

**Major Project Report**

**On**

**3-D reconstruction of biological imaging**

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| SL. N0. | Topic | Page N0. |
| 1 | Abstract |  |
| 2 | Introduction |  |
| 3 | Literature Survey |  |
| 4 | Problem definition |  |
| 5 | Solution Strategy |  |
| 6 | Gantt Chart |  |
| 7 | References |  |

**Contents**

**Abstract**

3-dimensional reconstruction model can help doctors in better visualization of human organs and make it easier and more accurate to diagnosis and prescribe therapy for the patient .​ Biological imaging produces 2 dimensional images that represents different cross sections of the appropriate part of the human body . 3dimensional reconstruction model is an important technique for accurate localization and evaluating brain tumor, thus helping neurosurgery planning for brain tumors. ​Accurate 3D reconstruction of human tissue is a challenge problem in medical imaging. In this paper, a novel 3D reconstruction method of human brain MRI images is proposed based on the segmentation of human tissue. First, we propose a novel region-based growing algorithm to get points of an MRI image. Then, the moving cubes algorithm is used to reconstruct the accurate 3D object model​. Results showed that the quality of the 3D brain tissue reconstruction was acceptable and linear interpolation of the 3D model improved the visualization of the brain surface morphology. This bias ﬁeld inconsistency can induce artifacts in the ﬁnal 3D reconstruction that can impact both clinical interpretation of key tissue boundaries and the automated analysis of the data.

**Introduction**

In recent years, magnetic resonance imaging has been widely used for various medical purposes . However, the traditional biological images only provides two dimensional (2D) images, and cannot been used to create an explicit three dimensional (3D) model . Therefore, reconstructing 3D model from 2D MRI images becomes an active research topic. The key challenge is how to obtain 3D data with high accuracy from original MRI images. The traditional methods of improving the 3D point accuracy are by improving the accuracy of region-based growing. Lavoue et al. improved the traditional seed selection scheme by dividing the pixels of the image into 9 types according to plus-minus of mean curvature and the Gaussian curvature. However, there are three main limitations of this algorithm: (1) the proposed method ignores the vertex points on the sharp edge, (2) the edge that dihedral angle is greater than the given threshold, (3) using the sharp edge information to improve the growing conditions doesn't work well on all cases. Zhang et al. . used Gauss curvature to assign all vertex , and set the vertex which has the larger minus Gauss curvature as the board by the threshold and minimum criteria. Their approach chooses work on MRI images since MRI images always lack of feature points and are gray scale images without much color changes. ultrafast multislice imagings equences ,such as single shot fast spin echo (SSFSE) or half-Fourier acquisition single shot turbo spin echo (HASTE) are increasingly popular in clinical imaging of moving anatomy, allowing the clinician to view 2D slices of anatomy in challenging clinical applications such as in utero fetal brain studies.

**Literature Survey**

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| Sl. N0. | Author and paper details | Findings | relevance |
| 1 | **Author :**T.Senthil Kumar  ,Rakesh , P.B  **Paper details:**   * **Name:"**3D Reconstruction OF Facial Structures From 2D Images For Cosmetic Surgery" * 978-1-4577-0590-8/11/$26.00 ©2011 IEEE | General principle of 3d reconstruction and approach  Visualization based on region of interest | Principal and method for 3d reconstruction approach  Visualization based on region of interest |
| 2 | **Author :**Baijiang Fan, Yunbo Rao, Wei Liu  **Paper details:**   * **Name: "**Region-Based Growing Algorithm for 3D Reconstruction from MRI Images"   978-1-5090-6238-6/17/$31.00 ©20 17 IEEE | Novel 3-dimensional method of human brain mri(magnetic resonance imaging) is proposed based on the segmentation of human tissues | Segmentation methods |

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| Sl. N0. | Author and paper details | Findings | relevance |
| 3 | **Author:**, Chao Yang†and Xinchun Li‡  **Paper details:**   * **Name :"**Reconstruction of Brain Tissue Surface Based on Three-Dimensional T1-Weighted MRI Images"     978-1-4673-9098-9/15/$31.00 ©2015 IEEE | In this paper a technique was given on 3 dimensional M.R.I and 3 dimensional printing to generate a 3 dimensional model that might help neurosurgery planning |  |
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