IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 5, May 2024

Machine Learning and Deep Learning Approach for Medical Image Analysis Summary Generator

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Abstract: *Colorectal cancer, which is frequent, recognized tumours in both genders around the globe. As per the report generated by WHO in 2018, colon cancer placed in the third position, whereas 1.80 million individuals are affected. Precisely, it is the succeeding leading cancer, which is the second most common cause of cancer in females, and the third for males. The loss of control over the integrity of epidermal cells in bowel or malignancy can be the cause of colorectal cancer. An effective way to recognize colon cancer at an early stage and substantial treatment can reduce the ensuing death rates to a great extent. To perform Screening of Morphology of Malignant Tumor Cells in the colon, a Gastroenterologist may refer to cancer diagnosis tests for pathological images. In any Histology method, the process takes a significant duration of time due to infinite numbers of glands in the gastrointestinal system, which may lead to irreconcilable outcomes. By diagnosing through computer algorithms, can give practical and contributory results. Hence, accurate gland segmentation is one crucial prerequisite stage to get reliable and informative morphological image data. In recent times, the scholars applied machine learning algorithms to pathological image analysis for the diagnosis of cancer disease. We propose that features extracted from the diagnostic tests, given as input to a machine learning architecture used along with semantic segmentation algorithm, provide results that are accurate than the existing image segmentation algorithms. This work is the extensive review of machine learning architectures used for semantic segmentation on the histological images of the colon.In our project we will be using the following algorithms such as Adaboost as existing and Convolution Neural Network (CNN) as proposed and its accuracy is been calculated and well compared to other algorithms. It is found that CNN performs less than other algorithms*

Keywords: CNN(Convolution Neural Network), Machine Learning, Colorectal cancer

I. INTRODUCTION

The occurrence and fatality percentage of colorectal malignancy has much increased in contemporary years. More often, Pathologist's diagnosis depends on pathology reports of images and from biopsies, provides information about the escalation of cancer through the lymph and other organs of the body. This procedure not only takes a great deal of time and also price. However, it likewise has apparent constraints. The research study shows that the analysis of various pathologists has even more significant incongruity. The primary factor for this incongruity is that the pathology medical diagnosis technique is subjective as well as easily affected by the atmosphere. Diagnosis of photos utilizing computer based algorithms can be an efficient method for sustaining the medical diagnosis. The bowel is the collection of hollow organs took part in a long, twisting tube starting from duodenum to the anus. It absorbs the fluids and electrolytes and compels the solid waste to the rectum along with anus for purgation.

II. LITERATURE SURVEY

[1]**Assessment of Tumor Invasion Depth in Colorectal Carcinoma Using Multiphoton Microscopy Shu Wang; Jianxin Chen; Yinghong Yang; Weizhong Jiang; Publisher: IEEE 2023** In this paper, multiphoton microscopy (MPM) was used to simultaneously label freely image loose areolar connective tissue in the submucosa and intramuscular septa in the muscular is propria to perform assessment of colorectal carcinoma invasion depth. The

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results indicated that MPM can accurately exhibit whether colorectal carcinoma invades into the submucosa or the muscularis propria. [2]**Colorectal Tumor Segmentation of CT Scans Based on a Convolutional Neural Network With an Attention Mechanism Yun Pei; Lin Mu; Yu Fu; Kan He; Hong Li; ShuxuGuo; Xiaoming Liu; Mingyang Li; Huimao Zhang; Xueyan LiPublisher: IEEE 2023** The proposed network consists of three major modules: an encoder module, which is fed CT scans to attain the feature map; a dual attention module, which includes a channel attention module and a position attention module to obtain more contextual information in the deep layer of the network; and a decoder module, which restores the feature map to the original size of the input images. [3]**Screening of Pathogenic Genes for Colorectal Cancer and Deep Learning in the Diagnosis of Colorectal Cancer Yanke Li; Fuqiang Zhang; Chengzhong XingPublisher: IEEE 2023** The three aspects of characteristics comprehensively excavate the genetic characteristics, and demonstrate the feasibility of the study through comparative analysis from different perspectives. Constructing a colorectal cancer gene network, analyzing the changes in the network structure during the development of colorectal cancer, and mining the network characteristics of genes are the first issues to be studied in this paper.

III. IMPLEMENTATION WORK

System Description:

Implementation is the process that actually yields the lowest-level system elements in the system hierarchy (system breakdown structure). The system elements are made, bought, or reused. Production involves the hardware fabrication processes of forming, removing, joining, and finishing; or the software realization processes of coding and testing; or the operational procedures development processes for operators' roles. If implementation involves a production process, a manufacturing system which uses the established technical and management processes may be required.

The purpose of the implementation process is to design and create (or fabricate) a system element conforming to that element's design properties and/or requirements. The element is constructed employing appropriate technologies and industry practices. This process bridges the system definition processes and the integration process.

System Implementation is the stage in the project where the theoretical design is turned into a working system. The most critical stage is achieving a successful system and in giving confidence on the new system for the user that it will work efficiently and effectively. The existing system was long time process.

The proposed system was developed using matlab. The existing system caused long time transmission process but the system developed now has a very good user-friendly tool, which has a menu-based interface, graphical interface for the end user. After coding and testing, the project is to be installed on the necessary system. The executable file is to be created and loaded in the system. Again the code is tested in the installed system. Installing the developed code in system in the form of executable file is implementation.

System Flow

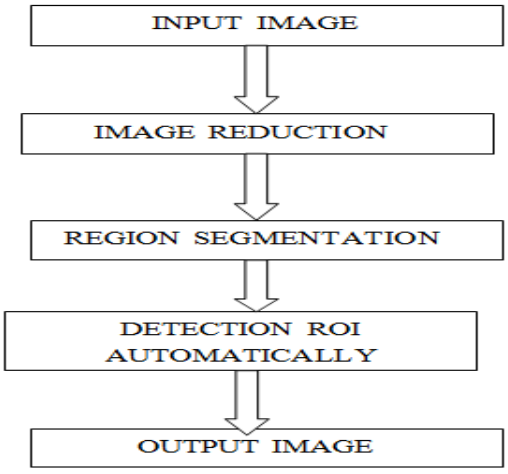

Fig 1.System Flow

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Module Description

There are 5 components in the system. They are

- Image Acquisition
- Image Preprocessing
- Image Segmentation
- Feature Extraction
- Classification.

In Image Acquisition, colorectal images are collected. The collected images are cropped to a specific size. Then noise present inside the Image is been removed. Segmentation is the third component. It consists of segmenting the converted grayscale images using K means filtering. This helps to get rid of problems like backgrounds, illumination of light, etc. Feature Extraction is extracting or showing the portion of the segmented images so that classification becomes easy. The last module includes the classification in which Tensor Flow and ML architecture is used.

1. Image Acquisition Image

Acquisition is the process of collection of images. These images are downloaded from the online dataset provider called Kaggle.com.

2. Image Preprocessing

Image preprocessing includes converting normal images into resize images. Grayscale images have the combination of black and white. Grayscale images help to reduce noise and also make the background neutral. It also helps to improve brightness of the image. Data augmentation is a way of creating new data which has benefits like the ability to generate more data from limited data and it prevents over fitting.

3. Image Segmentation

Image segmentation breaks the image down into meaningful regions. It divides digital image into multiple segments. The goal is to simplify or change the representation into more meaningful image. It differentiates between the objects we want to inspect further and the other objects or their background. It consists of segmenting the converted grayscale images using K means segmentation.

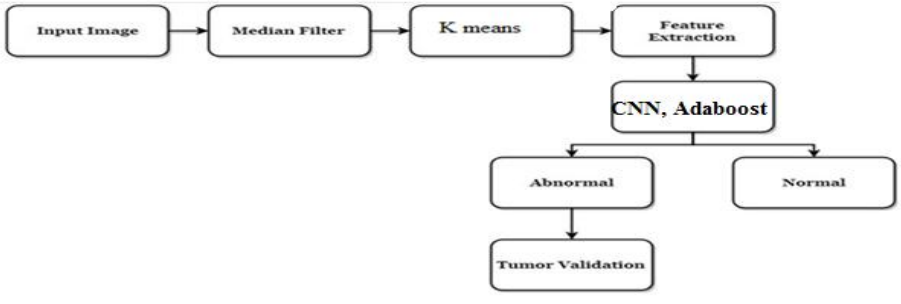
4. Feature Extraction

Feature extraction is extracting or showing of the segmented portion of the image so that classification becomes easy. Features are extracted in order to differentiate between the images. Features extraction is used in almost all machine vision algorithms. The common goal of feature extraction and representation techniques is to convert the segmented objects into representations that better describe their main features and attributes.

5. Classification

Here we use the concept of Classifiers and its architecture for classification method. The last module includes the classification in which Tensor Flow and Machine Learning algorithm will be used. Tensor Flow is a matlab-friendly open source library for numerical computation that makes machine learning faster and easier. Tensor Flow allows developers to create dataflow graphs - structures that describe how data moves through a graph, or a series of processing nodes. Each node in the graph represents a mathematical operation, and each connection or edge between nodes is a multidimensional data array, or tensor.

IV. SYSTEM ARCHITECTURE



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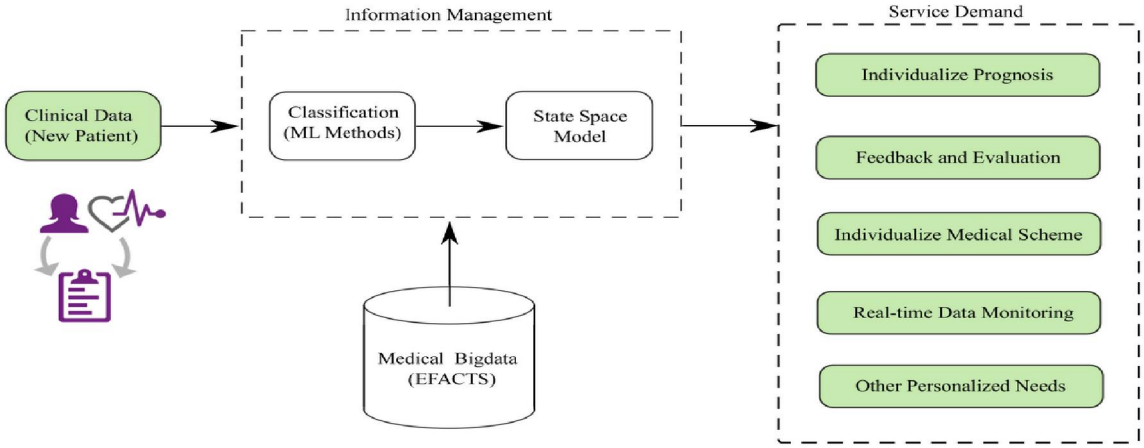
DATA FLOW DIAGRAM



Deployment Diagram

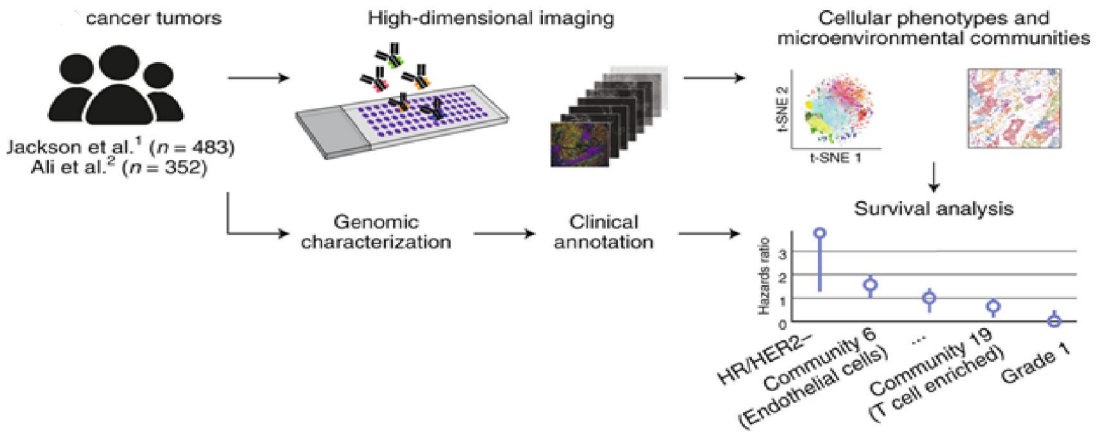


Fig.2 System Architecture

V. RESULT SCREENSHOTS

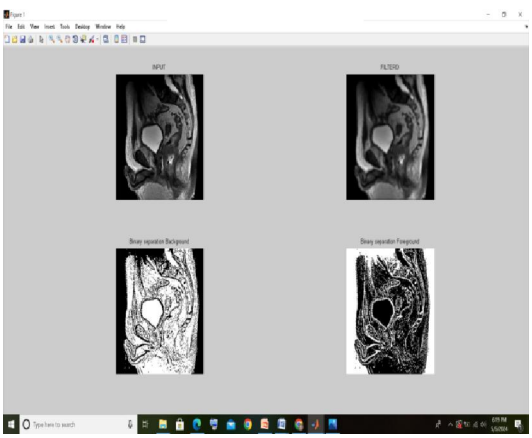


Fig 3. Result 1

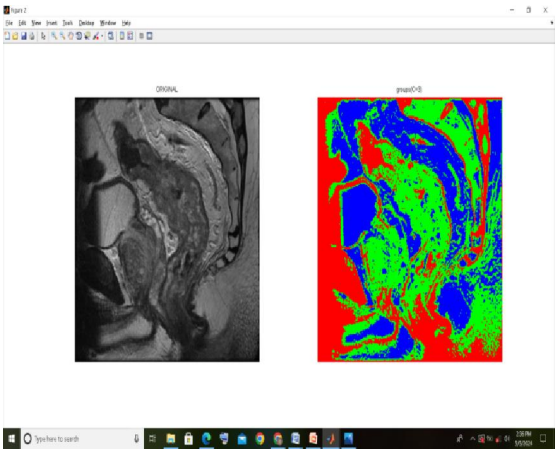


Fig 4. Result 2

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V. CONCLUSION

This project demonstrates the modelling of colorectal cancer as classification task and describes the implementation of ML approach for classifying colorectal cancer as either benign or malignant. The results of ML were compared on the basis of accuracy with existing system. It was observed that classification implemented by ML technique in this project is more efficient compare to existing algorithms as seen in the accuracy and precision. Based on the results, ML technique is more efficient compared to other existing methods technique in Colorectal cancer detection

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