

Estimation of 3d Visualization for Medical Machinery Images

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ABSTRACT

Measurements with X-ray, CT are subject to a variety of imperfections or image artifacts including: quantum noise, X-ray scattering by the patient, beam hardening and nonlinear partial volume effects. Image processing with Adobe Photoshop, ImageJ, Corel PHOTO-PAINT and Origin software has been used in order to achieve good quality images for quantitative analysis. Image enhancement technique allows the increasing of the signal-to-noise ratio. It also includes linear and nonlinear filtering, deblurring and automatic contrast enhancement. Statistical functions enable to analyze the general characteristics of a neuro image by displaying the image histogram. Data analysis of CT images can help distinguish between a neurological disease, a common disorder like Major Depression (MD) or Obsessive-Compulsive Disorder (OCD) and a normal brain.

Keywords – colour information, medical images, reconstruction, volume rendering, 3D view.

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I. INTRODUCTION

The reconstruction, segmentation and analysis are best approached from the 3D representation of the data set. To plug-in the medical image data set in very powerful manner and scalability integrative to any own macros. The total pixel count was also calculated and displayed, as well as the mean, modal, minimum and maximum gray value by using ImageJ program. Count indicates the total number of pixels corresponding to the intensity level. Computed Tomography (CT) is an imaging technique where digital geometry processing can be used to generate a 3D-image of brain's tissue and structures obtained from a large series of 2D X-ray images. X-ray scans furnish detailed images of an object such as dimensions, shape, internal defects and density for diagnostic and research purposes. Supposing that we have a very narrow pencil beam of monochromatic X rays which traverse an inhomogeneous medium and no scattered radiation reaching the detector, the transmitted intensity.

1.1 SCOPE OF PROJECT

Life sciences are experiencing an increasing demand for scientific image processing. Images are the primary data of developmental and cell biology. The number of images is exploding with the availability of high-throughput and high-resolution technologies. The acquisition of large three-dimensional (3D) data sets, often as time series (4D), has become the new standard. The first step in the analysis of biological image data is its visual inspection. In addition to the general requirement for visualization, the unique characteristics of each data set may demand specialized analysis. In the last twenty years, the fast increasing computing power and the additional support of 3D acceleration from the graphics devices have made it possible to render complex 3D scenes in real time, even in consideration of light sources, reflections and shading. There are two different approaches how to transform the graphical information such that it can be rendered: surface rendering and volume rendering. In the next step, there are two different methods how to project the 3D scene on the screen. The most common method is the normal mathematical layer projection which most video cards support. The other method is called rendering by ray tracing, which is often used in non real-time rendering processes, e.g. during the creation of computer animated movies. The design of the user interface has to be very clear and intuitive. Every function should be reachable within a maximum of two mouse clicks. The options, which directly affect the 3D model, are placed on a left-sided toolbar. By using ImageJ Plugin we can also perform a set of measurement on a selected object . The Integrated Density represents the sum of the values of the pixels in the selection, being equivalent to the product of Area and Mean gray value. Median exhibits the middle value of the pixels in the selected brain tumor. The measurement results are presented in calibrated units. May be some kind of update button is useful to recreate the textures from the current fixel data.

1.2 OVERVIEW OF PROJECT

The development of novel analytical tools is greatly facilitated by the existence of well-documented Plug-in libraries. These libraries must provide means to load and save any of the large diversity of image file formats implementations for computer vision algorithms and graphical user interfaces for data access by a human operator. Current imaging methods such as Magnetic Resonance Imaging (MRI), Confocal microscopy, Electron Microscopy (EM) or Selective Plane Illumination Microscopy (SPIM) yield three-dimensional (3D) data sets in need of appropriate computational methods for their analysis. The part of work in the project is to implement and integration of Algorithms of the following Interactive Surface Plot, Stack Surface Plot and Volume Viewer.

The paper deals with the 3D viewer geometry and colour information. This 3D viewer approaches its deals with rotate all side of the medical machinery images. And also contained color information is to used for affect part of medical images dataset to find out the clear image. In 3D viewer technique the digital geometry processing can be used to generate a 3D-image of brain's tissue and structures obtained from a large series of 3D X-ray images. The interactive 3D surface plot is to improve and perspective of medical image dataset. The luminance of an image is interpreted as height for the plot. Internally the image is scaled to a square image using nearest neighbor sampling. For selections the bounding box of the selection is used for the surface plot. The viewing position of the plot can be adjusted with the mouse. Double click on the plot to show it from the top, triple click on it to show it from the front.

In stack surface plot it **displays a three-dimensional graph of the intensities of pixels in a grayscale or pseudo color image**. The 3D Surface Plot plug-in also generates surface plots. It works with all image types and you can interactively adjust viewing angle, perspective, scale, lighting and smoothing. Creates a stack of plots when the source is a stack. Some plots can be improved by adjusting the contrast of the source image or smoothing it. When plotting a stack, closing the plot stack window will abort the plotting process. In volume viewer, the object is represented as a three-dimensional distribution of linear attenuation. Data collection time for such scanners ranges from 1 to 20 seconds. A special computer program calculates the values of density and creates cross-sectional images of the brain. Modern CT scanner can acquire data in a continuous helical or spiral fashion], shortening acquisition time and reducing artifacts.

I. LITERATURE SURVEY

Tomography software for three-dimensional reconstruction in transmission electron microscopy

Transmission electron tomography is an increasingly common three-dimensional electron microscopy approach that can provide new insights into the structure of subcellular components. Transmission electron tomography fills the gap between high resolution structural methods (X-ray diffraction or nuclear magnetic resonance) and optical microscopy. We developed new software for transmission electron tomography, TomoJ. TomoJ is a plug-in for the new standard image analysis and processing software for optical microscopy, ImageJ. TomoJ provides a user-friendly interface for alignment, reconstruction, and combination of multiple tomographic volumes and includes the most recent algorithms for volume reconstructions used in three-dimensional electron microscopy. The package has been written as a plug-in for ImageJ and benefits from all the possibilities offered by this freeware. The main advantage of this software is the availability of different algorithms for reconstruction. Thus unlike other public domain software for electron tomography reconstruction. This is due to the fact that the two main limitations of electron tomography are the missing edge and the low signal-to-noise ratio of the images.

3d reconstruction of medical images using java3d

Several techniques are described both for surface and volume rendering. In medicine volume rendering is often useful to handle the image stacks which are delivered by diagnostic devices. This work analyzes common rendering techniques with the focus on their usability for the medical sector. 3D computer graphics is a field in computer science with a strong evolution process. The industry has already been using 3D software for designing and testing new machines (e.g. CAD) for a long time. Now, the healthcare sector has discovered these new technologies for their purposes. Especially for diagnostics, image processing and analysis, these new technologies can be used. Images taken by radiological devices deliver important information about the clinical picture of the patient and help to locate anomalies. After a while, an international standard was created for these kinds of images. This standard is called DICOM, which stands for Digital Imaging and Communication in Medicine. Typically the devices make a series of separate images, with each image representing a specific layer of the targeted body part. The main problem is to display volumetric image data as 3D models as fast and accurate as possible.

EXISTING SYSTEM

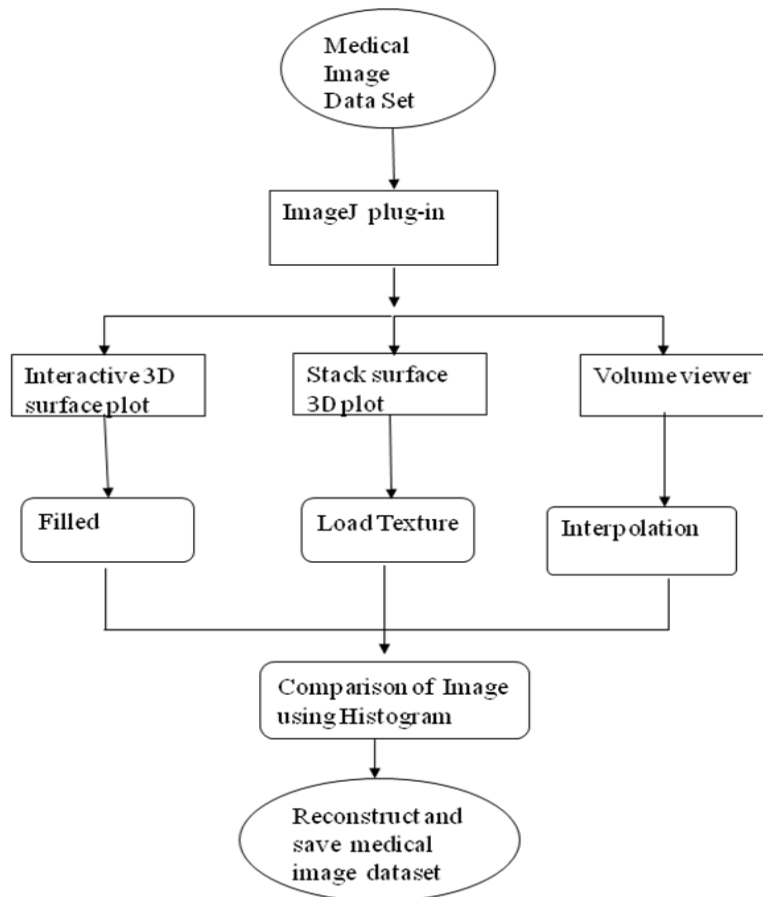
The existing system deals with major problem of Computed Tomography is non-invasive technique. CT image of every part in the human body without superimposition of adjacent structures not used in Stereo Vision using Medical Images. This approach resembles in some way what happens inside our brain, where the two different views coming from the eyes are used to recognize the various object in the scene and by exploiting a pair of images instead of just one allows to greatly improve the segmentation quality and robustness. It is very difficult to stereo vision system using Medical image estimates of 3D geometry of framed scene from two or more views of it. Major problem of stereo vision system using Medical image again reconstruct and also have been resizable and reliable depth information are difficult ones.

PROPOSED SYSTEM

In 3D stereo visualization library it includes a fully-functional plug-in for ImageJ. The plug-in is to be integrated in ImageJ's plug-in menus. When executed, the plug-in creates a new 3D scene, and automatically offers a dialog for displaying any open image stack as an image volume. The dialog provides the means to alter the attributes of the image volume, such as its representation type (volume rendering, isosurface (mesh) or orthoslices), and its colour and transparency settings. The menu of the 3D scene window offers options for inserting further image volumes and editing, annotating and transforming them. The proposed scene segmentation method requires as input two views of the same scene acquired by a standard stereo setup. The proposed scene segmentation method can be subdivided into four steps: Estimation of the 3D scene geometry by a stereo vision algorithm, Construction of a new scene representation that jointly considers both geometry and colour information, Application of a clustering algorithm on the combined colour and geometry data and Final refinement stage in order to remove artefacts due to noise or errors in the geometry extraction.

III. SYSTEM ARCHITECTURE DESIGN

Fig 3.1.1 Architecture Diagram



IV SYSTEM IMPLEMENTATION

4.1 MODULES AND ITS DESCRIPTION

1. 3D viewer geometry and colour information
2. Volume viewer
3. Interactive 3D surface plot
4. Stack surface plot

4.1.1 3D VIEWER GEOMETRY AND COLOUR INFORMATION

Computed Tomography (CT) is an image is to be applied by 3D viewer technique where digital geometry processing can be used to generate a 3D-image of brain's tissue and structures obtained from a large series of 3D X-ray images. X-ray scans furnish detailed images of an object such as dimensions, shape, internal defects and density for diagnostic and research purposes. Supposing that we have a very narrow pencil beam of monochromatic X rays which traverse an inhomogeneous medium and no scattered radiation reaching the detector, the transmitted intensity can be written as

$$I_{\phi}(x') = I_0(x') \exp\left(-\int_l \mu[x, y] dy'\right)$$

where $I_0(x')$ is the unattenuated intensity, ϕ and x' define the position of the measurement, $\mu[x, y]$ is the two-dimensional distribution of the linear attenuation coefficient, l is the straight line joining the source and detector. The X-ray source and detector rotate with the $x'y'$ frame and the X-rays travel parallel to y' . Projection (Radon Transform) of the object $\lambda_{\phi}(x')$ is defined as [1, 6]:

$$\lambda_{\phi}(x') = -\ln\left[I_{\phi}(x')/I_0(x')\right] = \int_l \mu[x, y] dy'$$

4.1.2 VOLUME VIEWER

The object is represented as a three-dimensional distribution of linear attenuation coefficient $\mu[x, y, z]$. In CT scanners the X-ray attenuation according to equation (1) is measured along a variety of lines within a plane perpendicular to the long axis of the patient with the goal of reconstructing a map of the attenuation coefficients H for this plane [3]. The resulting attenuation coefficients, in Hounsfield units are

$$H = \frac{\mu_{\text{tissue}} - \mu_{\text{water}}}{\mu_{\text{water}}} \times 1000$$

Small differences in H can be amplified visually by increasing the contrast of the display. In a third generation fan beam X-ray tomography machine a point source of X-rays and a detector array are rotated continuously around the patient. Data collection time for such scanners ranges from 1 to 20 seconds. A special computer program calculates the values of density and creates cross-sectional images of the brain. Modern CT scanner can acquire data in a continuous helical or spiral fashion [5], shortening acquisition time and reducing artefacts such as: quantum noise, X-ray scattering by the patient, beam hardening and nonlinear partial detector sensitivity, inadequacies in the reconstruction algorithm, non-uniformity scanning motion, fluctuation in X-ray tube voltage, etc.

4.1.3 INTERACTIVE 3D SURFACE PLOT

This plug-in creates interactive surface plots from all image types. Selections, which can be non-rectangular, are supported. The luminance of an image is interpreted as height for the plot. Internally the image is scaled to a square image using nearest neighbor sampling. For selections the bounding box of the selection is used for the surface plot. The viewing position of the plot can be adjusted with the mouse. Double click on the plot to show it from the top, triple click on it to show it from the front. The Perspective and Scale sliders allow the 3D-projection and the size of the surface plot to be changed. The plot height may be scaled with the ZRatio slider. The "Min and "Max sliders will limit the height range of the plot data. Best plotting results will be achieved if the image has the same size as the plot grid. Using the "Load Texture button opens another image that will be used as texture map. This feature can be used to warp images.

4.1.4 STACK SURFACE PLOT

Noisy images can be smoothed with the "Smoothing" slider. The "Lighting" slider gives the impression that the plot was illuminated and so improves the visibility of small differences. The "Save Plot" button generates a new image containing a screenshot of the surface plot. This algorithm say, it is to be calculated the x,y,z and xy,yz,zx position of Medical machinery images such as CT Scan and Microscopy, because CT scan its produced for Red Radiation signal. The Stack 3D surface plot is to improve the smoothing and also perspective of medical image dataset. Finally it is to be calculated the depth color degree 90dg upto 360 dg, without resolution change in original affect. Displays a three-dimensional graph of the intensities of pixels in a grayscale or pseudo color image.

V CONCLUSION

The paper investigates which estimation of synthesized view quality in 3D visualization are best suited to this kind of analysis. Experimental results confirm the effectiveness of the proposed framework and allow to properly rank stereo vision systems on the basis of their performances when applied to the scene segmentation problem has been solved and also improve performance. For programmers, it offers the means to trivially augment the capabilities of their custom applications with hardware accelerated 3D visualization. The framework has been very well received by the user and developer community, and is currently in use by numerous based application.

VI FUTURE ENHANCEMENT

Image enhancement technique allows the increasing of the signal-to-noise ratio and accentuates image features by modifying the colors or intensities of X-ray CT brain image. The X-rays penetrate the tissues differently depending on the type of tissue. The solid tissue, such as bone, appears white and the air appears black. Image processing of X-ray CT scans displayed the characteristic pattern of a normal and abnormal brain showing calcified and lack tissues or asymmetric perfusion in both hemispheres correlated with the neurological disease. Image analysis with OriginPro 7.5 and ImageJ programs revealed Histograms, Profile Plots, Power Spectra, measurements on a brain tumor with a Feret's Diameter of 1.724 cm and 3D Color Surface Graphs.

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