

A Survey on Fingernail Images For Disease Detection

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Abstract- Here we are discussing about a new method to recognize finger contact by image analysis, which does not disturb user's tactile feeling. Digital image processing plays a crucial role in medical imaging. Here we discuss about nail colors, texture, shape and pliability which are useful to detect disease. Nails diagnosis is the method in traditional medicines to detect the disease. Nails can show the present health condition of the human, genetically inherited information, and historical information of drugs usage. Many diseases could be identified by performing various tests on the nails of hands. Image preprocessing, image acquisition, segmentation, feature extraction etc, are various digital image processing technique that are used to identify features of the human nail. Normally pink and smooth nails show that the person is healthy. The various techniques used to process the nail images for disease detection has reviewed in this paper.

Keywords- Fingernail, Lunula, Nail body, Nail root, Eponychium, Nail Texture, Gall bladder.

I. INTRODUCTION

An array of matrix of square pixels is placed in rows and column is known as an image. To get the helpful information some operations are performed on an image. One of such operations is image processing. Image processing is a research on any algorithm that takes one image as input and returns an image as output .Image processing consists of image display and image printing, image editing and manipulation, image enhancement ,future detection, image compression.Applications of digital image processing contains biology, astronomy, security, biometrics ,medicine, military applications ,face recognition,etc.,

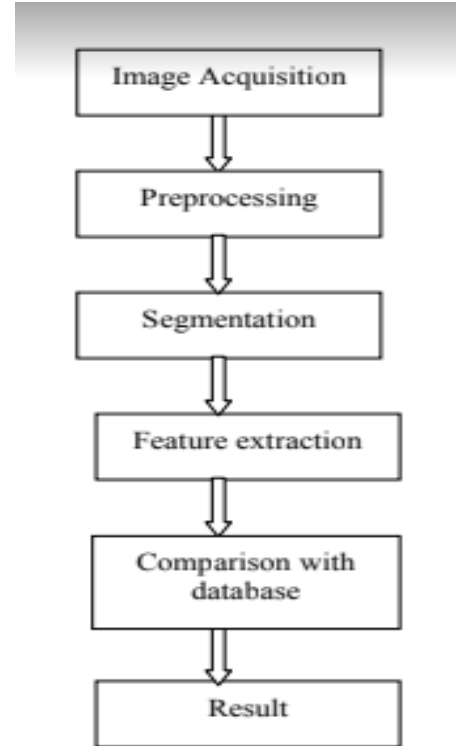


Figure 1. Block diagram of digital image processing

Nail image analysis consists of following steps:

1. **Image acquisition:** Digital image acquisition is the process of creating photographic images such as the interior structure of an object. The term is used to imply or include the processing, compression, storage, printing and display of such images. Accurate image analysis can be obtained by high resolution images. Scanner or digital camera takes image as an input. Preprocessing can be involved in this image acquisition such as scaling etc., Image processing is defined as an action of collecting an image from source. It is usually a hardware based processing. Without a figure no processing is possible. The image that is gained is completely unprocessed. Image acquisition is used to work with various sensors.
2. **Preprocessing:** Generally Pre-processing is an operation of images at the lower level of abstraction – both the output and input are intensity images. The main goal of pre-processing is to improve the image that decreases the unwanted distortions and enhances some image features

that are important for further processing. The main use of digital image processing method is its adaptability, repetition and the preservation of the original data precision. In the digital processing the image pre-processing consists of various techniques. The image pre-processing technology is the main objective of the study, this also is the present market and is also in usage. The complete range of image pre-processing is used in areas like the photography computations and photo enhancements. Pre-processing is used in order to evaluate steps that will avoid the difficulty and results in the increasing the accuracy of the implemented algorithm. Most preprocessing steps that are used to implement to reduce noise and to reconstruct an image, in order to perform operations of morphological and to convert the image to grayscale so that operations are implemented easily on the image.

3. Segmentation : Segmentation of image is the process of partitioning a digital image into multiple segments. The goal of segmentation is to simplify and/ or change the representation of an image into which that can be easier to analyze and is more meaningful. Segmentation attempts to partition the pixels of an image into groups that strongly correlate with the objects in an image. In segmentation the first step is automated computer vision application. Segmentation algorithm generally based on one of the two basis properties of intensity values those are discontinuity and similarity. There are various image segmentation such as non-contextual thresholding, contextual segmentation and texture segmentation.

4. Feature extraction: Feature extraction is the process by which certain features of interest within an image are detected and represented for further processing. Feature extraction starts from an initial set of measured data and builds derived values intended to be informative and non-redundant, facilitating the subsequent learning and generalization steps. The feature extraction stage is built and designed to process real images. The general features involved in feature extraction are independent features such as color, texture, and shape.

5. Comparison with database: Database is compared with the output of phase of the feature extraction which is generated.

6. Result: The disease detection in this phase is made by considering the result in the previous phase. To detect the disease in human body there are many ways such as nails, pathological tests, observation of tongue and nails etc., To identify diseases images of nails are considered in this

paper. As the nails are farthest from the heart they are the last to receive oxygen. Nails are the finger tip's envelop. They are often the first to show the signs of the disease due to this. Finger nail structure is shown below:

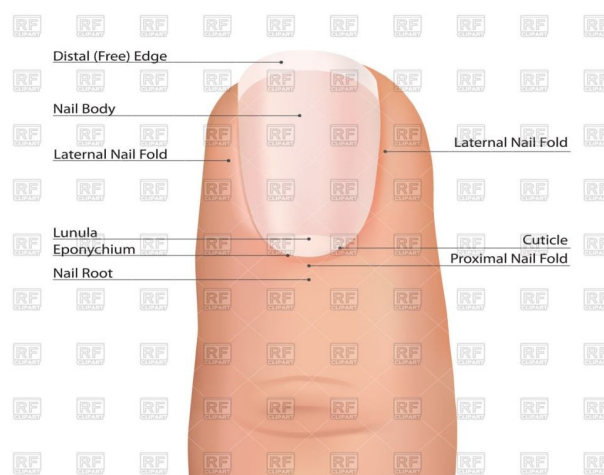


Figure 2. Figure Nail Structure

Group of organs that are represented by each finger are described below:

Table 1.

Finger name	Organ
Thumb	Excretory system, brain and also in the reproductive organs , stomach and spleenwort.
Index Finger	Nervous System ,Liver and gall bladder, kidney
Middle Finger	Blood circulation, yolky bitter and heart.
Ring Fingers	Hormonal System, Large Intestine, lungs and reproductive organs.
Little Finger	Heart and Digestive system

Generally Healthy human will have smooth, pink and shiny nails. Nail color analysis and disease symptoms are described as below:

Table 2.

Nail color	Disease Symptoms
Blue	Heart disease, Atherosclerosis, liver disease hepatitis, heart disease, lung disease, gas poisoning ,blood clots, prior strokes, lupus, increase of cholesterol, inflammation, decrease in hemoglobin,

	hypotension, myocardial infarction, severe infection, hypocalcaemia.
Black	Anemia, chronic kidney disease, trauma, silver deposits, cancer, bacterial infection, Adrenal gland, problems , liver disease, melanomas.
Green	Bacterial infection such as Bacillus infection, localized fungal infection, allergies to cleaning agents
Brown or Copper	Arsenic or copper poisoning , fungal infections
Gray	Lung problems, malnutrition ,arthritis ,edema, glaucoma ,cardiopulmonary disease.
Yellow	Bleeding , liver disease, nail fungus problems , digestive problems, diabetics, poor circulation, hyperthyroidism, lymphatic problems, respiratory problems
Pale or white	Overall mineral deficiency, heart or lung problems, kidney and liver disease, ulcers, malnutrition, anemia , candida, hookworm infestation.
Purple	Circulatory problems, oxygen deprivation, congenital problems.
Red	Brain hemorrhage,heartdisease,carbon monoxide poisoning, stroke, high blood pressure, lung disease.

II. NAIL TEXTURE AND MAKING ANALYSIS

Table 3.

Nail texture and making	Disease symptoms
Vertical ridges and split nails	Poor absorption in small intestine, vitamin A deficiency, iron deficiency, kidney problems, lupus, inflammation, depression , protein deficiency, hyperactivity, trauma, laryngitis, chemicals from food , dieting, asthma, chemo or radiation side effect.
Horizontal dips	Thyroid disease,syphilis, autoimmune diseases,

	accumulated toxin in the body and chronic infection like cancer ,picking at the nail bed , heart disease, stress.
Red bands at the tips	Liver overload, inflammation of the gastrointestinal tract, allergies.
Yellow nails	Thyroid disease ,diaetes, psoriasis, or respiratory disease such as chronic bronchitis, melanoma.
White spots	Calcium deficiency, vitamin A deficiency, kidney or hormone imbalances.

III. NAIL SHAPE ANALYSIS

Table 4.

Nail shape	Disease symptoms
Short small beds	Heart disease, protection of nervous system is destroyed.
Wide clubbed nails	Lung disease, emphysema, asbestos exposure, formation of cancer cells over lymph tissue.
Clubbed	lung and liver disease, fluctuation of nail bed, softening of nail bed, enlargement of finger tips, nail beds become non harden, heart disease, scars over lungs.

IV. NAIL PLIABILITY ANALYSIS

Table 5.

Nail pliability	Disease symptoms
Brittle or cracked nails	Keratin deficiency , vitamin A and D deficiency, weak functioning of kidney, malnutrition ,Lichen planus, calcium and protein deficiency, hypoparathyroidism, iron deficiency anemia.
Soft and thin nails	Vitamin c and protein deficiency, adrenal gland problems, leg cramps, poor nutrition, vitamin B deficiency ,anemia (low blood count), thyroid disorders.

V. CONCLUSION

By observing features of nails such as texture, color, pliability and shape in this paper we give a review on identification of disease. The data set of images can be observed and verified using image segmentation. Care must be taken and all the conditions and pre-assumptions are to be adhered these results are used in medical field and other branches of science as biometrics. It can be used once and can be changed with the period of time. So it is secure and useful in biometrics where finger analysis is treated as transient biometrics

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