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TOOTH LINER TECHNIQUES USING HARRIS CORNER DETECTION METHOD

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Abstract—

The significance of identifying early non-cavitated carious lesions and monitoring the lesion extent has led to increasing prospects for prevention, early diagnosis, and implementation of conservative treatments for the accurate parameters of human teeth. The Harris algorithm was evaluated to measure the ability of different methods for measuring the parameters of teeth and in order to detect the corners of the teeth image, which were acquired by intra oral camera for oral cavity. The corner detector techniques is used with morphology open operation and median filtering and then segment the image by the threshold based on the gray value of the image.

Keywords— *Intra Oral Camera, Corner Detector, Threshold Cornerness Pixels, Corner Detection Operator*

I.INTRODUCTION

An interest point has a location in space, but no spatial extent. The required computation time can reduce by the presence of interest points. These are some points which frequently used

to compensate for many vision problems, such as camera calibration, image registration, structure from motion,stereo matching, image mosaicing motion tracking,object recognition and mobile robot navigation[1]. specifically focusing on feature extraction such as robot navigation and manipulation [2,3].

In oral medicine, it is a very attractive technology that simulates the results before the actual treatment, which acquire the parameters of the treatment from the stimulation of treatment automatically. With the use of computer technology in oral medicine and reconstruct with software program, All the detail of oral cavity of teeth patients will be able to see. Oral cavity endoscope is a micro-camera system which collects light, machines and electricity. Because of the lighting and the reflection of the water on the teeth, the brightness of the image would able to see for doctors for teeth cavity treatments. There will be some "sequins" where the reflection is strong, and there would be big noise that increases the difficulty of the edge detection. One of the major problems encountered in tooth restoration is the bonding faults between the restoration material and tooth[4]. The teeth image have three region soft tissue regions, bone regions and teeth regions all region have different intensity values[5].

Enamel, dentin, and cementum are the three hard layers that comprise the solid structure of teeth. Enamel is the outer shell of the crown that is exposed to the environment and dentin is the inner layer beneath the enamel, where it extends to the root of the tooth. The enamel is internally contiguous with the inner dentin at an interface commonly known as the dentino-enamel junction (DEJ). The use of calibrated, commercial digital cameras for dental applications is promising[6].

Paper presents Harris corner detection algorithm, which is simple and an efficient means of producing input points of interest for feature-based approaches[7] Research Literature serves the purpose of improvement desires in context of corner detection as found in many of research works, a great deal of efforts has been done by computer vision community in solving the problem of efficiently detecting corners and edges.

Pros	- Robust to textured images (due to image filtering)
Cons	- Weak to detect structurally meaningful corners (obtuse angle, positional offset)

All the true corners should be captured with no false corners is interpretation dependent and there would be no defined definition for gray scale corner. The images with clear corners such image is used to improve the performance of corner detectors. The use of interest points (and thus corner detectors) to find corresponding points across multiple images is a key step for image processing and computer vision applications.

Some of the most notable examples are:

1. Teeth stereo matching
2. image registration (of particular importance in medical imaging)
3. stitching of panoramic X ray photographs
4. detection/recognition of teeth
5. motion tracking
6. robot navigation system for teeth

1. All "true corners" should be captured perfectly
2. It should not capture "false corners"
3. It should localized all corners in perfect manner
4. Corners should be noise robust
5. Detector should be efficient.

So the paper divided in subsection in first section introduction of paper is explained, Second section problem definition is explained , Third section shows the method which are used to find the corner of image, Fourth section shows the image auqization, Fifth section shows result of corner detection, Sixth section shows the conclusion of paper.

II.PROBLEM DEFINATION

There is no provisions given for computerized measurements of teeth for aligning a teeth , the measurement of teeth was done by a traditional methods by using Vernier Calliper, Gear Tooth Micrometer, the measuring tool will not give an accurate parameters of a teeth. The cost of machinery for measuring teeth are costly as well as require huge space. Older methods for measuring teeth parameters consume more time and it's costly also, and measurements was not taken in point fiction manner , so it was impossible to fit tooth properly at proper position .The measurement of teeth should give correct value of teeth by detecting corners of teeth.

III.METHODOLOGY

The paper described about software that would provided accurate parameters for teeth corner detection and its used for sharpening teeth which will provide the proper measurements for teeth liner.

A. Edge-Based Corner Detection Method:

Here corners of teeth detected with the help of edges of teeth images.

1) Apply Corner Detection Operator

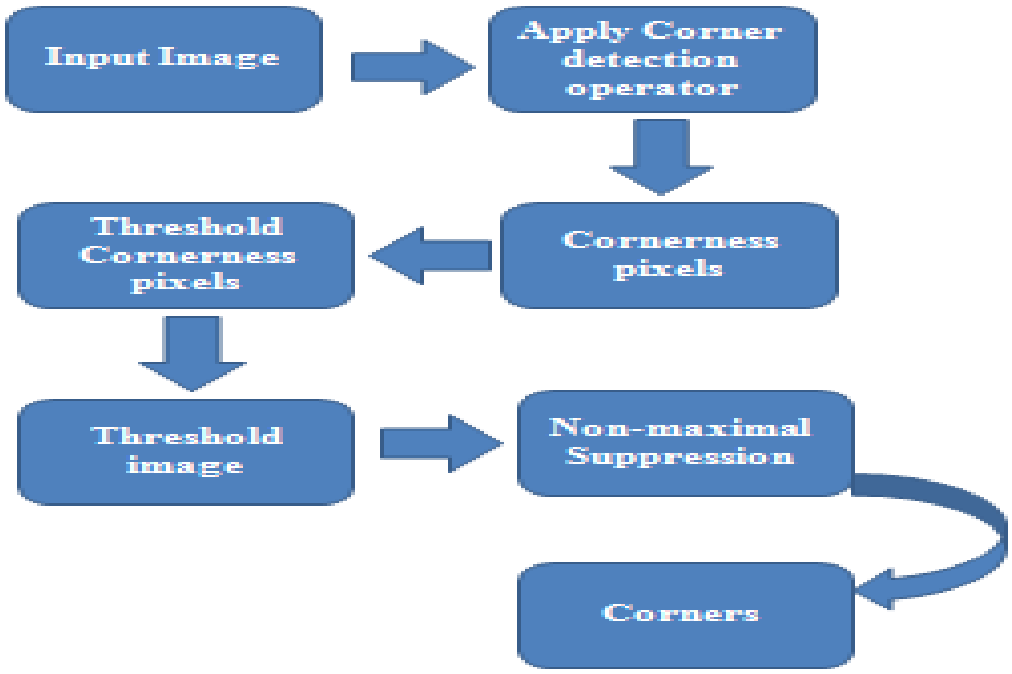
Here intra oral dental camera images are used as the input image for detecting the corners of teeth apply corner detection operator on input image and then it measures the cornerness value of pixel. The value is simply a number for indicating a degree are used as cornerness pixel values to which the corner operator believes that pixel is a corner and the output is cornerness pixels.

2) Threshold Cornerness Pixels

Here as shown in fig 2 for avoiding to measure the small corners which are not true corner threshold cornerness pixels are used So the cornerness pixels would be threshold so the threshold value set at high to remove the false corners and also at low to detect the true corners of the input image.

B .Non-Maximal Suppression

The non zero numbers of threshold cornerness pixels would be captured as corner. so apply non-maximal suppression to each point of threshold cornerness pixels and gives the output as corners and the corners are detected on the input image.



1 . Flow graph for detecting the corners

IV. .IMAGE ANALISIS SYSTEM

A digital intra oral camera was attached to a gridded-base copy stand . The stand also supported two white strip lights (RB 5000, with Phillips Fluorescent daylight bulbs, Kaiser).

Digital intra oral camera covers with plastic polymers and on upper part one switch for flash ON and OFF purpose . With the help of gridded-base copy stand intra oral camera rotated in 360 degree by which its easy to capture the images of teeth for tooth liner treatments.

V.IMAGE AUQIZATION

After drying excess moisture on teeth with a soft tissue, camera lens positioned parallel to the tooth surface. The position of the camera adjusted as necessary and capture teeth images. The input data is taken as a image of teeth, which is captured by the "Intra Oral Dental Camera" the input image will undergo through the process of corner detection which will help to calculate the measurement of teeth that need to be aligned and for sharpening of teeth.

All of our operatories are equipped with intra-oral cameras to provide visual for observing, diagnosing and treating the teeth . We use the latest camera systems before and during procedures, using an interactive digital computer screen and the "Intra Oral Camera" attached to computer with the help of USB – which displays the teeth and detailed features of the teeth or infection being treated. Visual images of tooth fractures and nerve exposures etc can be observed and documented; the insight provided through the use of these tools helps in formulating a comprehensive treatment plan with our patients.

VII.RESULT

Fig 2 shows the input image of teeth captured by the "Intra Oral Dental Camera". Edge detection of teeth image shown in fig 3 by using non-maximal suppression having an threshold value by which it show the edges of teeth. Fig 4 shows the corner captured image of teeth where the corners are detected on original input image by which software will calculate measurements of teeth .

Fig 2: Input Image of teeth

Fig 3: Non Max Suppressed Image

As shown in fig 4 white dots shows the corners of teeth and the corners of teeth are calculated using threshold value and sigma value, if threshold value and sigma value changes the corner capturing capacity also changed.

Fig 4: Corner Captured Image

VIII .CONCLUSION

The proposed method will be beneficial as there is no such tool available which will take input as a image with intra oral dental camera and help to find the measurement of tooth for its proper alignment. The proposed method will also find the edge and with help of corner detection it is possible for finding the intensity of pixel at each matrix part. The proposed method will also find the threshold value of image and also shows the time required for calculating the measurements of teeth.

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