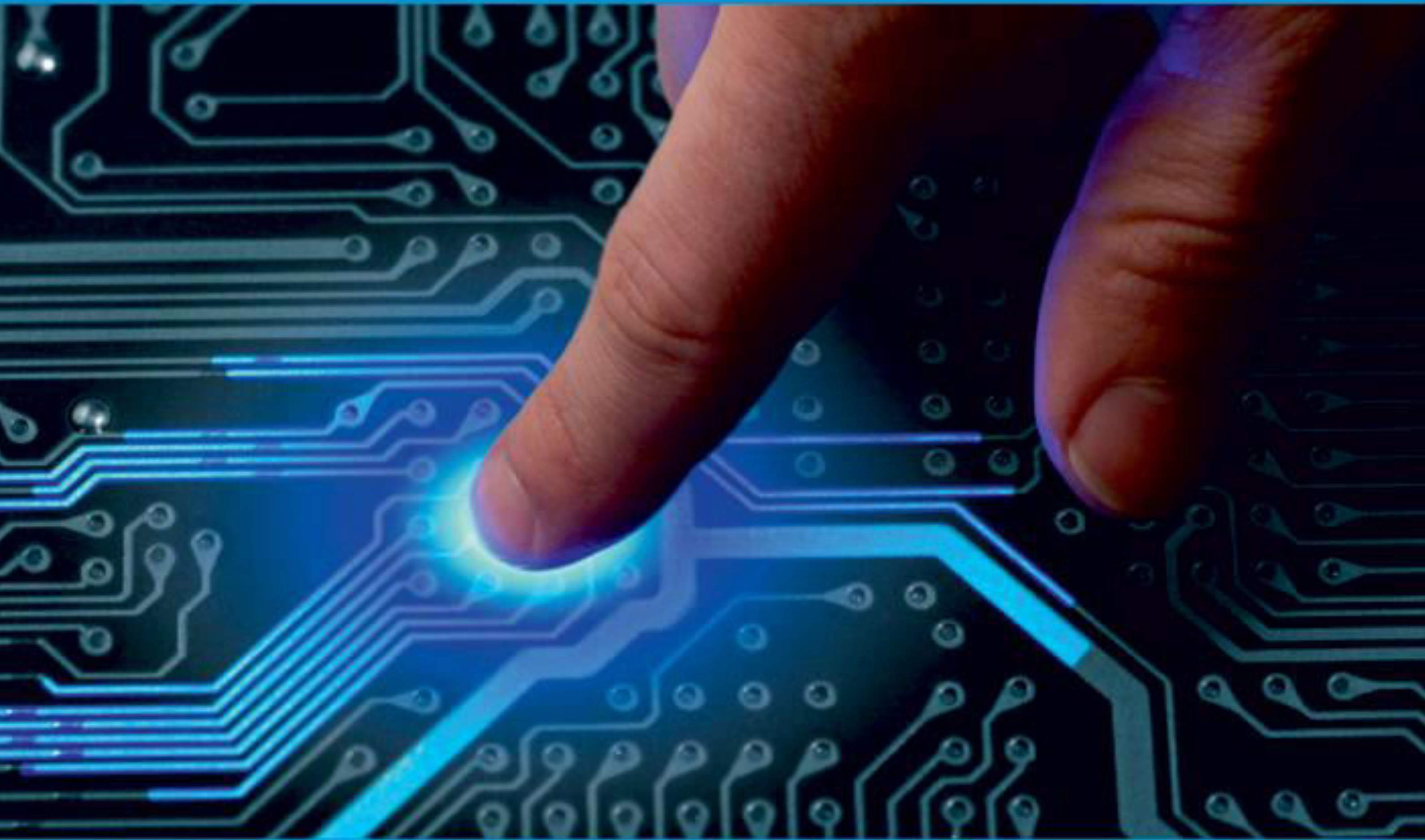
IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 10, Issue 6, June 2022

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.165

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 6, June 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1006118 |

Analysis and Identification of Gastrointestinal Disease Using Deep Learning Approach

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ABSTRACT: Several diseases can infect the gastrointestinal (GI) tract of a person. If these abnormalities aren't caught early, they could turn into gastric cancer, which is a common type of cancer with more than a million new cases each year around the world. Endoscopy is a common way for diseases of the digestive system to be checked out. During the exam, gastrologists can miss some abnormalities for a number of reasons, such as strange shapes, a large number of frames, and being tired. Deep learning is the best choice for computer-aided diagnosis because of how well it works and how recently it has improved. We have set up a model that tries to find polyp disease automatically from endoscopic images. We used the KVASIR dataset and the R-CNN model to look at endoscopic images of polyps and find diseases. By making changes to CNN's hyperparameters, we were able to get an accuracy of 96 percent.

.**KEYWORDS:** Human Gastrointestinal, Hyperparameters, Endoscopy, KVASIR, PolypDisease.

I. INTRODUCTION

One of the most critical functions of the human body is that of the digestive system. This important organ may be affected by a variety of disorders. Cancerous cells may form if these abnormalities are not detected and treated promptly. According to the WHO, colorectal cancer is the third leading cause of mortality in both men and women (WHO). It accounts for 10% of all reported cancer cases. It is estimated that 2.8 million new cases of gastrointestinal malignancies per year are being discovered over the globe. In terms of mortality, over 65 percent of these malignancies are lethal. Imaging advancements have made it feasible to see regions of the human body previously inaccessible. One of these procedures is an endoscopy. A camera-equipped tube is often used to examine the gastrointestinal system. As a result, the classification of a condition via endoscopic evaluation is heavily reliant on the judgments of gastroenterologists. When it comes to analysing data, the outcomes may vary from one person to the next. Endoscopic data processing by hand often takes a long period and demands intense concentration. It may potentially go awry, depending on the level of expertise of the physicians. For these reasons, it's possible that automatic recognition might help speed up the procedure while also saving time and money. Using deep learning-based approaches to handle medical imaging challenges in artificial intelligence has been more prominent over the last several years. Traditional machine learning approaches have been outperformed by deep learning. GPUs are becoming more efficient at doing calculations. In this research, endoscopic data will be used to categorise various gastrointestinal tract issues. The KVASIR dataset is used to train deep learning models that use convolutional neural networks. Dyed-resection-margins

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and Dyed-lifted-polyps are two of the eight classes in this dataset, which includes Cecum, Pylorus, and Z line (normal) (diseases). [17]

II. LITERATURE REVIEW

1. Texture and Deep Learning Features for Finding Abnormalities in the Gastrointestinal Tract," Springer Nature Switzerland AG, 2018, p. 2018: S. Nadeem, S. Sadiq Ali Naqvi, M. Atif Tahir, and M. Zaid Endoscopy data may be used to anticipate issues and disorders in the digestive tract, according to this study. Detecting illnesses and other abnormalities in the GI tract early on may save lives. An ensemble strategy that incorporates texture and deep learning characteristics to better predict GI disorders like Peptic ulcer disease is discussed in this article [1]. Another addition to deep learning is transfer learning. It's done using a traditional colonoscopy. Using logistic regression and a variety of retrieved variables, 83 percent accuracy and an F1 score of 0.821 are attained on the testing sample.

2. Computer-assisted identification of gastrointestinal illnesses using a multi-class picture data collection An article on multimedia systems appeared in the proceedings of the 8th ACM conference: An picture collection from within the gastrointestinal (GI) tract, known as Kvasir, was employed in this investigation. The grouping of photos is based on three anatomical landmarks and three clinically significant features. In addition, there are two sets of images showing how an endoscope is used to remove polyps from within the body. Annotating and categorising the dataset is the responsibility of doctors (experienced endoscopists). Computer-aided illness detection research relies on Kvasir for both single and multiple disease detection. We encourage and enable multimedia researchers to engage in the area of medical detection and retrieval by providing them with this tool..

3. Create an Expert System for Diagnosing Liver Diseases by Mirmozaffari M. Elsevier publishes the European Journal of Engineering Research and Science. The purpose of this research is to develop an expert system based on the VP-Expert shell to identify liver illness. In addition to block charts and Mockler charts, data was fed into the expert system through other means. It was originally categorised into three groups: blood tests, clinical symptoms, and illness duration in this instance. Based on the block diagram's three groupings of components, the Mockler chart was created. Mockler charts present the three illness diagnostic variables, the questions that go with them, and the answer range for each one. Finally, the tables explain how the system functions depending on the user's responses to the questions.

4. Research by F. Bray, J; Ferlay, I; Siegel, I; Torre; and GLOBOCAN Estimates of Incidence and Mortality in the World 68:6, 394–424, 2018. 2018 Cancer Statistics Worldwide: A Global Perspective" by Ahmedin Jemal Even within the same nation, there are significant differences in the most frequent cancers and the most common causes of cancer mortality. [4] The lack of high-quality cancer registry data in many low- and middle-income countries is critical to planning and implementing evidence-based cancer control programmes. In order to prioritise and assess national cancer control initiatives, the Global Initiative for Cancer Registry Development (GICRD) is an international cooperation.

5. L. Aabakken and colleagues (2014). Endoscopes should be able to report in a consistent manner. Clinical and Experimental Hepatology Even in endoscopy of the gastrointestinal tract, the use of a standard language is becoming more necessary. In order to create a common language, endoscopic results must be documented in a methodical manner. "Minimum Consistent Terminology (MST) of gastrointestinal endoscopy" gives a standard approach to describe what is observed during endoscopy. Lesion descriptions and qualities are used

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to assist trainee endocrinologists define lesions correctly, and the system also serves as a reference point for more experienced endocrinologists. As a result, [5] the current article recommends standardising the "peri-endoscopic" elements of the endoscopic report as well. Quality assurance programmes are also becoming more prevalent at this same moment.

III. SUMMARY OF LITERATURE SURVEY

Early disease detection with the help of computers is an important area of research that can make healthcare systems and medical practise better all over the world. The Kvasir dataset, which is made up of images of the gastrointestinal tract, is divided into three clinically important findings, three important anatomical landmarks, and two types of endoscopic polyp removal. There are many diseases that affect the GI tract. Each year, esophageal and stomach cancers cause 2.8 million new cases and 1.8 million deaths. Endoscopy is the best way to look at the digestive tract. The stomach, oesophagus, and upper part of the small intestine are all looked at during a gastroscopy. The colon and rectum are looked at during a colonoscopy. Both of these tests are done on high-resolution, real-time videos. Endoscopy equipment is expensive, and you need a lot of training and experience to use it. Colorectal cancer can be prevented if early lesions are found and removed with an endoscope, and then the right treatment is given. Different doctors have different abilities to find colorectal cancer. If a doctor can't look at the images well, this can make it harder to find colorectal cancer. For treatment and follow-up, it is also important to know the type of disease. So, it would be great to have automatic diagnostics. Automatic diagnosis of pathological findings could help with evaluating and identifying gastrointestinal cancers, which would make the use of medical resources more efficient and effective.

IV. EXISTING SYSTEM

Deep learning-based algorithms have been utilised to discover and categorise digestive tract issues, according to a study of the models. Naqvi et al. developed a method for detecting gastrointestinal (GI) illnesses and put it to the test using the KVASIR dataset. F1 score was 0.75, which indicates that they were not as accurate as they should have been.

V. PROBLEM STATEMENT

Computer vision has a particularly difficult time with medical picture diagnosis. CT-scans, X-rays, MRIs, etc. have been used extensively in recent research in this field. Images acquired using an endoscope are considerably different from this kind of information (traditional and wireless). Medical diagnostic approaches that have been around for a long time don't perform well with multimedia data. For one thing, looking at each photo (or frame, for video endoscopy) and highlighting any irregularities takes a long time. As a result, the patient is subjected to additional expenses, inconvenience, and discomfort throughout the procedure.

VI. PROPOSED SOLUTION

Proposed Solution

We came up with a way for the R-CNN technique to find polyps in the GI tract. Endoscopic images from the KVSAIR dataset, which has about 1200 images, are used in this system. These images are then used to find the affected area in the GI tract.

Objectives

- To process the data of the Polyps image from endoscopic image dataset.
- To extract the feature from pre-processed data
- To accurately detect the Polyps disease.
- To compare the performance of model accuracies by using different hyper parameters

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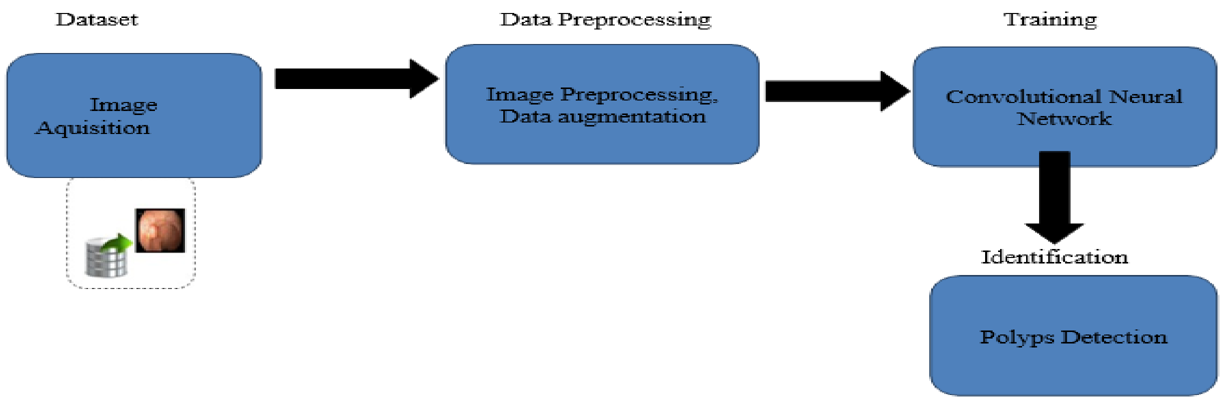
Methodology Presented

In this section, we have implemented the system which will detect the Polyps in GI tract. Initially collect the kvasir dataset from the simula website. These dataset contains different diseases like polyps, esophagitis, dyed polys, normal Z line, ulcerative etc.

Data processing to remove the noise or the unwanted background present in the dataset by using normalization techniques. Split the dataset into 80% of training set and 20% of validation set.

By CNN model extract features of the dataset by creating the relu layer, max-pooling layer, activation layer, sigmoid layer is used to summarize all the layer and to get the accuracy of the training processes. After completing the training process got the accuracy 96%.



Proposed baseline CNN architecture

Neural networks based on convolutions Networks like CNN [16] may be taught from beginning to finish without the need of any custom techniques. It is able to extract and select characteristics, categorise or forecast, and then train itself. The input layer, convolutional layers, pooling layers, fully-connected layers, and the output layer typically make up a CNN model.

The baseline CNN that we employed in our testing has the following structure:

- The photos in the input layer depict several types of digestive system polyps.
- It's a multiplication of the input by the calculated weights in convolutional layers: (filters).
- Feature maps derived from convolutional layers may be down sampled using the Max-pooling method. In each patch, the maximum value for each feature map is maintained. max pooling kernels are set to 2 with a two-step stride.
- After each convolutional layer, we utilised a ReLu layer to remove the negative values.
- It's here that the final prognosis for each picture is made. As fully-connected layers, we went with sigmoid and soft max.

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VII. RESULTS AND DISCUSSION

CONVOLUTION LAYER	DIMENSIONS	EPOCHS	BATCHSIZE	TESTACCURACY
32	3	50	64	82
32	5	50	64	74
64	3	100	64	82
128	3	100	64	85
32	3	50	64	86
64	3	50	64	83
32	3	100	64	87
64	3	50	64	88
64	3	100	64	92
64	**3**	**500**	**64**	**96**

Tableno:1

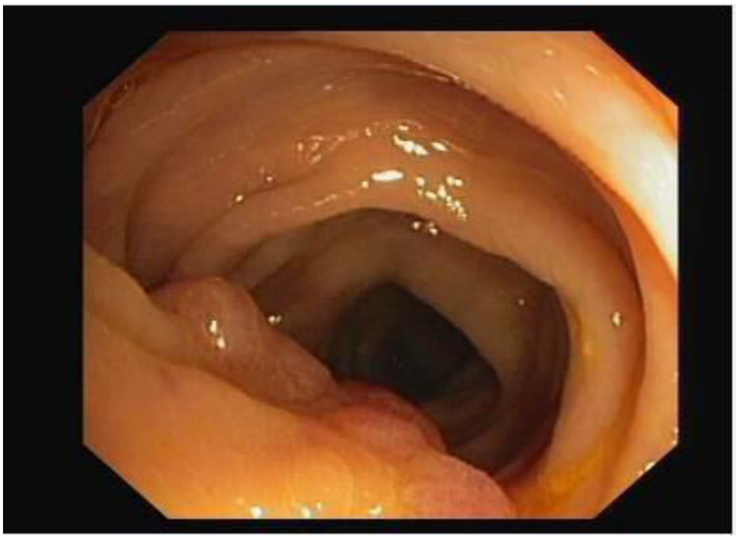

Fig.1:Original Image

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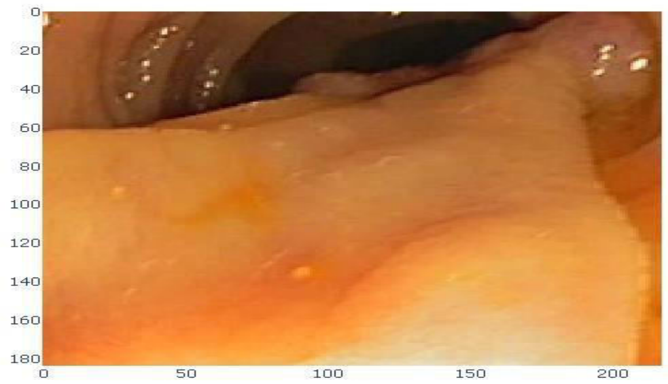
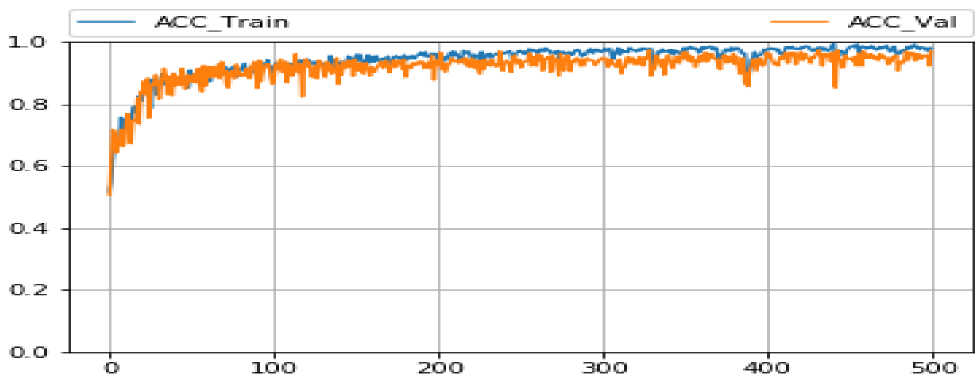


Fig.2:CroppedImage



Validation/Testloss:0.15933184139430523Validation/Testaccuracy: 0.96484375

Layer (type)	Output Shape	Param #
conv2d_148 (Conv2D)	(None, 148, 148, 64)	1792
activation_270 (Activation)	(None, 148, 148, 64)	0
max_pooling2d_148 (MaxPoolin	(None, 74, 74, 64)	0
conv2d_149 (Conv2D)	(None, 72, 72, 64)	36928
activation_271 (Activation)	(None, 72, 72, 64)	0
max_pooling2d_149 (MaxPoolin	(None, 36, 36, 64)	0
conv2d_150 (Conv2D)	(None, 34, 34, 128)	73856
activation_272 (Activation)	(None, 34, 34, 128)	0
max_pooling2d_150 (MaxPoolin	(None, 17, 17, 128)	0
flatten_62 (Flatten)	(None, 36992)	0
dense_123 (Dense)	(None, 128)	4735104
activation_273 (Activation)	(None, 128)	0
dropout_62 (Dropout)	(None, 128)	0
dense_124 (Dense)	(None, 1)	129
activation_274 (Activation)	(None, 1)	0

Fig.3: CNN model with Layers

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Fig.4:InputImage

Fig.5:OutputImage

VIII. CONCLUSION & FUTURE WORK

We have used the model which will reduce the cost and also will reduce the time of medical process. We have used the deep learning automated system to identify the Gastrointestinal tract abnormalities (polyps detection in GI tract) using endoscopic images which is very much necessary in the field of medical. We have taken only polyps as one of class for identification, but it can be enhanced by using different deep learning algorithm for identifying various GI diseases. And also, this model has been trained and tested only for one type of dataset, this only may not proof that will work for all dataset. However, there are still many critical issues that remain to be addressed regarding the roles of polyps in maintenance integrity. so, in the future we are going to reduce this risk.

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