

Tongue Based Diagnosis System Using MATLAB

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Abstract: -- Tongue diagnosis is carried out using MATLAB Software on tongue images having cracks and the results gives the problems associated with the given tongue image. The human tongue carries information about the status of health of a person. A crack on the tongue is also called as a scrotal tongue or fissured tongue, is a condition by deep groves in the dorsum of the tongue. The major areas that we examine for tongue diagnosis are shape, color and cracks on the tongue. Chronic disorders are also revealed by cracks on the tongue. Thus a crack on the images of tongue tells the health condition of a human being. A deep crack in the center reaching to the tip reflects hyper activity of Heart fire. Cracks in the center line reveal back problems. If cracks exhibited horizontally, then it is caused to deep and long standing emotional problems. One crack down in the middle is an indication of nerve disorder. If the crack extends to the tip of the tongue then heart and lungs may be stressed.

Index Terms— Tongue diagnosis, fissured tongue, deep groves, dorsum

I. INTRODUCTION

The tongue is a part of the body with many connections in the human body, both to the meridians and the internal organs that makes us to know about the health status of a person. The normal color of a healthy tongue is a sanguine pink. The color of the patient's tongue provides information about his/her health status. For example, dark red color can cause ulceration, while a white tongue indicates cold attack, conditions such as anemia. Cracks on the surface of the tongue will be deep or shallow in shape. They vary in depth, as deep as 6 millimeters. The appearance of obvious cracks tells the blood stasis and excessive heat in the body. Cracks appearing on the tongue can cause irritation, mouth sores or pain. If the food gets stuck in these cracks it causes bad breath and increases risk of developing a bacterial or fungal infection in the mouth. Around 2-5 percent of the population in the United States of America has cracked tongue. The cracks will grow more as you get older. Causes of fissured Tongue are Melkersson-Rosenthal syndrome(a neurological disorder which causes long lasting swelling of the face, facial muscle weakness), Injury to oral cavity ,Severe alcohol consumption, Severe tobacco chewing, Eating hard food, Down syndrome, glossitis(geographic tongue),drug reaction, over body heat. A cracked tongue may indicate an oral yeast infection, or oral thrush. A weak immune system, diabetes, cancer and vaginal yeast infections are all causes of oral thrush.

Nevertheless, most of the fissures occur on the middle 1/3rd of the organ.

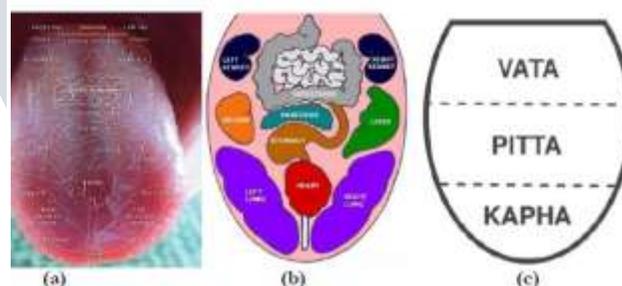


Fig.1 (a) Tongue image (b) Representation of different parts of body on tongue (c) Division of tongue according to Ayurvedic medical system

II. CRACKS ON THE TONGUE BODY

Absence of Cracks: Vata and Kapha are healthy.

One crack in the middle: Is an indication of Vata disturbance and a deficiency of kapha in the stomach. If the crack extends to the tip of your tongue, your heart and lungs may be stressed. These tongue markings can develop from symptoms such as chronic hunger, constipation, heartburn, dry chronic cough and even insomnia. A crack down the middle of the tongue is an indication of a Vata nerve disorder.

Less number of cracks: Systemic Kapha deficiency and disturbed Vata.Kapha deficiency and Vata disturbance indicates that there is a dryness going on in the body and the nervous system is depleted.



Fig.2 The crack in this figure is caused due to Melkersson Rosenthal syndrome

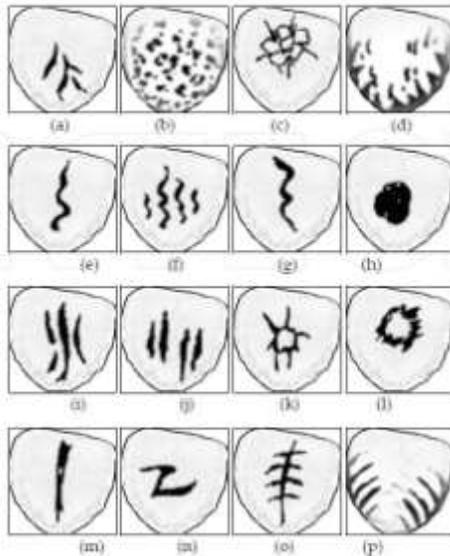


Fig.3 Typical tongue crack categories

According to the Traditional Chinese Medicine theory, there are 16 kinds of typical tongue cracks as shown in Fig.3

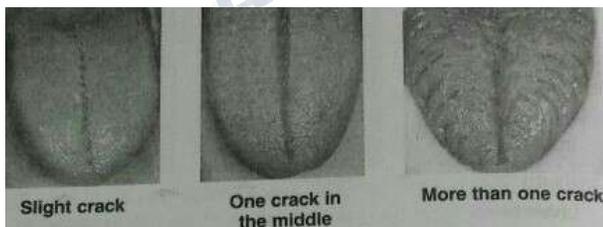


Fig.4 Cracks in the tongue body

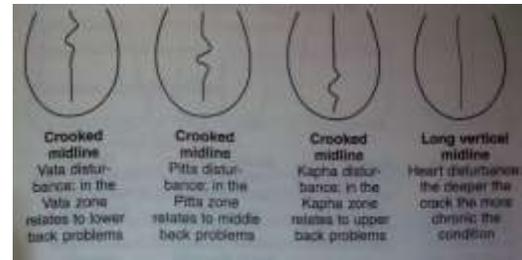


Fig.5 Tongue middle line cracks

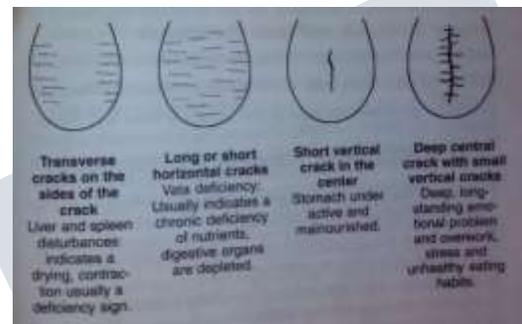
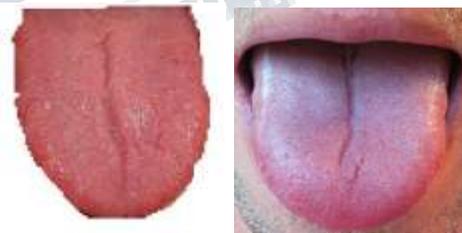


Fig.6 Tongue cracks



(a) (b)



(c)

Fig.6 (a) person is suffering with disturbances in liver and spleen. (b) Suffering from heart disturbance (c) suffering from stomach under active and malnourished

III. METHODOLOGY

Segmentation

The segmentation of tongue images help doctors to diagnose disease. Segmentation of an image is the process of dividing an image into multiple numbers of parts. This is used to identify objects in the digital images. There are different ways to perform image segmentation such as thresholding methods, Color-based Segmentation methods such as watershed segmentation. The simplest method of doing image segmentation is called the thresholding method. We can find numerous applications based on image segmentation are Object detection, Recognition Tasks, Medical imaging , Traffic control systems. The result of image segmentation is a usually a set of segments that collectively cover the entire image or a set of contours extracted from the image. The real purpose of segmentation is to change the representation of an image into a meaningful image which is easier to analyze. Image segmentation is also used to locate objects and boundaries in images.

IV. ANALYSIS OF CRACKS ON THE TONGUE:

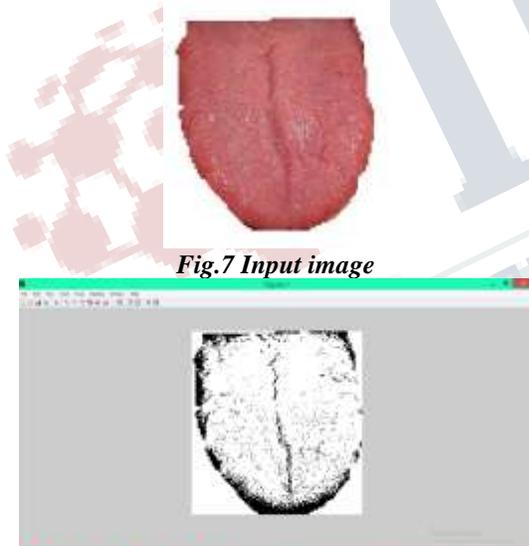


Fig.7 Input image

Fig.8 Binary image

A binary image is the one where the whole tongue image is converted into two colors white and black.

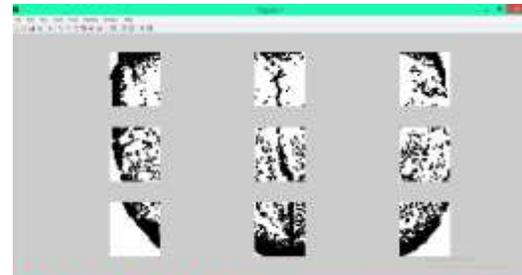


Fig.10 Segmentation of the image

The binary image from the a divided into nine parts.

This type of crack tells that the person is suffering with disturbances in liver and spleen.



Fig.12 Input Image



Fig.9 Binary Image

Input image is converted into a binary image of white and black.



Fig.11 Segmentation of the image

The binary image is divided into nine parts. This type of crack tells that the person is suffering from heart disturbance, deeper crack more chronic condition.



Fig.13 Input image



Fig.14 Binary Image

Input Image Is Converted Into A Binary Image Of White And Black.

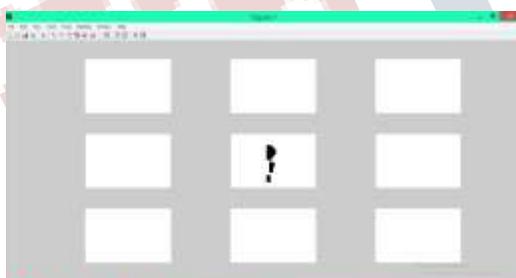


Fig.15 Segmented Image

Binary image is divided into nine parts.

This type of crack tells that the person is suffering from stomach under active and malnourished.

V. CONCLUSION

In this paper tongue diagnosis is carried out with tongue images having cracks. Segmentation is done to tongue images and the various conditions of the tongues are

identified. Thus cracks on the images of tongue tell the health condition of a human being. A deep crack in the center reaching to the tip reflects hyper activity of Heart fire. Cracks in the center line reveal back problems. If cracks exhibited horizontally, then it is caused to deep and long standing emotional problems. One crack down in the middle is an indication of nerve disorder. If the crack extends to the tip of the tongue then heart and lungs may be stressed.

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