Automated Segmentation And Tracking of The Intima Media Thickness in Carotid Artery Using Wavelet Decomposition And Histogram Equalization.

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ABSTRACT
In this paper we have developed a novel fully automatic algorithm for the segmentation, measurement, and tracking of the intima media complex (IMC) in B-mode ultra sound video sequence. We are using MATLAB 2013b version. In the initialized step customized video tracking method is used to detect the IMC more accurately in the particular frames. Image-pre-processing is done to remove the noise. Using wavelet decomposition and histogram equalization technique, IMT wall is been enhanced and then the wall is segmented. Blob detection is used for the video tracking process.

Keywords- cardiovascular events, Blob detection technique, automated video processing.

I. INTRODUCTION
Video tracking is the process of locating a moving object using a camera which of some are human computer interaction, security surveillance, video communication and compression ,traffic control, video editing. The video tracking is a time consuming process because the amount of data that is been contained in the video is processed efficiently. The main objective of video tracking is to associate target objects in serial video frames. Because of the increase in complexity of the problem the tracked object changes positions over different periods of time. In order to reduce the complexity the image target may change for different possible motions of objects. For instance
(1)When tracking planar objects, the motion model is a 2D transformation of an image of the object (e.g. the initial frame)
(2)When the target is a rigid 3D object, the motion model defines its aspect depending on its 3D position and orientation.
(3)For video compression, key frames are divided into macro blocks.
(4) The motion model is a disruption of a key frame, where each macro block is translated by a motion vector given by the motion parameters
The image of deformable objects can be covered with a mesh; the motion of the object is defined by the position of the nodes of the mesh.

Fig.1. An example of visual serving for the robot hand to catch a ball by object tracking with visual feedback that is processed by a high-speed image processing system.

II. ALGORITHM
To perform video tracking an algorithm examines sequential video frames and outputs the movement of targets between the frames. In this paper we are using WFIM Algorithm called as Wavelet Filtering Intima Media Algorithm, in which the wavelets are used for processing and compressing the images of intima wall and also it reduces the computational complex of separable transforms. There are two major components of a visual tracking system: target representation and localization of filtering and data suggestion. The following are some common target representation and localization algorithms: Blob tracking, Kernel based tracking; contour tracking, visual feature matching, and Particle filter tracking.

A. Blob Tracking: Blob tracking refers to mathematical methods that are aimed at digital images.
B. Kernel tracking: It is a mean shifting tracking based on maximization similarity measure.
C. Contour tracking: It refers to detect the object boundaries that are initialized from the previous frame to the new position in the original frames.
D. Visual Feature matching tracking: It used for registration
E. Particle filter tracking: This tracking allow the tracking of complex objects along with more complex object interaction like tracking objects moving behind obstructions.

III. TOOLS USED
The methodology used in this paper is Blob detection methods. In this paper we have used a framework for removing the noise and complexity of image in the intima wall. These frames are analysed used the frame analysis technique. Image Pre-processing technique tool is used to remove noise from the videos. Also Image Enhancement method namely Wavelet decomposition technique and Histogram equalization technique for segmenting walls of intima wall. The segmentation is done using a technique called Blob
detection technique. Also measurement analysis is also applied for measuring the length and diameter of the carotid artery.

IV. INTIMA MEDIA THICKNESS
Intima-media thickness (IMT), also called as intimal medial thickness, is a measurement of the thickness of innermost layer of wall of artery of tunica intima and media. The thickness of wall of blood vessels can be measured using other imaging modalities. It is used to detect and track the atherosclerotic disease present in human and also to regret and process the atherosclerotic. It is also used as a non-invasive tool to track the changes in the arterial walls. The IMT can predict the cardiovascular events in future with the usefulness of measuring the changes in IMT overtime. IMT is occasionally used in clinical practice, but its role is not clear. The management of arterial hypertension suggested the use of IMT measurements in high-risk patients to help identify target organ injury. IMT has increasingly become easier to measure using higher grade equipment and careful attention to image quality; most clinical carotid ultrasound software in widespread use in the United States is not designed to easily facilitate measurement of IMT
Advantages of external ultrasound methods are
Lower cost compared with most other methods
Relative comfort and convenience for the patient being examined
Lack of need for any IV's of other body invasive methods (usually) and
Lack of any X-Ray radiation.

V. WAVELET TRANSFORM
Wavelet transformation is one of the most popular candidates of the time-frequency-transformations. This paper deals with the formal, mathematical definition of an orthonormal wavelet and of the integral wavelet transform. The wavelet Packet Decomposition (WPD) is also known as Optimal Sub band Tree Structuring (SB-TS). The Discrete wavelet transform is used to transform the wavelet where the discrete-time signals is passed through more filters.

VI. SAMPLE CODING
clear all;
close all;
clc;
v=VideoReader('new1.avi');
yvd=v.NumberofFrames;
xvd=read(vd);
\[ \text{Wname} = \text{db1} \]
\[ [cA1,cH1,cV1,cD1] = \text{dwt2(OrgImage,Wname)} \]
\[ [cA2,cH2,cV2,cD2] = \text{dwt2(cA1,Wname)} \]

\[ \text{EnhancedImage} = \text{idwt2(cA2,cH2,cV2,cD2,Wname)} \]

\[ \text{EnhancedImage2} = \text{adapthisteq(EnhancedImage)}; \]
\[ \text{li=bwlabel(EnhancedImage2,8);} \]
\[ \text{cl=label2rgb(li,'lines','w','noshuffle');} \]
\[ [\text{B,L,N,A}]=\text{bwboundaries(bbb2)}; \]

Distance measures
(For further coding contact the author’s email)

VII. SIMULATION RESULTS

**Fig 2.** Length of the carotid artery

**Fig.3.** Diameter of the Intima media thickness
VIII. CONCLUSION

Thus this paper deals with the IMC segmentation, is the substantial level of supervision that is required to compensate for the errors that are generated by the challenging imaging conditions that are present in the CCA video ultrasound data. In this we have introduced a new automatic methodology for the segmentation and tracking of the two IMC interfaces in longitudinal carotid B-mode video ultrasound sequences that is able to identify in an unsupervised manner the IMT changes and the LI and MA displacements during the cardiac cycle. , the evaluation of the IMT over the cardiac cycle allows the extraction of additional indicators that can be used in the assessment of the arterial dynamics, which may allow a more accurate prediction of future cardiovascular events.

IX. SUMMARY

Puthanial.M is pursuing her PhD in Wireless communication related work in the area of smart antennas under the guidance of Dr. P. C. Kishore Raja.

Charlet Shiny. J and Bhuvaneshwari. C, Undergraduate students from Department of Electronics and Communication Engineering worked very closely on the paper and currently working on their project about video tracking for locating objects in human, and also the reduce the increase in the complexity of tracked and remove the noise video image and also segmented the image is enhanced using Blob detection technique and measure the length and diameter of the carotid artery using software’s- MATLAB 2014a version.

X. REFERENCES


