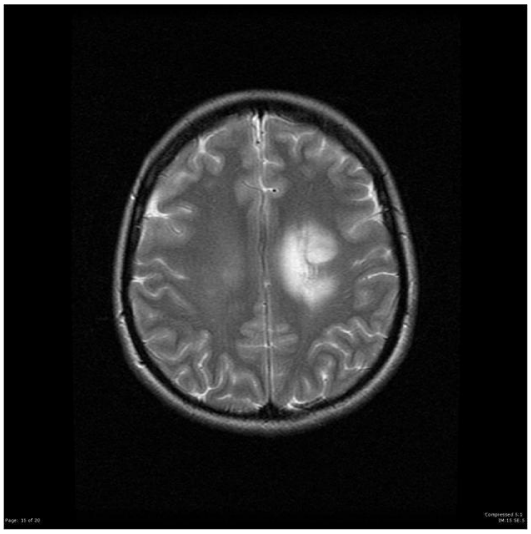
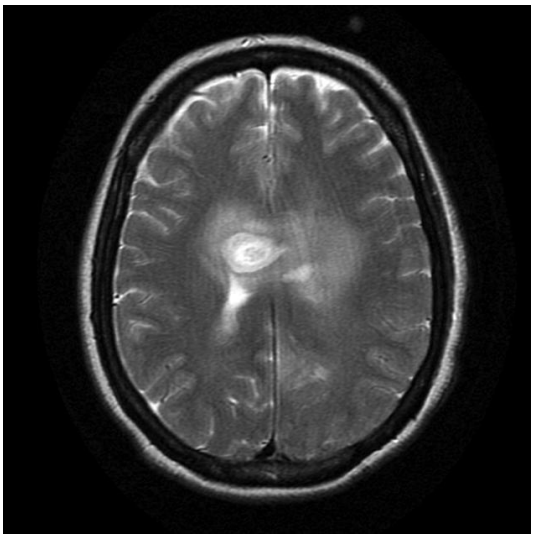
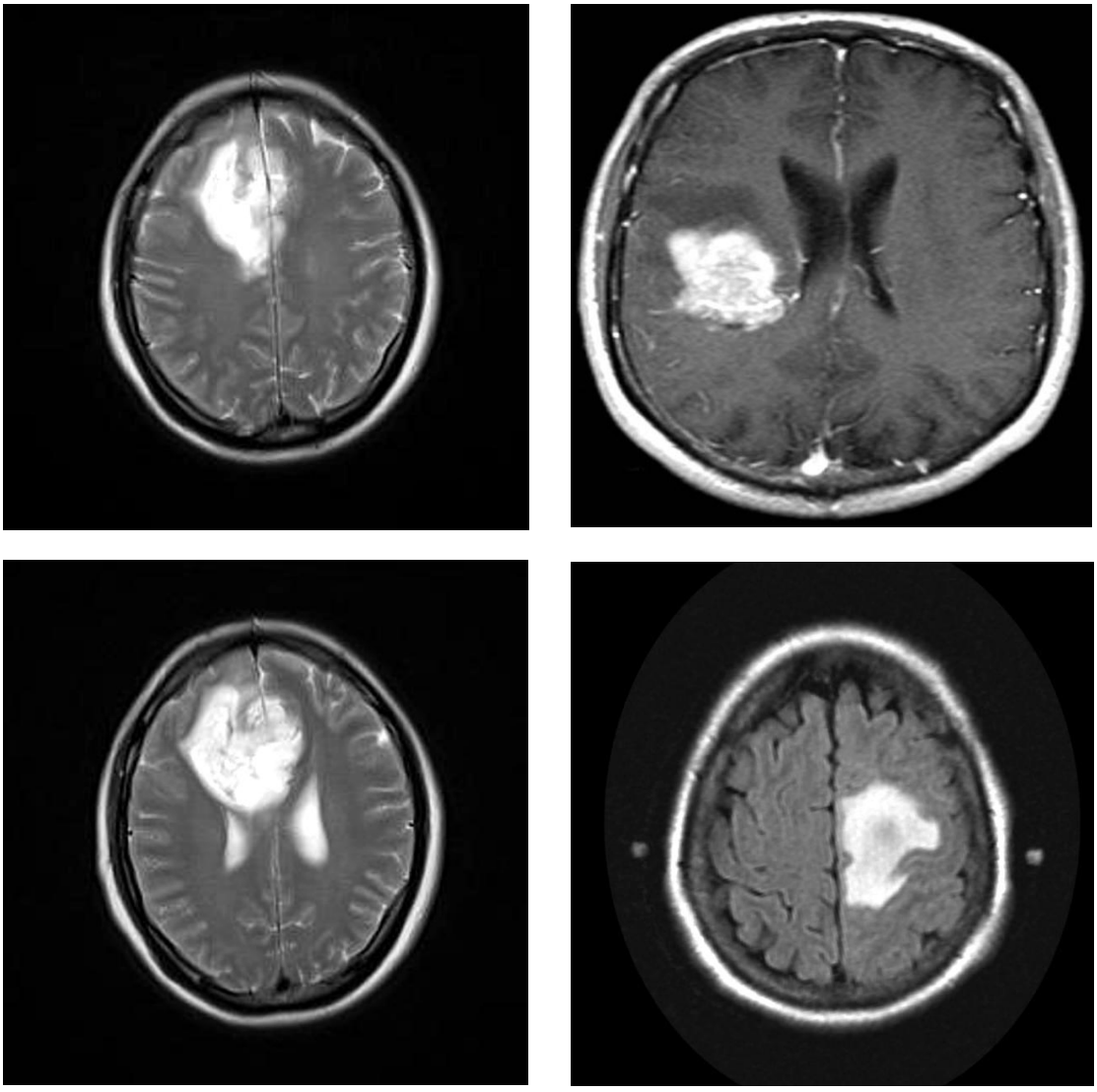


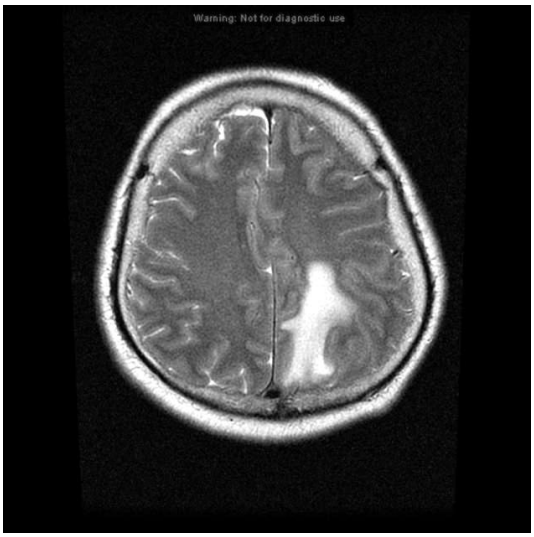


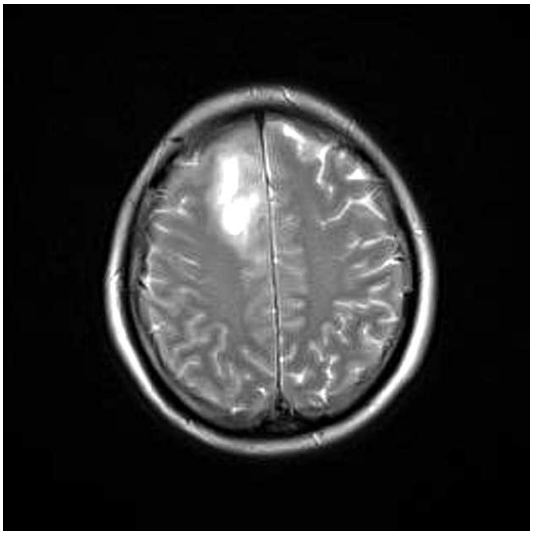


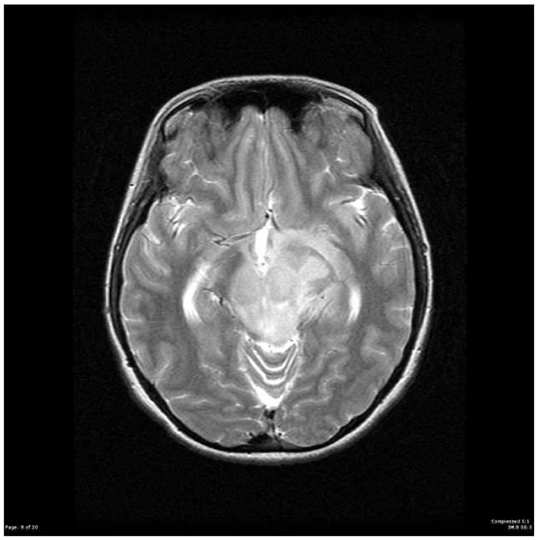
After applying the proposed algorithm step by step output images are shown in the following section.

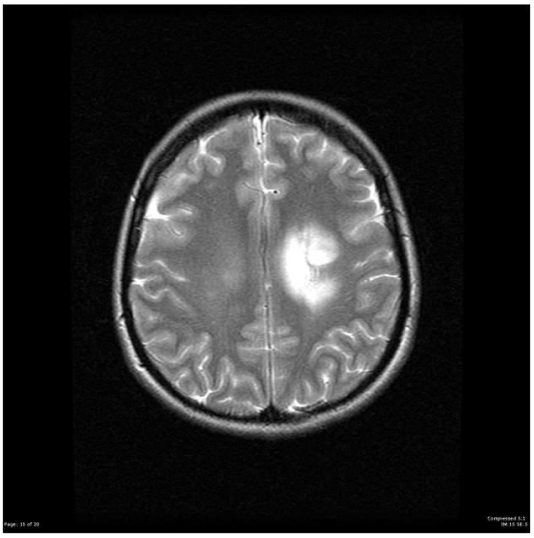
ENHANCED IMAGES

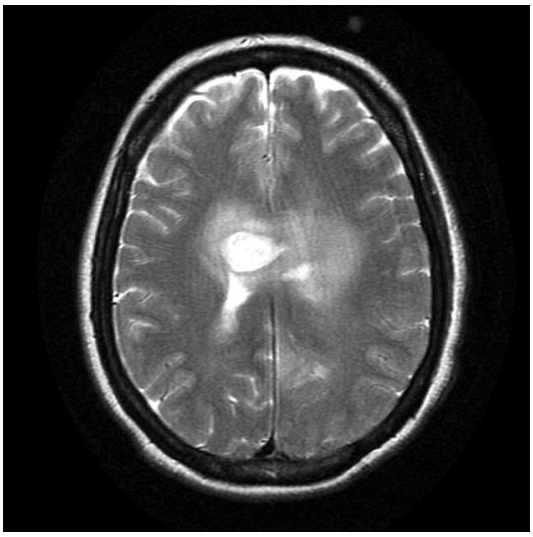












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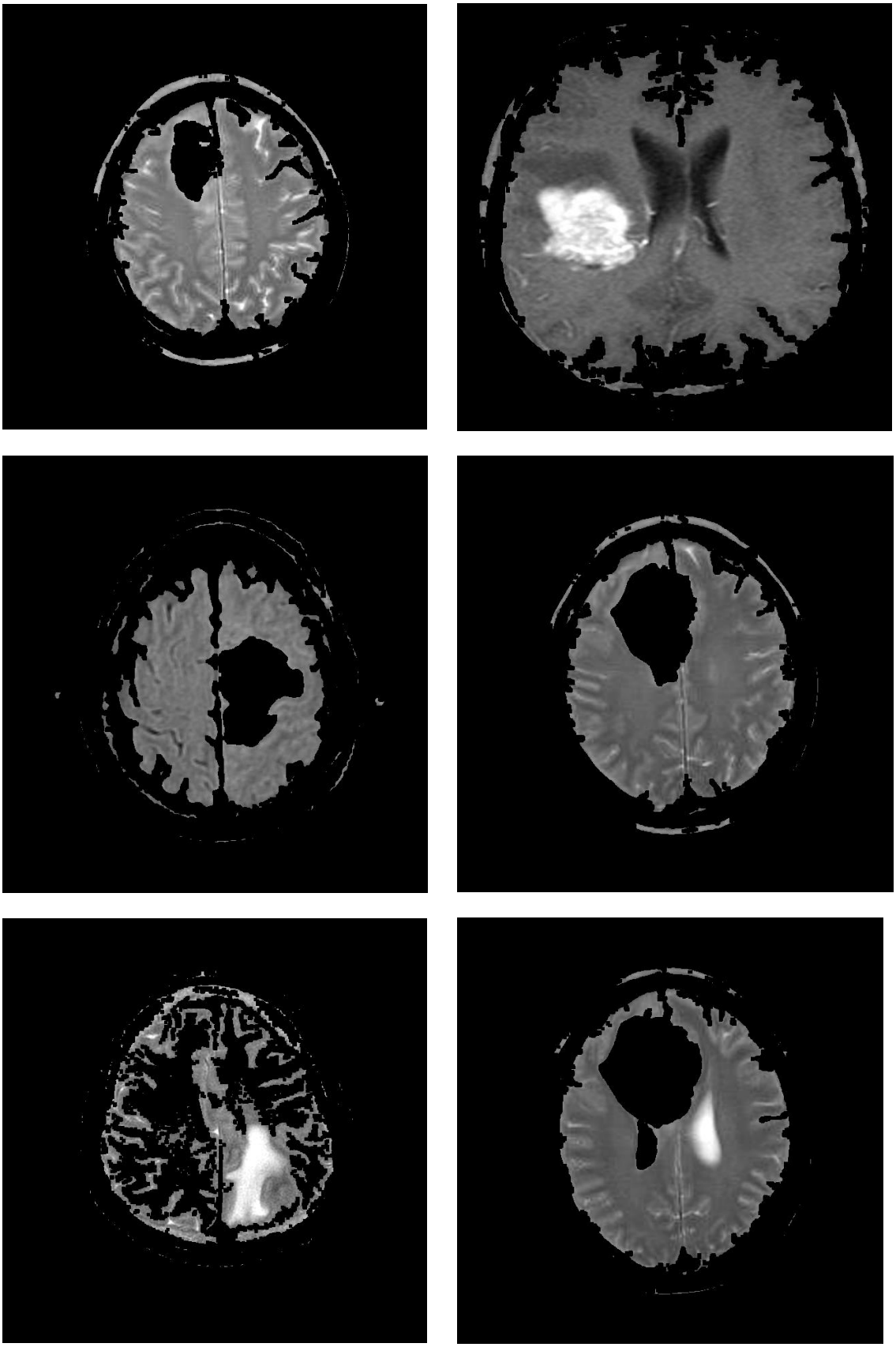
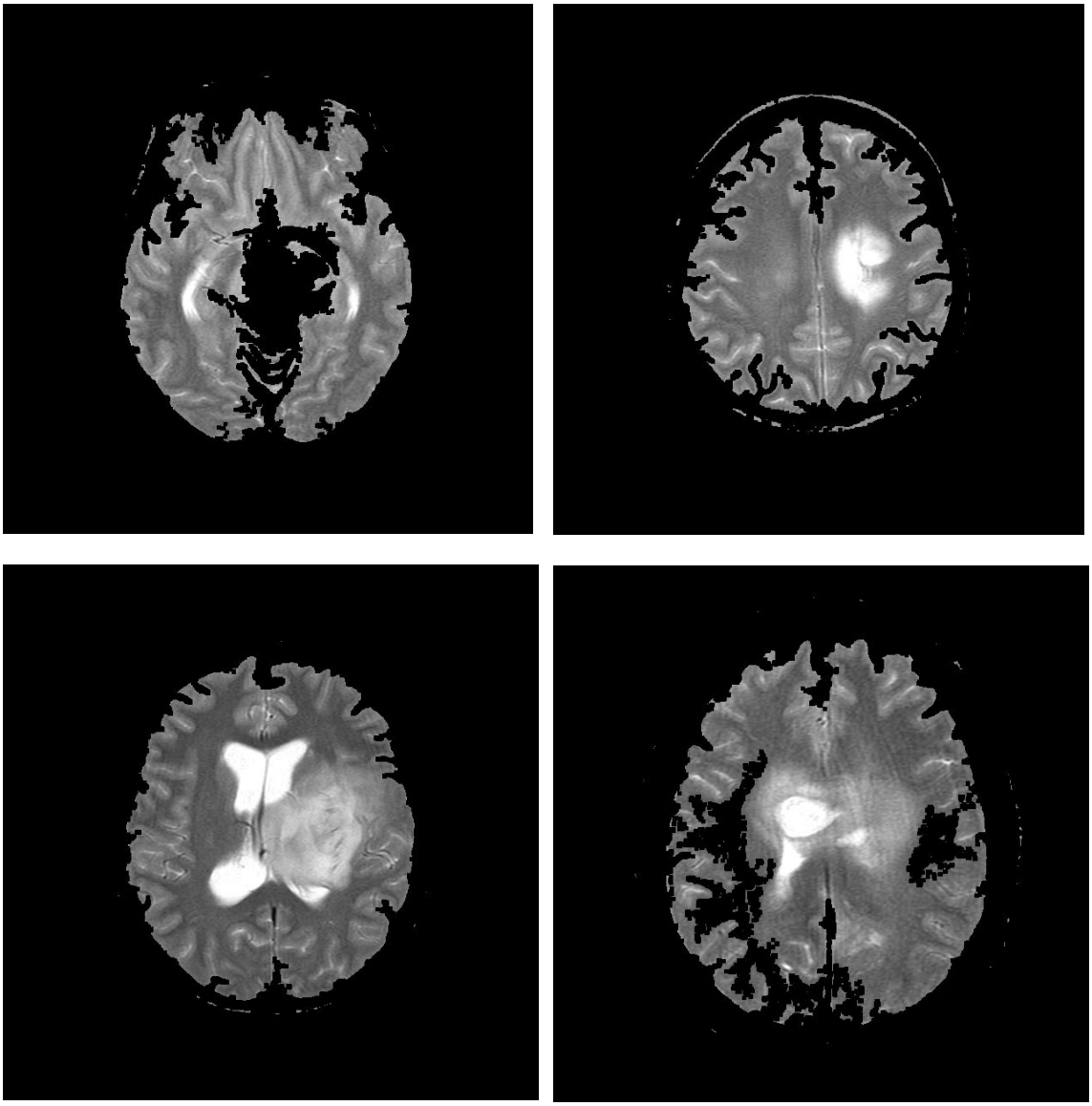
SKULL STRIPPING





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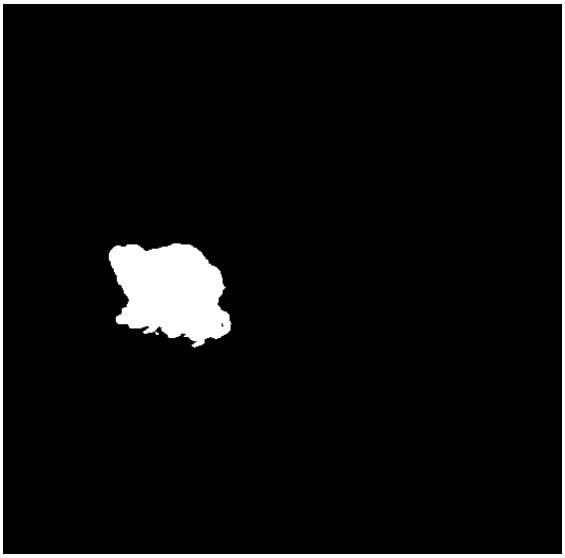

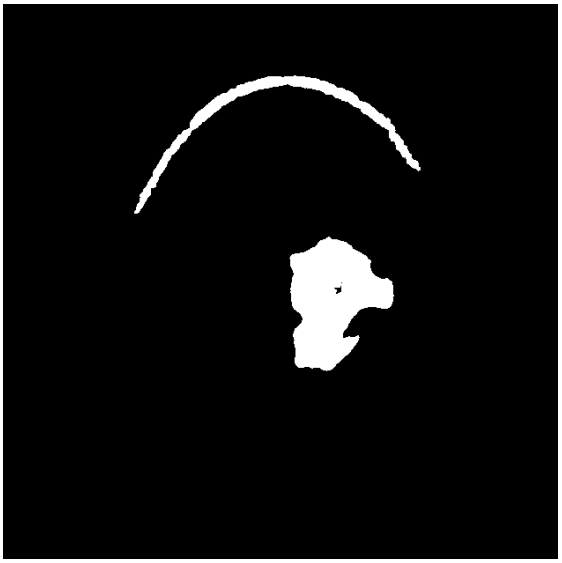

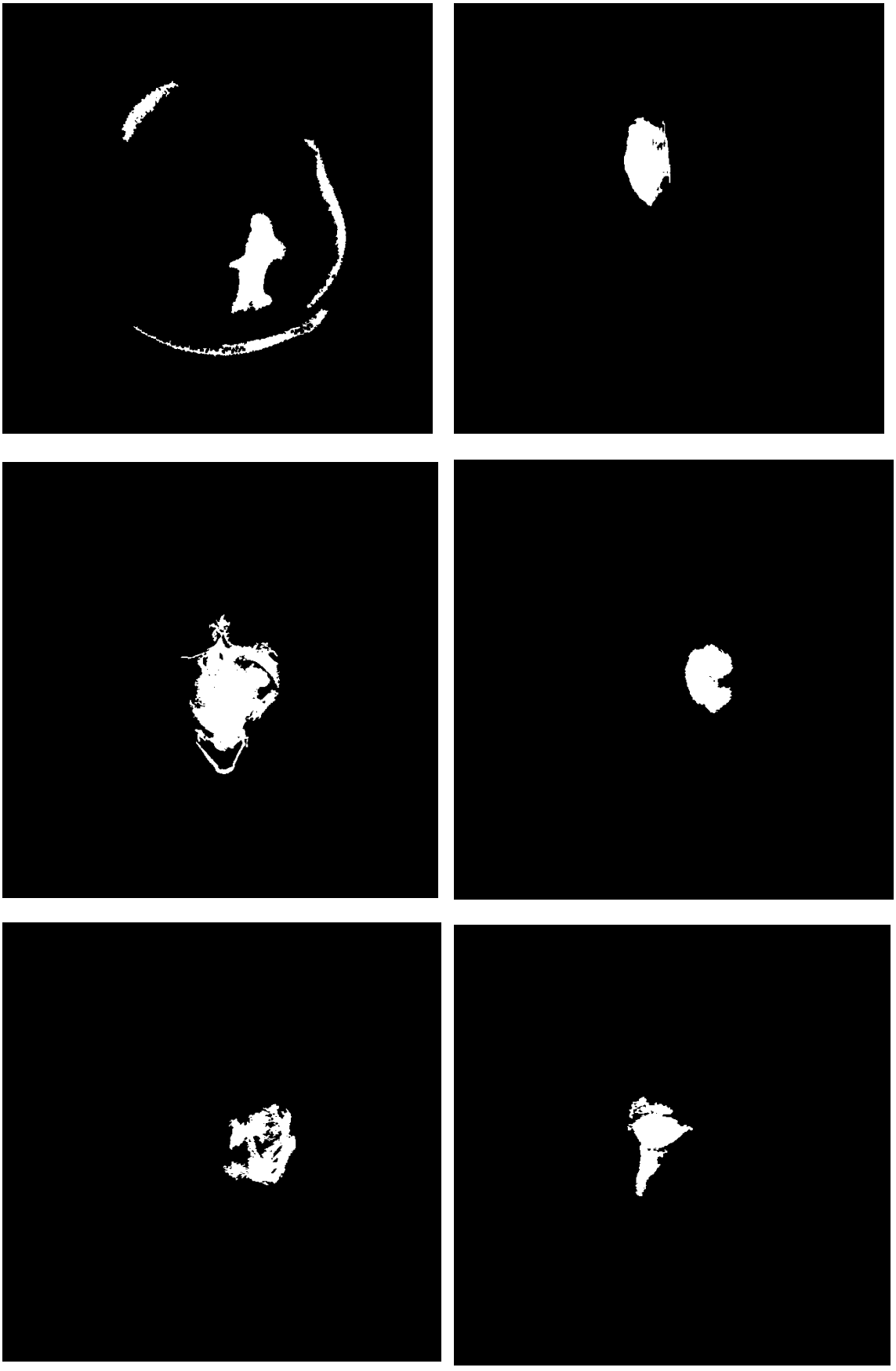

ACRONYMS

ASL	Arterial Spin Labelling
BOLD	Blood-Oxygen-Level Dependent
CBF	Cerebral Blood Flow
CBV	Cerebral Blood Volume
CNS	Central Nervous System
CSF	Cerebral Spinal Fluid
CT	Computed Tomography
DB	Decibels
DIR-MRI	Double Inversion Recovery MRI
DTI	Diffusion Tensor Imaging
DWI	Diffusion-Weighted Imaging
FCM	Fuzzy C- Means Clustering
FLAIR	Fluid Attenuated Inversion Recovery
FMRI	Functional Magnetic Resonance Imaging
GM	Grey Matter
MEG	Magnetoencephalography
MR	Magnetic Resonance
MRA	Magnetic Resonance Angiography
MRI	Magnetic Resonance Imaging
MRS	Magnetic Resonance Spectroscopy

MRSI	Magnetic resonance spectroscopic imaging
MRT	Magnetic Resonance Tomography
MRV	Magnetic Resonance Venography
MS	Multiple Sclerosis
NMR	Nuclear Magnetic Resonance
NMRI	Nuclear Magnetic Resonance Imaging
PET	Positron Emission Tomography
PSIR-MRI	Phase-Sensitive Inversion recovery MRI
RF	Radio Frequency
SPECT	Single Photon Emission Tomography
WM	White Matter