

Review on Emerging Techniques to Detect Oral Cancer

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Abstract: Oral tumor is a kind of head and neck malignancy, is any carcinogenic tissue development situated in the oral hole. Oral growth is one of the hazardous wellbeing issue on the planet. On the off chance that the diseases are recognized in the late stage prompts life undermining. So it important to distinguish such sorts of disease at the preparatory stage. Early recognition assists specialists with providing on time solution which is advantage to the patients. There are numerous restorative picture handling procedures requires consistent enhance nature of administrations in human services industry. This paper gives accessible picture handling procedures to recognize and arrange the oral malignancy.

Keywords: Oral cancer, Medical Image Processing, Segmentation, Feature Extraction

1. INTRODUCTION

Tumor is a strange development of cells. There are more than 100 sorts of tumor, including bosom malignancy, skin disease, lung growth, oral tumor and so on. Oral malignancy shows up as a development in the mouth [10]. Oral malignancy, which incorporates diseases of the lips, tongue, cheeks, floor of the mouth, hard and delicate sense of taste, sinuses, and pharynx (throat), can be life undermining if not analyzed and treated early. Side effects change contingent upon the sort of malignancy. Tumor treatment may incorporate chemotherapy, radiation, and/or surgery. Early assessment of oral precancerous injuries can dramatically affect oral malignancy death rates [13].

In spite of late indicative and restorative advances, the 5-year survival rate for oral malignancy has stayed under half in the course of the most recent 50 years inferable from the accompanying reasons [11]:

- The greater part of oral tumor cases (60%) present with cutting edge stages (III and IV) at conclusion;
- Oral growth has the most astounding danger for the advancement of second essential tumors ('field cancerization marvel') of any maligna.

The finding of Oral pre-tumor location is the test in the wellbeing business. Especially in the location, assessment of right on time stages. In spite of the fact that oral malignancies are distinguished effectively, recognizable proof gets to be troublesome in introductory stages.

The medicinal picture examination assumes a vital part in clinical finding of oral malignancy and treatment of specialist. Assortment of cutting edge imaging procedures, for example, Magnetic Resonance Imaging (MRI), ultrasound, Computerized Tomography (CT) and Radiography and so forth give the needful data to the wellbeing business. For some reasons, the utilization of data by manual examination is troublesome. With the propelled innovation in the field of PC, imaging innovation, cutting edge preparing apparatuses and develop method for taking care of picture information, imaging systems have gone into therapeutic field. This expanded the capacity of comprehension, there by the level of conclusion has enormously enhanced by utilizing the preparing and investigation of diverse restorative pictures. The preparatory determination of oral tumor depends on visual assessment and enlistment of the persistent's oral hole as real nature computerized pictures. Albeit reciprocal systems exist, based e. g. on infrared or fluorescence spectroscopy[14].

The MR pictures might not have high determination due to moving ancient rarities affected by the moving tongue and jaw. So a proficient picture preparing calculation is expected to recognize the suspicious locale in the disease range with high determination. The recognition of malignancy tissues in the early stage is troublesome by dental radiograph [15].

This paper examines an assortment of oral malignancy discovery calculations and picture preparing strategies in the wellbeing business.

2. RELATED WORK

Literature on various techniques are described to detect and classify the oral cancer in digital images. A lot of research has been done on detection of oral cancer.

Lalit Gupta et al [1] proposed another system for Feature Selection utilizing Mean – movement and Recursive Feature Elimination strategies to build segregation capacity of the element vectors. The creator portrayed that the assessment of the execution of the calculation done on an in-vivo recorded LIF information set comprising of spectra from typical, dangerous and pre-threatening patients. The scope of affectability and specificity is >95 gotten towards harm utilizing the proposed technique

Sebastian Steger et al [2] have proposed a strategy for novel picture highlight extraction approach that is utilized to foresee oral malignancy reoccurrence. This examination work proposed different numeric picture highlights that portray tumors and lymph hubs. . This work presented the accompanying methodology which is autonomous from human subjectivity: Registration and managed division of CT/MR pictures shapes the base of the mechanized extraction of geometric and composition components of tumors and lymph hubs. To decrease the measure of client cooperation amid subsequent meet-ups this work joins the past examination's division results. The strength and the numeric way of the extricated components make them in a perfect world suited as information for an advanced versatile expectation environment that gauges the probability of oral tumor reoccurrence and helps the clinician to build up a treatment arrangement.

M. Muthu Rama Krishnan et al [3] have proposed a wavelet based composition arrangement for oral histopathological segments. As the traditional technique includes in stain force, entomb and intra spectator varieties prompting higher misclassification mistake, another system is proposed. The proposed system, includes highlight extraction utilizing wavelet change, highlight determination utilizing Kullback – Leibler (KL). In this work creator considered 67 typical and 47 OSF histopathological pictures as per review study outline convention. In the preprocessing level, middle channel and histogram based complexity improvement have been utilized as a part of request to lessen the commotion for normalizing recoloring varieties of epithelium. The division of epithelium from the grayscale picture is refined by changing over the standardized picture into twofold picture utilizing fluffy dissimilarity and post preparing is done utilizing morphological operations. From that point, surface components of the epithelial district are extricated utilizing Haar, Daubechies, Coiflet, Symle biorthogonal wavelet families including Gabor+wavelet. Subsequently, feature selection is done using Kullback–Leibler (KL) divergence and probability density function is also estimated to show the discriminating potentiality of each feature vector. The ideal subset of wavelet based surface components are encouraged to Bayesian classifier and bolster vector machines (SVM) for screening and characterization of OSF. In this study, it is watched that SVM with straight piece capacity gives better

grouping precision (92%) when contrasted with Bayesian (76.83%). All in all, it can be prescribed that the textural components of typical oral mucosa and OSF show critical varieties that, when measured, could be entertained for supporting in the analytic procedure.

Ranjan Rashmi Paul et al [4] proposed a recognition procedure to recognize oral malignancy utilizing a system called wavelet on neural systems. In the work, the wavelet coefficients of Transmission Electron Microscopy (TEM) pictures of collagen filaments from ordinary oral sub mucosa and Oral Sub mucous Fibrosis (OSF) tissues have been utilized as a part of request to pick the element vector and to prepare the Artificial Neural Network [16].

Anu Radha et. al [5] proposed Detection of Oral Tumor in light of Marker – Controlled Watershed Algorithm. In this paper, a novel system is proposed to recognize tumor cell present in mouth gave by an Orthopantomogram. This paper depicted that, a novel numerical morphological watershed calculation is proposed to protect these edge subtle elements and in addition noticeable ones to recognize tumors in dental radiographs. Applying watershed on pictures prompts over division despite the fact that it is preprocessed. To stay away from the overhead because of over division, the system called Marker Controlled Watershed division is utilized to section tumors. The outcomes got are entirely great and were tried. The Algorithm ventures for Marker – Controlled Watershed division are as per the follow

1. Compute a segmentation function. This is an image whose dark regions are the objects to be segmented.
2. Compute foreground Markers. These are connected blobs of pixels within each of the objects.
3. Compute background Markers. These are pixels that are not part of any object.
4. Modify the segmentation function so that it only has minima at the foreground and background Marker locations.
5. Compute the watershed transform of the modified segmentation function. Marker – driven water



Fig. 1. Enhanced Image

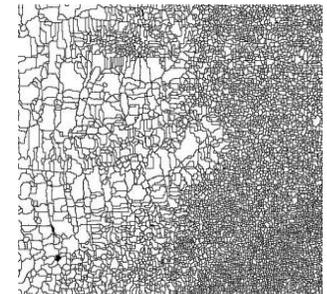


Fig 2. Image after Watershed

The info picture is upgraded utilizing straight difference extending which is appeared in Figure 1. Subsequent to preprocessing, watershed division is connected to the picture



Fig 3. (a)



Fig 3. (b)



Fig 3. (c)



Fig 3. (d)



Fig 3. (e)



Fig 3. (f)

Fig 3. (a), (b), (c), (d), (e) Marker – Controller watershed Segmentation results (f) shows tumor area The output image (e) shows the tumor part with less blurring and noise.

TABLE 1: Comparison of Algorithms

No. of cases: 10

Segmentation algorithm	Accuracy	Speed
Watershed segmentation	85.20%	91%
Marker controlled watershed segmentation	90.25%	92.55%

Woongyu Jung et al [6] proposed a method in oral disease recognition utilizing Optical Coherence Tomography (OCT). For the imaging profundity of 2-3 mm, OCT is suitable for

oral mucosa. They likewise distinguished oral disease in 3-D volume pictures of ordinary and precancerous sores [3].

Neha Sharma. et. al [7] proposed Extracting Significant Patterns for Oral Cancer Detection Using Apriori Algorithm. In this paper, the creator talked about a methodology for disease identification and counteractive action in light of investigation utilizing affiliation guideline mining. The information dissected are relating to clinical manifestations, history of dependence, co-dismal condition and survivability of the growth patients.

Apriori Algorithm:

The apriori is an excellent calculation for successive thing set mining and affiliation principle learning over the value-based databases[17]. It continues by distinguishing the regular individual things in the database and stretching out them to bigger and bigger thing sets the length of those thing sets show up adequately frequently in the database. The regular thing sets controlled by an apriori can be utilized to decide affiliation rules, which highlight general patterns in the database. Affiliation standards mining utilizing apriori calculation utilizes a "base up" methodology, broadness first pursuit and a hash tree structure to tally the hopeful thing sets proficiently. A two-stage apriori calculation is clarified with the help of flowchart as appeared in Figure 4 and the calculation is specified underneath:

Apriori calculation: Candidate Generation and Test Approach
Step 1: Initially, filter database (DB) once to get successive 1-itemset.

Step 2: Generate length (k + 1) applicant thing sets from length k visit thing sets.

Step 3: Test applicants against DB.

Step 4: Terminate, if no regular or competitor set can be Generated. To choose fascinating standards from the arrangement of every single conceivable tenet produced, requirements on different measures of noteworthiness and hobby can be utilized. The best-known limitations are least edges on backing and certainty.

Anuradha, et. al [8] proposed Statistical Feature Extraction to Classify Oral Cancers. The proposed strategy fragments and arranges oral growths at a prior stage. The tumor is recognized by Marker Controlled Watershed division. The components removed utilizing Gray Level Co event Matrix (GLCM) is Energy, Contrast, Entropy, Correlation, and Homogeneity. The separated elements are encouraged into Support Vector Machine (SVM) Classifier to group the tumor as kindhearted or harmful. The exactness got for the proposed strategy is 92.5%. The proposed square graph appeared in the figure 5

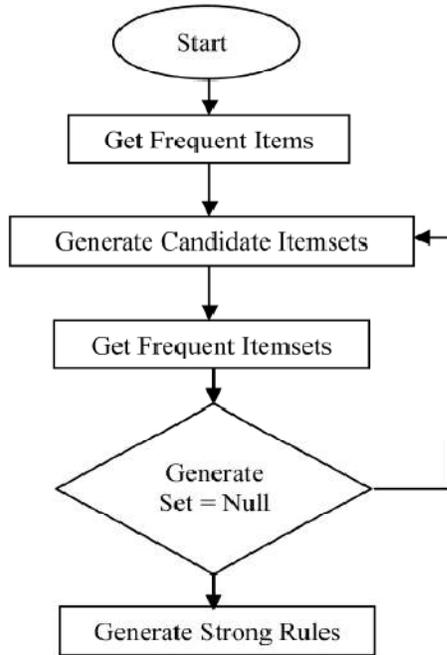


Fig. 4. Flow chart of apriori algorithm

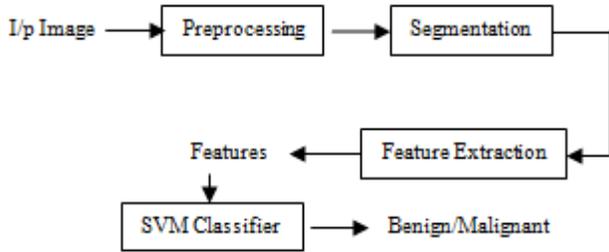


Fig. 5. Proposed method block diagram

For the proposed work 27 pictures were picked haphazardly.composition Features are acquired for the divided some portion of the tumors. GLCM elements are removed and its arrangement was gotten. From Table2 watch the component values for the different specimen pictures.

TABLE 2: Feature Extraction

Feature	Img1 (normal)	Img2 (normal)	Img3 (abnormal)	Img4 (abnormal)
Energy	0.1453	0.1961	0.5936	0.7214
Contrast	0.1904	0.2661	0.7269	0.8175
Entropy	4.9486	5.0543	6.9135	7.4569
Correlation	2.2454	2.5357	3.9767	4.1253
Homogeneity	1.1227	1.2647	1.9835	2.0626

From Table 2, the pictures are named typical and anomalous utilizing SVM Classifier. Additionally the diagram appeared in Figure 6 speaks to the factual element values for favorable and harmful injuries of oral tumor.

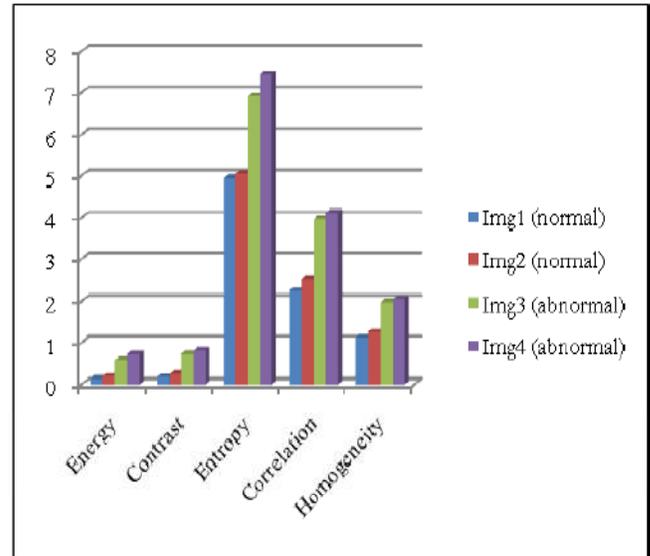


Fig. 6. Performance Analysis

Anuradha, et. al [9] proposed Oral Cancer Detection Using Improved Segmentation Algorithm. This work depicted that the discovery of oral growths utilizing Image Processing. Dental X – Rays are utilized as the Input Image for recognition. In the initial step, Linear Contrast Stretching is utilized to expel commotion from the Dental X – Ray Image. Watershed Segmentation and Marker Controlled Watershed Segmentation are utilized to portion tumors from the improved Image. Issue of over division emerges in both the division calculations. In this way, Marker Controlled Watershed Segmentation is moved forward. The Segmentation Algorithms are looked at for pace and precision. The velocity is computed previously, then after the fact Linear Contrast extending. The proposed calculation gives better segmentation

3. DISCUSSION

Author	Technique	Advantages
Lalit Gupta	A new feature selection and classification scheme for screening of oral cancer using laser induced fluorescence	Increase discrimination ability of the feature vectors Sensitivity : Above 95% and specificity : Above 99%
Sebastian	novel image	Oral Cancer Prediction

Steger	feature extraction approach	Automatically
M. Muthu Rama Krishnan	Wavelet based textureclassification of oral histopathological sections	Improves the Accuracy
Ranjan Rashmi	A novel wavelet neural network based pathological stage detection technique	ProtectionAuthentication
K Anu Radha	Detection of Oral Tumor based on Marker – controlled Watershed Algorithm	Accurecy is more than 90% the quality of the image is enhanced using linear contrast stretching.
Woonggyu Jung	Optical Coherence Tomography	Accurecy is more detected oral cancer in 3-D volume images of normal and precancerous lesions
Neha Sharma	Apriori Algorithm	the highest confidence level, thereby, making them very useful for early detection and prevention of oral cancer
Anuradha	Statistical Feature Extraction to Classify Oral Cancers. Transform	The proposed system segments and classifies oral cancers at an earlier stage.
Anuradha	Oral Cancer Detection Using Improved Segmentation Algorithm	Better speed and accuracy

4. CONCLUSION

In this paper the survey study of various oral cancer detection techniques in the medical image processing is done. The analysis of medical image processing and its applications in healthcare industry are described in this paper. The advanced Medical image processing techniques and algorithms are reviewd.

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