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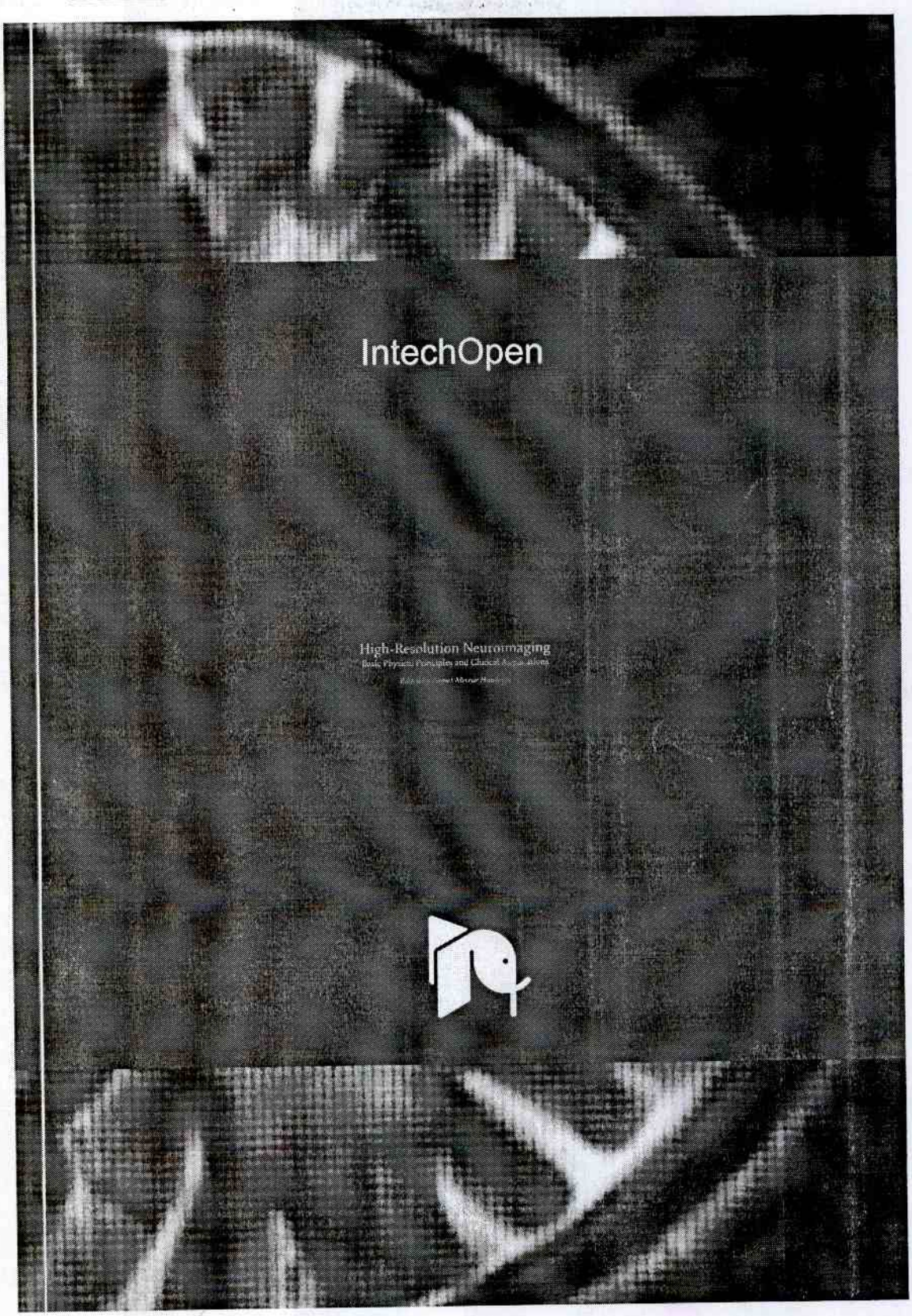

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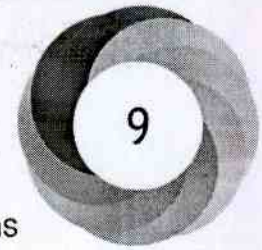

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Chapter 4

Detection of Brain Tumor in MRI Image through Fuzzy-Based Approach

Neha Mathur, Yogesh Kumar Meena, Shruti Mathur and Divya Mathur

Additional information is available at the end of the chapter

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Abstract

The process of accurate detection of edges of MRI images of a brain is always a challenging but interesting problem. Accurate detection is very important and critical for the generation of correct diagnosis. The major problem that comes across while analyzing MRI images of a brain is inaccurate data. The process of segmentation of brain MRI image involves the problem of searching anatomical regions of interest, which can help radiologists to extract shapes, appearance, and other structural features for diagnosis of diseases or treatment evaluation. The brain image segmentation is composed of many stages. During the last few years, preprocessing algorithms, techniques, and operators have emerged as a powerful tool for efficient extraction of regions of interest, performing basic algebraic operations on images, enhancing specific image features, and reducing data on both resolution and brightness. Edge detection is one of the techniques of image segmentation. Here from image segmentation, tumor is located. Finally, we try to retrieve tumor from MRI image of a brain in the form of edge more accurately and efficiently, by enhancing the performance of diffe rent kinds of edge detectors using fuzzy approach.

Keywords: fuzzy inference system (FIS), magnetic resonance imaging (MRI), nuclear magnetic resonance (NMR)

1. Introduction

The tumor refers to as a swelling in any part of body, which creates a lump or mass in the body. The term "tumor" which literally means swelling, can be applied to any pathological process that produces a lump or mass in the body. Tumors are the major characteristic of neoplasm's [1]. Neoplasm is a group of diseases term usually used for cancers. Sometimes while performing

system rules set. These thresholds are then provided to Sobel edge detector. The comparison between the performance of edge detectors, by considering an edge detected image obtained by using edge detectors such as classical Sobel edge detector, canny edge detector and Sobel edge detector with proposed method is made on the basis of subjective method. The simulation results are shown in **Table 2**, whose first column represents the input of original MRI images 7.tif, 30.tif, 9.tif, 35.tif, respectively. The second, third and fourth column of table contains the output edge detected image obtained from the classical Sobel edge detector, Canny edge detector and modified Sobel edge detector using proposed method respectively.

In **Table 2**, the performance of classical Sobel and canny edge detectors on the basis of human judgment, compare with the performance of the improved Sobel edge detector implemented by the proposed method. After Serial number, the leftmost column shows the original image and the rightmost column shows the edge detected image of it obtained from the improved Sobel edge detector. The edge detected image obtained from the classical Sobel and canny edge detectors is presented by the second and third column respectively.

From the above result, it is clear that Canny edge detector provides over segmentation as it provides a large number of edges in an image which makes difficult to detect the tumor. Classical Sobel provides a limited number of edges, which in some images not even completes the boundary of tumor. When proposed method is applied to the classical Sobel, it enhances its performance by providing complete edges of the tumor.

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