Diagnosis of gastric cancer in role of endoscopic imaging techniques in artificial intelligence and machine learning applications: An overview

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Abstract. Gastric cancer is a serious medical issue because its occurrence and death rates are increasing all over the world. Furthermore, obesity, tobacco use, alcohol consumption, and a few dietary defense elements are known cancer-causing agents. In some nations, early detection strategies have been shown to reduce GC-related morbidity and mortality. It offers therapies that are minimally invasive like most effective procedure is endoscopic resection. The most appropriate standard for using a procedure that is typically secure to precisely evaluate the lesions region. It is simple method and it can be expected difficult techniques can be viewed as in early stage of tumour in accurate diagnosis. A few uses of computerized method have arisen in the field of gastric malignant growth. For example, image diagnosis-based prediction conclusion and guess expectation, because of its viable computational power and learning capabilities. As a result, a detailed outline of how artificial intelligence can be used to treat gastric cancer through image-based endoscopic diagnosis and machine learning analysis applications is provided. In this review, which demonstrates the future developments in this field for the early prediction of gastric cancer, it was also thoroughly discussed the possibility of AI models being over fitted, their accuracy, and their usefulness to clinical research in this field of image processing. In addition, in this review article was been detailed about synopsis of the therapy choices of malignant growth.

1 Introduction

Gastric cancer is the most serious health issues its rank 5th in worldwide and 4th in mortality till 2020.Moreover it crosses more than million new cases and 567,000 deaths. Basically, it been projected and it suddenly rises up to the level of 1.56 million new cases in the history of world-wide and millions of deaths occurred [1]. Therefore, men's have more serious health problem and mortality rate rather than women. In all over the world Asia has the more and highest rates in mortality and incidence in every month new cases and deaths

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is happened. The stage of gastric cancer has a direct impact on its prognosis. Early-stage stomach cancer patients can exceed the 5-year survival rate; be that as it may, most of patients are as of now in advanced stage when they are analyzed. Patients benefit from early recovery diagnosis and treatment. Due to the limited treatment options, advanced gastric cancer has a low diagnoses and low survival rate [2]. As medical technology has advanced and public health awareness has increased, diagnosing and treating due to rising number of people are in need of treatment for stomach cancer. Consequently, the primary objective of current research is to enhance gastric cancer detection accuracy, particularly in its starting stages.
The most typical type of stomach cancer is an adenocarcinoma. Adenocarcinomas come in three main pathologic categories: unpredictable, radial, and gastro enteric type. According to the WHO classification, the four main types of GC are tube-shaped, bulge, colloid, and poorly dependable based on the predominant histologic pattern [3]. Stomach cancer prevention is a major public health concern, and early lesion detection is essential for providing a definitive, minimally invasive treatment and enhancing survival rates.
This review paper summarizes the strategies for early gastric cancer (EGC) prevention and diagnosis, as well as the available treatments and gastric cancer diagnosis in applications of artificial intelligence and machine learning, based on the role of endoscopic imaging technique analysis.

2 PREVENTION

2.1 Risk factors of gastric cancer

The most common causes of gastric cancer include Helicobacter pylori (Hp) infection, smoking, consuming meat, obesity, and alcohol consumption [4]. Several factors, including polyphenols in citrus fruits, nonsteroidal anti-inflammatory drugs etc., may help prevent cardiovascular disease.

2.2 Helicobacter pylori

The most significant environmental risk factor for gastric cancer is helicobacter pylori, a class I carcinogen. In 90 percent of cases of non-cardia gastric cancer are caused by chronic Hp infection. The epithelial-mesenchymal transition, cell migration, and cell attack can all be altered by prolonged HP contamination, which can also result in MALT lymphoma, which is many times reversible just with Hp annihilation [5]. Notably, screening programs have been established in many Asian nations to increase Hp eradication and detection. In addition, efficacy for HP eradication in many patients who have ulcers in their intestines and long-term gastritis has been expanded in the Japanese health care systems, respectively.

2.3 Tobacco

Tobacco use is categorized as a group one in carcinogen. A meta-analysis by Morais et al. found that smokers are 25% more likely to develop GC [6]. In accordance with this information, which is directly related to the quantity and duration of cigarette smoking, the risk rises by 25% and 44%, respectively, for smokers who have been smoking for 30 years or more compared to non-smokers. About ten years after quitting, the risk of acquiring GC is comparable to that of non-smokers. [5]. The fact that smoking appears to have the strongest relationship with GC in the heart is interesting. In addition, it appears that

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smoking causes dysplasia, metaplasia, and chronic atrophic gastritis. Numerous studies looked into the genetic basis for the development of gastric cancer.

2.4 Alcohol

Alcohol use is linked to a higher risk of gastric cancer, particularly when it's 1 gram or more per day, according to a study of moderate drinkers. According to Deng et al meta-analysis's drinking alcohol significantly increased the risk of having GC compared to not drinking, with a probability value of 1.30. Strong drinkers were a subgroup with an Odds ratio 2.05. Acetaldehyde, the initial metabolite of ethanol, can result in Genetic damage when Genetic variation is suppressed [7]. Acetaldehyde levels appear to increase after drinking alcohol, high levels of acetaldehyde that resulting in nausea, rapid heartbeat etc.

2.5 Obesity

In recent years, it has been found that obesity is a significant risk factor for the development of many different types of cancer, is likely to have a greater impact than smoking in the coming years. Body Mass Index of gastric cancer have a direct connection, as indicated by a meta-analysis by Gao et al. [8]. This finding emphasizes the significance of losing weight at any stage of obesity, from mild obesity to severe obesity. In addition, compared to non-cardia GC, cardiac GC has a greater connection with obesity. In fact, a recognised risk factor for esophageal cancer may be increased by fat. cancer, cardia gastric cancer, and Barrett's oesophagus. Because insulin resistance may also contribute to cancer, and it is important to highlight the function of adipose tissue as an endocrine system. [9]. Obese patients have altered levels of adiponectin, leptin etc., as well as a variety of glucocorticoid and sex hormone synthesis, oxidative stress, and inflammatory markers. Cancer risk appears to be affected by all of these metabolic changes. In a similar vein, each of them might inherit a significant genetic risk [10].

3 GASTRIC CANCER SCREENING

The benefits from systematic gastric cancer screening programs all over the world. Screening tests are a secondary preventative measure because they enable the early detection of asymptomatic malignancies, initial tumours' and malignant. Gastric cancer screening test would make it possible to remove EGC and precancerous lesions, thereby reducing mortality and increasing therapeutic success [11]. Sadly, screening and treatment have only been implemented in a small number of countries with a high prevalence. However, due to all of the mentioned risk factors, furthermore, gastric cancer diagnoses are anticipated to rise even in low-prevalence regions [12]. As a result, researchers believe that recognizing the potential advantages of secondary prevention requires an understanding of precancerous situations. Likewise, the people with a higher risk of stomach cancer should be tested by the clinician, by the accessibility of blood markers, modalities imaging techniques, and particularly, endoscopy imaging techniques.

3.1 Imaging

Photofluorography has been used for gastric cancer screening in Japan since 1960, resulting in a notable 40–60% decrease in gastric cancer-related mortality [14]. Population-based data indicate that the X-ray approach with a barium used in photofluorography screening has demonstrated good diagnostic performance in sensitivity 36.7%; precision

96.1%. The presence of polypoid lesions, a change in the gastric fold, narrowing, deformity, rigidity, barium pooling on stomach area, and endoscopy must be used to confirm and analyze all radiographic findings. Korea began its national campaign for gastric cancer screening in asymptomatic adult patients aged 35 to 65 in 2003 [13] in accordance with patient preferences. Therefore, patients were select Endoscopies and barium examinations.

3.2 Endoscopic image-based analysis

Gastric cancer is evaluated via imaging, endoscopy, pathology images, and other techniques. Initially, gastric cancer detection has been the main application of endoscopy. The surface structure can be precisely analyzed using narrow-band imaging and linked colour imaging, both of which are used in image-enhanced endoscopy. The study's findings [15] suggest that using these endoscopic procedures might help diagnose gastrointestinal tumors more accurately. Endoscopy missed 10% of upper gastrointestinal cancers, according to a survey. Even if two experts engaged in an endoscopic unit, a missed diagnosis would still happen. This was due to the fact that doctors needed years of training to accurately diagnose gastroscopy images [16]. Upper gastrointestinal endoscopic performance standards Qui et al., Endoscopy.

1. Guidelines of Performance Measures in endoscopy---Key Performance Measures include following guidelines prior to an endoscopy, keeping track of the length of the procedure, accurately documenting abnormal discoveries and anatomical markers in imaging, using standardized disease and sures terminology, and Barrett's surveillance utilized the protocol, precise recording of difficulty following therapeutic endoscopy [17].
2. Minor Performance Measures finding gastric cancer by endoscopy technique---Initial diagnostic endoscopy and monitoring for gastric intestine metaplasia should take no less than seven minutes. a minimum of one minute of inspection per centimetre of Barrett's epithelium, using Lugol chromoendoscopy to rule out second primary esophageal cancer in high-risk patients, Implementation of MAPS (procedure for patients with gastrointestinal ulcers and malignancies) recommendations, prospective registration of Barrett's patients, and confirmed biopsy methodology to identify gastric intestinal tumor formation[18].

3.3 Analysis method in imaging techniques

Second, histological image identification is the most reliable technique for locating tumours. The lack of staff of pathologists has led to a severe work and incorrect diagnoses. Today, imaging analysis is frequently employed to assess lymph node metastases brought on by stomach cancer. The morphological properties of the lesions serve as the main foundation for the imaging evaluation [19]. For instance, adipose tissue and lymph nodes might be mistaken for one another in the perigastric region. Overdiagnosis and incorrect treatments are risks when doctors lack experience. Diagnostic accuracy always reduces when there are a number of cases. Mostly AI is becoming increasingly used in applications of medical due to the requirement for more accurate detection, classification, segmentation, and margin delineation. Developing technologies think like humans is the aim of artificial intelligence. Machine learning is an essential component of artificial intelligence. Compared to more conventional machine learning techniques like Bayesian networks and support vector machines, deep learning is more flexible in a variety of domains and contexts [20]. Also, it is more accurate and flexible. One of the most widely used deep learning image processing techniques is the convolution neural network. CNN's core consists of convolution, pooling, and complete association layers. The convolutional layer uses a lot of data to find features. The pooling layer packs the info include guide to kill the most helpful qualities. Also, it can speed up calculations, make network calculations easier, and minimise the size of extracted feature information. To reach the final prediction result, the fully connected layer must aggregate all of the characteristics and transmit the output value to the classifier [21].

3.4 Endoscopic gastric cancer evolution therapy

ER with hypersaline epinephrine in 1983. High-frequency knives were used to completely resect the lesions, which were subsequently removed. It is comparable to the contemporary ESD approach, but because to larger technological challenges at the time, it was less extensively used. In EMR, a single surgery can only remove a limited amount of tissue, and when many procedures are used, the regional overall incidence is significant [22]. Hence, the introduction of a novel endoscopic technique has been desired. As a result, Ono et al. created a new EMR technique. It was initially used in a clinical setting in 1995. Following the development of the surgical equipment in 2002, numerous incision tools, were designed [23]. The present name "ESD" was first proposed in 2004, and in March 2006, a stomach ESD test was added to the list of insured inspections. In the majority of Japanese organizations right now, ESD is used to perform ER for EGC [24].

4 DETECTION OF GASTRIC CANCER IN ENDOSCOPIC IMAGING TECHNIQUES AND ITS VARIOUS TYPES

The recognition and analysis of stomach tumors have been worked on during that time because of continuous headways in endoscopic advances. In order to evaluate stomach lesions and achieve early detection and diagnosis, a number of categories have been raised. This is due to the development of many endoscopic diagnostic procedures for EGC. For early detection and management of EGC, an appropriate white light endoscopic detection is required. In contrast, image-enhanced endoscopy can now clearly distinguish superficial EGC with minor morphological alterations that were previously difficult to identify with white light endoscopy. The precision of EGC diagnostics can be expanded by joining amplifying endoscopy with IEE to assess and recognize anomalies in the surface designs. This survey article will give a nearer assessment of the different EGC characterizations in light of different endoscopic symptomatic modalities and open watchers to later and novel groupings that were made explicitly for the stomach and utilized for the performance measures and analysis detection of gastric tumors.

1. White Light Endoscopy (Macroscopic): During screening endoscopy, superficial stomach malignancies that are mostly asymptomatic are frequently discovered as incidental findings. A superficial gastric cancer is a pre-cancerous lesion that invades both the submucosal layer and the stomach mucosa [25]. To improve treatment, prognosis, and outcomes, it is essential to correctly identify and diagnose these tumors using white light endoscopy, the standard endoscopic imaging approach, as well as an accurate evaluation of the performance efficacy.
2. Magnifying Endoscopy with Narrow Band Imaging: Identification of the peripheral growth of the lesion, pathology prediction, and detection of minute morphological changes in the gastric mucosa have all been made feasible by the development of magnifying endoscopy with NBI, which has increased diagnostic accuracy for EGC. Tumor growth modifications that can go

undetected during white light endoscopy can be detected NBI has the potential to increase the stomach mucosal surface for greater examination and identification [26]. A normal tissue displays a regular pattern of tiny, spherical pits surrounded by gathering venous system and a subepithelial tube of capillary flow that resembles a honeycomb under magnification endoscopy and Narrow band imaging. Hisada et al claim that by magnifying NBI, it is possible to detect superficial EGC by using three parameters: fine mucosal structure loss, capillary expansion, and various capillary morphological concepts are three examples. The significant sensitivity and specificity of 90 and 95 percent, respectively. [27].

3. Magnifying Endoscopy Simple Diagnostic Algorithm for Early Gastric Cancer (MESDA-G): When a suspect stomach lesion is discovered, MESDA-G suggests performing magnification endoscopy to precisely determine whether a boundary line is present or absent. The lesion should be classified as non-cancerous if there is no obvious boundary line. On the off chance that an unmistakable limit line is seen, the design inside the line to be freely assessed to see whether it is normal or missing. A malignancy is indicated by the presence of an abnormal pattern. In point of fact, a lesion is not cancerous if it does not have an irregular pattern. A simple and effective demonstration calculation for determining EGC, gastric tumor detection, has been viewed as MESDA-G utilizing the versus characterization. It has been demonstrated that there is a high predictive value for positive and negative outcomes, high diagnostic specificity. However, the rates of diffuse-type EGC remain unknown [28], so additional research of MESDA-G application It would be beneficial to the diffuse-type EGC diagnosis. The MESDA-G diagnostic procedure is still effective.
4. Endocytoscopy: One of the more recent and effective new endoscopic procedures, endocytoscopy (EC), gives ultra-high magnification and permits imaging of the GI mucosa at the cellular level [29]. Throughout the process of using this approach, staining techniques must be used. Based on the literature that is currently accessible in stomach carcinoma, which lacked a characteristic glandular structure and had a nucleus that was peripherally situated and surrounding by cytoplasm. Although EC seems like a method, its expensive and only accessible few places worldwide. Technical difficulties with this approach can make it difficult to obtain clear images as well as problems with the right staining technique. There are not many training facilities available globally, despite the fact that training is necessary to execute EC correctly [30]. As EC cannot see cellular processes beneath the superficial epithelial layer, it is still unable to determine the depth of invasion of gastric lesions. With these opportunities for development, EC requires more investigation in upcoming research.

4.1 Artificial Intelligence in endoscopic imaging techniques

Due to the ongoing advancement, artificial intelligence (AI) in the area of endoscopic technology has received a lot of research. Convolutional neural networks were utilized by Hirasawa et al to detect EGC in endoscopic imaging, and their respective sensitivity rates were found to be 92% and 97%. Additionally, research there was no evidence that AI was any better or any worse than skilled endoscopists [31]. The application of artificial intelligence in recognizing EGC, were 86% and 93%, separately, as per an examination article, which showed that man-made intelligence was more precise in distinguishing EGC than experienced endoscopists. The Cao et al. Endoangel system has demonstrated potential for endoscopic diagnosis and real-time detection of EGC [32], whereas most studies on AI's use in EGC diagnosis have not used real-time techniques. While simulated intelligence has assisted endoscopic innovations with improving, further exploration is expected to decide the exact and limits of simulated endoscopists intelligence. The most beneficial and accurately diagnose EGC, interaction between AI and endoscopists is required. [33].

4.2 Input variables and predicting gastric cancer

One of the most well-known diseases on the globe is gastric malignant development, and Japan may have one of the highest rates worldwide. Moreover, the most common cause of mortality in East Asian nations is stomach cancer. Risk factors for stomach cancer include chronic superficial gastritis. It is crucial to conduct fast and accurate stomach cancer screenings [34]. Other risk factors include recurrent Helicobacter pylori infection, pernicious anemia, and consuming too much salt. Patients who are considered to be at increased risk may try to get ready by following precautionary treatments. Instead, if a patient is predicted to be at low risk, they may choose to minimise the frequency of upper gastrointestinal endoscopic tests, such as those that are carried out yearly in Japan and come with possible dangers in addition to high screening charges. 200,000 persons who had undergone an endoscopic examination were analysed, and the results revealed a 0.13% rate of unfavourable complications and a mortality rate of 0.004%. So many people in high-risk categories have been advised to undergo endoscopic screening for stomach cancer [35].

The disease has been associated with a number of ecological risk factors, but there is still a need for quick screening to assess a patient's risk of developing gastric cancer in the clinical setting. However, one innovative and powerful machine learning method is XGBoost16,17. With the aid of thousands of classification and regression trees, XGBoost is able to precisely capture and comprehend complex and nonlinear relations (CARTs). CARTs are capable of discovering nonlinear correlations between input variables and results in an ensemble-enhancing way. Logistic regression and other linear methods are often not appropriate for prediction models with detailed relationships, even if nonlinear methods can be used to predict the possibility of developing stomach cancer [36]. This research assessed the reliability of a prediction model for the beginning of stomach cancer using artificial intelligence and machine learning methods and in modern medical techniques databases.

4.3 Literature search and selection criteria

The requirements for inclusion and exclusion are stated below, and they were used to choose the studies. The parameters were as follows:1. Research on recognizing gastric cancer lesions or imaging in extraction of data screening CNN. 2. Characteristics of using CNN-based or main CNN components-based models. 3. Clinical performance parameters in Artificial Intelligence algorithm are AUC, which stands for accuracy, sensitivity, and specificity.4. Researchers' studies and Articles were published

4.3.1 Research on recognisinggastric cancer lesions or imaging in extraction of data screening in CNN

Gastric cancer lesions or imaging data extraction was done by Niikura et al [37]. Each author's finished paperwork was compared, and any variations were clarified through review and discussion. The evaluator functioned as the final source in cases when issues could not be satisfied. The following details were extracted by the authors from the paper:

Recognizing the author, the year of publication, the study's methodology, the data set's source, the patient's basic information, the dataset images, tumor diagnosis, the number of Artificial Intelligence tasks, such as division, location, and characterization, the use of various test sets, and the different types of diagnostic and therapeutic injuries [38].

4.3.2 Characteristics of data evaluation using CNN-based models

The investigations that were a piece of the orderly research survey. The screening procedure was evaluated using the Quality Assessment on Diagnostic Accuracy Studies (QUADAS-2) tool. Four components make up the tool: The subject screening, the diagnostic testing, the overall framework, the timeframe, and any remaining concerns about its application are also reviewed [39]. Each area's bias risk is graded according to how low, or high.

4.3.3 The clinical performance parameters of the AI algorithm are AUC, which stands for accuracy, sensitivity, and specificity.

Between 2018 and 2020, literally the entire series of articles were published. To demonstrates how quickly CNN has become more effective at detecting cancer in recent years and how deep learning is rapidly being used in medical decision-making. The main focus of the research was on Hong Kong, China, Japan, South Korea. Researchers conclude to the conclusion that the prevalence of stomach cancer is higher the more research that has been done on the condition. Datasets images that didn't meet the requirements were processed simultaneously in the majority of examinations. The pattern recognition's image quality is evaluated throughout testing and training [40]. The image recognition capabilities of CNN are really interesting. It performs better in terms of assessment than standard machine learning. Programmers can process images using the more well-known network framework VGG. The network depth of CNN is growing to ensure accuracy as cutting-edge networks like VGG, Inception, and ResNet exist. CNN is targeting both quick and modest development. Artificial intelligence is rapidly used in the treatment of digestive issues. The results of gastrointestinal endoscopy disease identification by physicians and deep learning were compared in research by Qui et al [41]. The findings, the quantity and quality of the training data significantly impacted CNN's endoscopic diagnosis. Images and patients can be utilised to identify helicobacter pylori infection, according to a meta-analysis. Artificial Intelligence is indicated was more reliable for detecting gastric and esophageal neoplastic lesions when the AUC was higher than 0.88. Increasingly number of diseases are being detected using artificial intelligence [42]. Several researchers utilized a deep learning algorithm to detect between different chest CT scans during the global pandemic.

4.3.4 Researchersstudies, and Articles were published

It can also be used to distinguish the boundaries of abnormal slices and identify the cancer type. It's predicted that stomach cancer detection techniques based on CNNs will become common in deep learning in a few decades. Furthermore, only images that are challenging to interpret now need to be identified, which will significantly minimise the amount of work required [43]. Therefore, it is not required to separately analyse every patient's image, In regions with expanding population and a decreased number of healthcare facilities. Moreover, intelligence might make a big difference. Online medical service has led to a rapid expansion of telemedicine services. In remote areas has been significantly raised. Moreover, researcher faith that physicians, pathologists, and algorithmic reasoning will collaborate to enhance medical treatment [44]. The positive aspect of this research was the choice of studies on CNN algorithms evaluated in images of stomach cancer. Each data extract is subject to further limitations. Despite the fact that this study featured excellent articles in various languages, it simply summarised CNN's findings on gastric cancer imaging. It is challenging to evaluate performance in a clear manner because to the various levels of challenge in analyzing images or lesions, which leads us to our second parameter. Thirdly, the study includes images and research materials from different countries and ethnic groups. It generated a variety of images. The evaluation methods and the variables were different during a single moment [45]. Moreover, physicians and pathologists will be able to use CNN's findings as a determining the diagnosis of challenging cases. Because of this, have looked at a lot of research papers that predict gastric cancer using machine learning, neural networks, and artificial intelligence.

5 Discussion and conclusion

The global health care system has significant problems with access to basic treatment and correct diagnosis. A change away from previous, more basic machine learning techniques and towards more recent deep learning techniques has occurred. Moreover, AI necessity for operator-dependent screening procedures. The application of the algorithm has a major impact on the precision of clinical diagnostics and the growth of health and medical activities. The CNN models of stomach cancer are useful for margin detection, classification, segmentation, and definition, according to our methodical analysis. For the specific CNN model architecture, neither a regular standard nor an evaluating standard exists. Comparing CNNs with performance evaluation measures and diagnostic result, and other machine learning approaches and data sets in research is the best study methodology. When precision, accuracy, sensitivity, and specificity were evaluated, all investigations, including Therefore, evaluated the research's level and examined the variety of images, the efficacy of each simulation, and other research-related factors. Also, research on gastrointestinal disorders has been done in the past, but this is the first study to exclusively examine CNN use in gastric cancer. Moreover, CNN data on stomach cancer detection, classification, segmentation, and margin segmentation were thoroughly evaluated in this study. According to CNN, this might be more useful in the future for detecting stomach cancer.

6 Conclusion

In this review article of gastric cancer detection and diagnostic method, is clearly reviewed the convolution neural networks and AI methods to solving the problem to detect early tumor detection which is helpful for patients because of rising rates of morbidity and mortality worldwide, GC is a significant threat to public health. The best method of lowering mortality is prevention. First off, since lifestyle influences carcinogenesis significantly, doctors should concentrate more on modifying it while lowering risk factors. Also, whenever possible, the eradication of HP should be promoted. Furthermore, the use of screening tools such serological measures or endoscopy could be investigated. Monitoring for precancerous abnormalities and doing a thorough endoscopic check could help with early GC prevention and identification. ER is currently the gold standard for treating EGC, and surgical minimally invasive techniques provide patients with EGC with an excellent quality of life. Even though there is already a vast information base of precancerous diseases. Consequently, it is important to implement and promote population-wide screening for precancerous diseases and lesions. According to a summary of CNN's analysis of medical images, the network can be used to recognise gastric cancer. The prediction accuracy ranged from 77.3 to 98.7% across all of the studies, illustrating that they performed well in terms of identifying. It is predicted that CNN will play a significant part in assisting scientists and physicians in accurately diagnosing diseases. Moreover, physicians and pathologists will be able to use CNN's findings as a determining the diagnosis of challenging cases. Because of this, have looked at a lot of research papers that predict gastric cancer using machine learning, neural networks, and artificial intelligence. Endoscopic technologies have improved over time to enable more accurate evaluation in cancer detection. Have seen advancements in conventional white light endoscopy and the introduction of new endoscopic diagnostic modalities. These improvements have prompted numerous characterizations for EGC, which were shrouded in this survey study. AI also to emerge in the field of endoscopy, potentially enabling improved EGC detection and various endoscopic modalities for improved prognosis and improved survival rates.

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