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# Non-invasive visualization of vein in geriatric patients

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***Abstract--****Medical treatment require to access vein in which is challenging in geriatric patients. As age goes, the skin loses tone and elasticity, becoming more prone, bruising and fragile. Older patients experience several medical conditions and weakened immune systems in which excessive venous puncture are anxious. Thanks to lack of subcutaneous material, the veins become less healthy. NIR camera is used for vein pictures and the MATLAB (MATLAB) program package for processing is used. The camera resolution for NIR amounts to approximately 1080 * 720, which picks up areas behind the skin in order to find the venas by means of a new approach to visualize the vein using the triangulation of the hand photos. The tips of the knuckle are used for standardizing photos and separating regions of concern from the view of veins.*

***Keywords--*** *Geriatric patients, triangulation, styling, knuckle shape, visual.*

## I INTRODUCTION

For certain cases, diagnosis or recovery involves the usage of blood drawings, medications and substances, which can be accomplished with the adequate exposure to patients to their venous system. Words which do not need fast access allow doctors and phlebotomists more time to locate a vein. During emergency incidents such as vomiting, severe kidney dysfunction, hypotension, pain, and cardiac arrest, the patient's vein must be instantly available. However, even qualified paramedics or doctors can very often fail to get patients access.

Many of those patients who do not appear palpable or visible to the nose bumps are geriatric [1-3]. Biomedical imaging methods assisted by biological tissue wave propagation are used to diagnose and cure infections, but are often used to view organ and biological systems within the body in a non-invasive way. Optical tomography may be a increasing imaging technique that offers non-invasive, experimental usability, cost-effectiveness and reproductiveness. Optical light that gives the cellular physiological modifying phenomenon work at different wavelengths provides knowledge on biological processes, supplied with some kind of interaction [3-6]. Over the past decade, publications in the sector have published exciting findings as genuinely shocking pictures of human or animal organs, enabling one to visualize bio-medical imaging capabilities with light. Very few reports include information on visualizing subcutaneous veins [7-9]. In obese individuals, it is impossible to find veins by the contact or vision owing to the existence of large amounts of subcutaneous fat. Tendencies of the adipose tissue tend to imagine the vein and therefore contribute to weakness in the area [10]. The nurse or plebotomer should be

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equipped to distinguish adipose tissue from veins so such mistaken sticks should be prevented. Geriatric patients can quickly fall down due to lack of elasticity, whereas pediatric patients have strong yet delicate veins and are very short.

It is difficult to find the veins of geriatric patients, because most do not comply with each other and catch veins[3]. Anguish allows the blood pressure of the victim to increase and therefore to compress the vein. The reduction of the venous tissue is a major issue because of the fragile veins in elders. The experience of prior venous punctures in a patient is important as people with past vein punctures are more likely to have compromised veins. One explanation is that the vein rolling is failed because the vein moves away from the position where the needle was implanted which leading to needless sticks. For the corresponding shifts in the body, the mechanism expands or growing. The hand muscles shift as the body length from infancy increases. Throughout adult life, development is typically small and thus vein trends are relatively constant in the age range of 20-50 years.

Veins can compress, break and burst, and so vein simulation is challengeful. Problems including fatigue, lack of vein patency, and poor blood pressure, as well as other issues such as arthritis, are affected by a stroke in the elderly. In near-infraroad for illumination, the blood vessels receive fewer radiation than their corresponding subcutaneous area and thus create strong contrasts. NIR imaging of the hand vein was also researched for private venous trends in the literature which, as age is increased, lose visibility. A vein image[4] used to detect the thick veins will be displayed by the NIR camera.

## II PROPOSED SYSTEM

NIR camera is used for vein pictures and the MATLAB (MATLAB) program package for processing is used. The resolution of the NIR camera is around 1080 * 720, which picks up regions under the skin to see the veins. The system's expense metric is one of the key benefits. A new approach is used to triangulate images of the hand and to extract information from the knuckle form. The knuckles are used to normalize the image and to remove the area of interest. Finally super imposition using transparency and indexing algorithm which is executed to provide visualization of veins over raw input image.

**A.NIR camera:**

Normal camera with resolution 1080*720 when removing the IR filter will become NIR camera where the hand image is illuminated by IR illuminator with wavelength 700nm as shown in figure. 1.

**Figure 1**:Hand Image

**B. Binarisation:**

Using Ostu thresholding, the picture is transformed into a gray color. The threshold of Otsu contains all relevant threshold values for iteration as shown in figure. 2.

**Figure 2**:Binarised Image

The threshold value is determined by pixels that each fall to the foreground at each pixel point on either side of the threshold; the threshold value is estimated by the mean sum of the foreground and the background diffusion.

**C. knuckle tip:**

The contour of the image is obtained before finding out the knuckle point as shown in figure. 3. These tips will be used as location point to find vein pattern and these points are given 1,2,3 key points

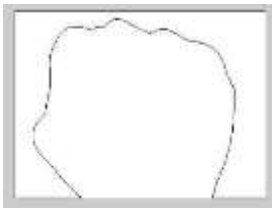


**Figure 3**: Contour Extraction

The tips for the knuckle are derived from the middle base by finding the peaks from rising point of contour. The same approach is used to find finger tips using the detection of manual geometry as shown in figure. 4. Used to check the visual contour from left to right and from top to bottom to see tips in your hands.

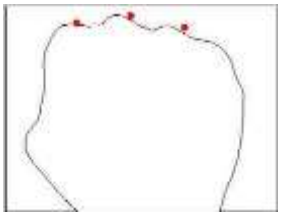


**Figure 4**:Knuckle Tip extraction

**D.Roi extraction:**

The pictures taken from the NIR camera are of low quality, with blurry veins attributable to noise and irregular illumination of close-to-distance IR illuminators. This process of analysis of vein patterns is empirically tailored to the essence of the images produced as shown in figure. 5.

**Figure 5**:ROI Extracted Image

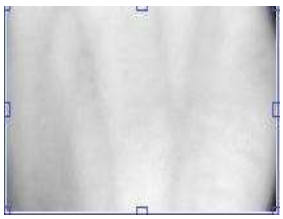


Figure.6 subject to adaptive histogram equalization with local gray level details for image enhancement. The resulting picture is thinner that creates the structure of the vein template.

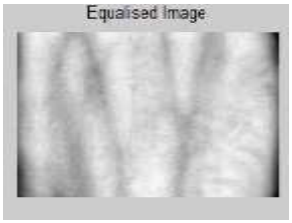



**Figure 6**: Equalized Image

The picture output is thinner, producing the shape of the vein pattern as shown in figure. 7.

**Figure 7**: Thinned Image

**E. Vein bifurcation and vein ending:**

The derived vein pattern is used to locate secure and special focal points as shown in figure. 8. A vein fork finds a vein point that forks or diverses in branch veins, and the vein ends at the end of the vein. The connection of each pixel and the crossing number are measured and bifurcation. The crossing number is calculated.

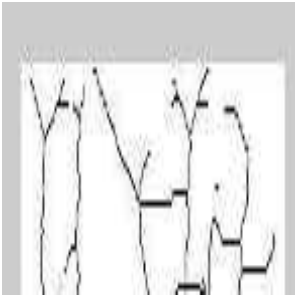
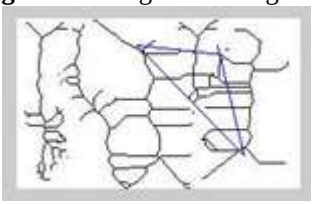


**Figure 8**: Vein Pattern Extraction

**F. Minutiae triangulation:**

The solution to triangulation is to use the triangulation of Delaunay using a simple topological form. During superimposing, the points are used to locate the dense veins. The venous are readily visible in geriatric patients for use in surgical procedures as shown in figure. 9.

**Figure 9**:Triangulated Image.



The position and type of a, i.e=(pi, qi, mi). The type of minutiae can be represented.

**G. Super imposition:**

Transparency and Indexing Algorithm is used. The superimposing is achieved by overlapping the image. The raw hand image is super imposed over vein detected as shown in figure. 10.

**Figure 10**: Original Image

**Figure 11:** Vein Image

This method is used to find out the veins which are thick and finds out their connectivity over them as shown in figure. 11.

## III RESULTS

The aim of this project is to identify the veins of patients in geriatric patients in a non-invasive way. In certain instances, the venous vein is weak or not noticeable during the venous puncture process. This Vein imagery system is an infrared imaging device that provides means to locate venous at the very first attempt. it is necessary to know the exact position of the vain as shown in figure. 12. Thin venes are not evident so only the thickest veins are noticeable during this phase, meaning that they are suitable for injection of Cather or blood gathering.

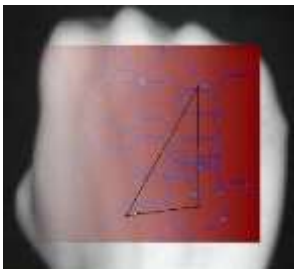


**Figure 12:** Super Imposed Final Vein Image

The image data set consists of 30 images captured from people of different age group ranging from 60 year to 70 years. The images have been captured by the NIR camera with resolution 1080*720 using triangulation as shown in figure. 13. The obtained triangle points will provide the thick vein bifurcation points.

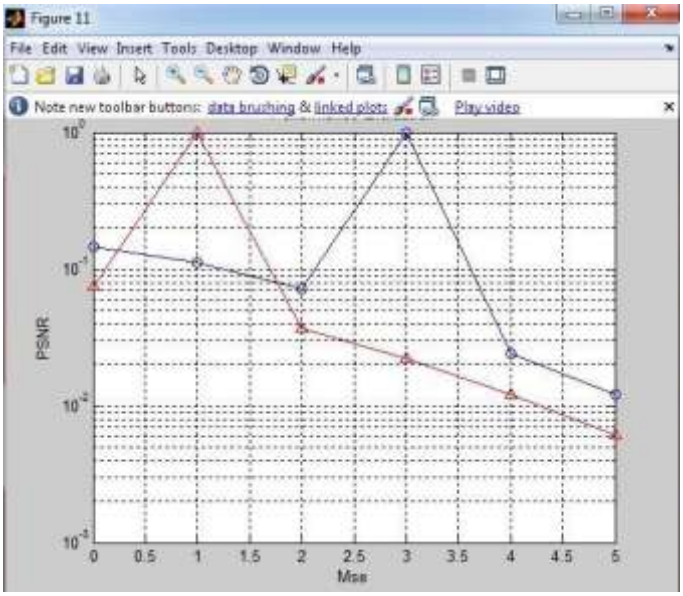



**Figure 13:** Performance Metrics

The performance metrics of the output is compared original input hand image where the noise is filtered

## IV CONCLUSION

This project provides a complete vision system for efficient low cost veins visualization in geriatric patients. During the first effort to prevent discomfort and suffering owing to the repeated application of a needle, the nurses will then locate their veins. A study of the optimal wavelength combinations for various skin tones and/or hair must still be conducted further.

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