DISCERNMENT OF CANCER
IN BUCCAL CAVITY

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Abstract-**Oral cancer is a significant health problem throughout the world. Most oral cancers are identified at the later stage where, treatment becomes unsuccessful. It is very important to detect such type of cancers at an earlier stage. Early detection helps oncologists to provide a necessary therapeutic measure which also benefits the patients. The identification of oral cancer in dental x-ray pictures is complete victimization of various images processing techniques that are helpful in medical diagnosis, clinical functions and time period applications. Various tooth structures segmentation is outlined within the dental x-ray pictures which can be used for the first detection of oral cancer that plays a key role within the identification of cancer cells. The proposed work comprises of preprocessing, segmentation and classification. In preprocessing, resizing and enhancement of images are done. The image is segmented and classified using neural networks where the affected part is identified. An automated method is developed for classification of cancer cells in buccal cavity.**

Keywords- Dental X-ray image, Region Masking Algorithm, Stochastic Gradient Decent with Momentum (SGDM), Convolution Neural Network.

I. INTRODUCTION

Oral cancer is one of the most common complex diseases in the world. Cancer cells can occupy any places in the oral cavity like gum, jaw, lips, tongue and the floor of the mouth. Most of the oral cancers looks similar under the microscopic view and are called squamous cell carcinomas. These cancer cells are malignant and lead to spread all over the mouth rapidly. Tumor cells that rise from odontogenic soft tissues are called as Odontogenic tumors. They may be benign and malignant. Malignant tumors are harmful and are cancer cells. Mouth cancer is due to excessive use of Tobacco and Alcohol.

Cancer affected in gum due to extreme use of Tobacco.

Cancer affected in Jaw due to usage of alcohol.

It also includes poor hygiene and chronic irritation. The early detection of oral carcinoma can dramatically reduce the death. The treatment and cure of oral cancer is mainly depends on the early detection. Unlike other type of cancers, oral cancers are visible with naked eye, some cancer cells are located in the internal part of the mouth, detecting them is a tedious process. This paper proposes a computer aided system of identifying cancer affected area in oral cavity using image processing and Convolution Neural Network techniques.

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II. METHODOLOGY

Image processing is one of the most growing research areas in the medical field. It includes the analysis, enhancement and display of images captured via X-ray, MRI and CT scan. The flow chart of proposed methodology is shown below.
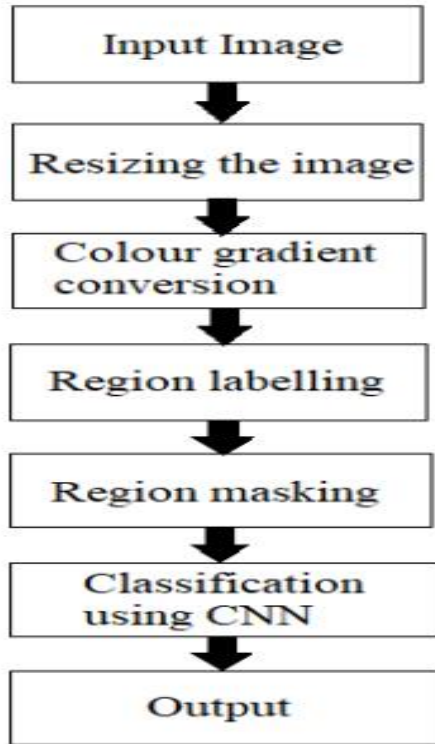
III. PREPROCESSING

It is essential to improve the image data that suppresses the unwanted distortions or enhances some features that are important for further processing. Pre-processing uses considerable redundancy in images. Neighboring pixels corresponding to one object in real images have essentially the same or similar brightness value. Thus, distorted pixel can often be restored or enhanced as an average value of neighboring pixels. Resizing the input image to the standard dimensions is done. Color space conversions as RGB images are converted into Grayscale format images. Then, the image is pre-processed image.

Preprocessed image

IV. SEGMENTATION

Image segmentation is a commonly used technique in digital image processing and analysis to partition an image into multiple parts or regions, often based on the characteristics of the pixels in the image. In computer vision, Image Segmentation is the process of subdividing a digital image into multiple segments (sets of pixels, also known as super pixels. Segmentation is a process of grouping together pixels that have similar attributes. At first, partitioning an image based on changes in intensity. Secondly, partitioning an image into regions that are similar according to predefined criteria. Then, the grayscale image is converted into black and white image for easy identification of affected area. Region Masking Algorithm is used to segment the input image. This algorithm will mask the region which is varying with the pixels of neighboring pixels. Then, the series of morphological operations are performed to classify the cancer image.

Segmented image

V. CLASSIFICATION

Image classification is a process of extracting the features and classify according to its visual content. There are many classifiers such as CNN, KNN, SVM and ANN algorithms. This paper uses CNN algorithm to classify the segmented image. Convolution Neural Network (CNN) is commonly known as neural network which is a mathematical motivated by the structure of biological neural networks. A neural network consists of an interconnected group of artificial neurons. This work describes the use of neural network in classification of medical images such as oral cancer, where the input units represents the feature vector and the output units represents the pattern class which has to be classify. Each input vector (feature vector) is given to the input layer, and output of each unit is corresponding element in the vector. Each hidden units calculates the weighted sum of its input to outline its scalar a net activation. The product of input vector and weight matrix at the hidden layer is generally called net activation function. Convolution Neural network is a useful tool for mouth cancer classification.

CNN algorithm employs several layers to perform the classification function. These layers are the input layer, convolution layer, ReLu layer, max pooling layer, fully connected layer, softmax layer

Final classified image

VI. CONCLUSION

In this proposed work, the dental X-ray image is captured and the series of operations to classify the image is performed. Early detection of squamous cell carcinoma up to 90% accuracy can be obtained by using convolution neural network. Thus, early screening is done and patient can be treated well in time, with less cost and more efficiently, hence, survival rate increases considerably.
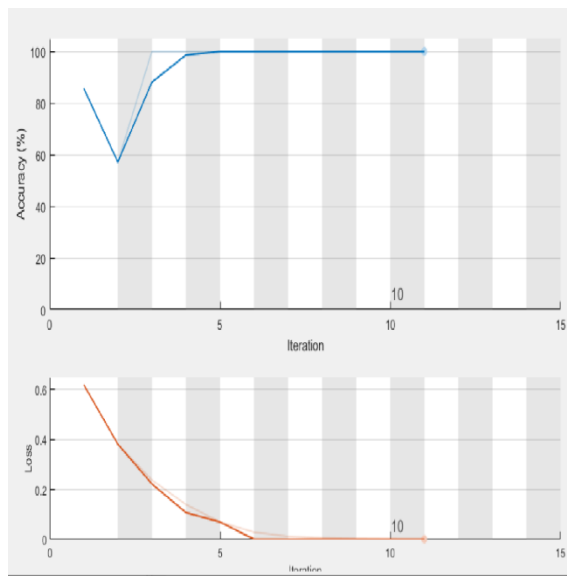
VII. FUTURE SCOPE

This project can also be implemented for   all type of cancers. This helps patients undergo painless diagnosis and reduces need of biopsy kind of tests for identification of oral cancer.

VIII. REFERENCES

[1] O.E. Langland, R. P. Langlais, J.W. Preece, "Principles of Dental imaging", Lippinlott Williams and Wilkins, Philadelphia, USA, 201-298, 2002.

[2] N. Patanachai, N. Covavi saruch and C. Sinthanavothin, "Wavelet transformation for dental X-ray radiographs segmentation technique", 8th International conference on ICT and knowledge engineering, IEEE, PP, 103-106, 2010.

[3] K. Anuradha, K. Sankaranarayanan, "Identification of suspicious regions to detect oral cancer at an earlier stage", International Journal of advances in Engineering and Technology, March 2012, ISSN: 2231-1963.

[4] M. Monica Subashini, Sarat Kumar Sahoo, Shiwang Sagar,"Cancer cell diagnostics based on Tissue Morphology using image processing", Third International Conference on Sustainable Energy and Intelligent System (SEISCON 2012).

[5] Mohammed Al-Ma'aitah, Ahmed Ali Alzubi, "Enhanced computational model for Gravitational search optimized Echo state neural networks based oral cancer detection",Journal of Medical Sciences (2018) 42: 205.

[6] K.V.Kulhalli, V.T.Patil, V.R.Udupi, "Image processing application for computer aided diagnosis of cancer", International Conference on Advances in Computing and Management-2012.

[7] Rajdeep Mitra, Dr.Menaka R, "Characterisitcs of oral cancer Lesions using Texture Features", National conference on Science, Engineering and Technology (NCSET-2016), ISSN: 2321-8169.

[8] T. Morikawa, A. Kozzkai, A. Kosugi, H. Bessho, T. Shibahara, "Image processing analysis of oral cancer, oral potentially malignant disorders, and other oral diseases using optical instruments",International Journal of Oral and Maxillofacial Surgery, 2019.

[9] National Cancer Institute, www.cancer.gov.

[10] Centre for cancer Research, https://ccr.cancer.gov

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