Application Value of Artificial Intelligence in the Identification of Gastric Cancer Polyps. A Cooperative Diagnosis Method Based on AI and Was Established

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Abstract

Objective: Gastric cancer polyps is a common digestive system disease, which is closely related to gastric cancer. This study focuses on AI (Artificial Intelligence)-assisted gastroscopy for cancer polyp detection, including methodology exploration, brand-new system construction and real-time clinical trials, in order to realize the independent development and validity verification of AI-based cancer polyp collaborative diagnosis system and provide an efficient diagnostic means for gastroscopy for polyp detection. **Methods:** By studying the risk factors and experimental samples, the experimental samples were trained with BPNN (BP neural network) in the artificial neural network, and the conclusion was drawn. GA (genetic algorithm) is used to optimize BPNN. BPNN discriminant function is used as discriminant function for embedding. **Results:** The best threshold of AI model for cancer polyp detection was 0.79, and the AUC under the curve was 0.882. Combining AI white light mode with NBI(narrow band imaging) mode, we can find that the sensitivity of AI parallel analysis is the highest (88.8%) and the specificity of AI series analysis is the highest (95.238%). **Conclusion:** The real-time application of AI-based cancer polyp collaborative diagnosis system can improve the detection results of gastric cancer polyps to some extent, and it is safe and effective to use AI-assisted detection system to detect cancer polyps. in real time.

Keywords: Gastric Cancer, Cancer Polyp, Gastric Cancer Polyps, AI, Neural Network

Introduction

AI (artificial intelligence) has become more and more mature, among which DL (deep learning) is an important branch of AI. It has been applied in many fields, such as medical treatment and transportation, which has brought brand-new changes to people's life, work and medical treatment. Pathological diagnosis is the gold standard of tumor diagnosis and the decisive factor for clinicians to formulate treatment plans and predict prognosis for patients with malignant tumors. In gastroscopy, AI based on DL is mainly used to assist the detection of intestinal polyps. and the classification of colon lesions.[1,2] The fully digital image processor in the endoscope system can not only observe the shape of tumor surface opening, but also observe the structure of tumor surface capillaries by AI electronic staining technology, which is helpful

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for the diagnosis and treatment of tumor.

Gastric cancer polyps. is a common digestive system disease, which is closely related to the occurrence of gastric cancer. Gastric polyps. are abnormal growths that can develop in the lining of the stomach and are considered a risk factor for gastric cancer [gnnm]. In this regard, researchers have developed many new technologies for endoscopic diagnosis, including high-definition gastroscopy, gastroscopy attachment, endoscopic image enhancement technology and new endoscopy, etc., to improve the detection of polyps. under gastroscopy, and launched related clinical research for these new technologies.[3-5] A meta-analysis shows that the risk of gastric cancer in high intake of red meat and processed meat is 22% higher than that in low intake. Moreover, literature [gnnm] states that the incidence of gastric cancer is at an increasing trend among all age groups, and it closely relates to the local economic development level. By training with a large number of labeled images, DL algorithm can classify and identify a huge number of image data.[6] Literature[7] established a model based on CNN (Convolutional Neural Network) to detect gastric cancer, with an overall sensitivity of 92.2%. However, due to the interference of inflammatory lesions and complex anatomical structure of gastric cavity, 161 non-cancerous lesions were wrongly identified during the test, resulting in a positive predictive value of only 30.6%. Literature[8] developed a model based on CNN to identify esophageal cancer, with a sensitivity of 98%. Literature[9] classifies the stained histopathological images of gastric cancer based on DL, and the overall recognition accuracy reaches 69.9%. Literature[10] has developed a new and more advanced computer medical diagnosis software, which contains more than 2,000 diseases and more than 5,000 symptoms. Nevertheless, CNN-based models only analyze the underlying pixels of the gastrodcopic image to locate polyps., missing the spatial and positional information contained in the anatomical structure of gastroscopic image, which leads to a lower accuracy in detection, as mentioned by [gnnm authors]. Considering the limitations of CNN-based models, MGNN (masked graph neural network) model is proposed by [gnnm authors] to address these by utilizing the graph structure and convolution operations to extract spatial and semantic information of gastroscopic images. With its masked self-training strategy, it compensats for the deficiency in the number of manually labelled gastric polyp images, helping avoid overfitting [gnnm].

AI technology provides a new idea for the development of the medical industry, especially when DL technology matures, it promotes its large-scale application in the medical field, such as imaging examination, pathological examination and other fields, especially in endoscopic examination, which can find precancerous lesions earlier and significantly reduce the incidence and mortality of gastrointestinal tumors. The expert medical system established by AI technology is helpful to reduce labor-related costs and improve medical efficiency.[11,12] The ultimate goal of AI digital image processing is to replace human force in the process of recognizing and distinguishing images, and to recognize human visual ability and brain information processing ability by using computer simulation. As an example, [gnnm authors] propose that Healthcare 4.0, the integration of advanced technologies such as AI, Big Data and IoT, provides large amounts of datasets, which are used to train MGNN models for more accurate and efficient detection of polyps. in gastroscopic images, resulting in a more effective system with lower costs. When AI is combined with CTC (CT Colonography) technology, it is often necessary to dig deeply in the face of a large number of image data and analyze the correlation between endoscopic image data and disease diagnosis.

In this study, DL technology is used to train the neural network model with high-quality marked data, and a computer-aided diagnosis model for gastric cancer polyps. was initially established to test the automatic recognition ability of gastric cancer polyps. in computer-aided diagnosis endoscopic images and videos, with an aim of clarifying the clinical value of AI model in the diagnosis of gastric cancer polyps. and assisting novice endoscopists to improve the recognition and diagnosis level of polyps.

Research Method

Research Objects

Patients who are scheduled to undergo gastroscopy in each participating endoscopic center are continuously included, and the inclusion criteria, exclusion criteria and exclusion criteria are as follows:

Subjects' selection criteria: 18 ~ 65 years old (including 18 and 65 years old), regardless of gender; Patients with indications for gastroscopy who intend to undergo gastroscopy; All the pulmonary nodules were surgically removed, and the diagnosis was made by two senior pathologists through paraffin section after operation. No radiotherapy, chemotherapy, targeted and immunotherapy were performed before operation, and there was no history of other parts or previous lung malignant tumors; Sign a written informed consent form.

Exclusion criteria: late gastric cancer. Inflammatory bowel disease. History of gastric cancer surgery. Submucosal lesions. Those who have contraindications for biopsy. Poor intestinal preparation affects visual field observation.

Test Method

In this study, DL method is used to solve the problem

of target detection, and the open source implementation based on Faster-CNN algorithm, TensorFlow and Faster-CNN is adopted to explore the methodology of constructing cancer polyp detection system under AI-assisted gastroscopy. ImageNet pre-training model is used for initialization parameters, Mementum optimizer is used for training, and the learning rate is exponentially attenuated to adjust the degree of loss function to parameters. The initial learning rate is set to 0.001, and the attenuation is 0.5 times of the previous 50,000 steps.

Each gastroscopy picture is labeled by an endoscopist. After that, we trimmed the periphery of the gastroscopy picture. We send a 64× 64 resolution color image as input to the model. In order to improve the adaptability of the data in the neural network, we normalized the endoscopic data before the training set was input into the neural network.[13]

We use TensorFlow DL framework to train our convolutional neural network model. Then, the frame with the highest score is selected from multiple frames through confidence score, and the predictive label and frame for gastric cancer polyps. are presented to assist the endoscopist in detection.

Picture Evaluation

According to the overall imaging quality, select the appropriate pictures from the retained endoscopic images, discard the mucosal areas mapped in them, and take the pictures diagnosed as cancerous by biopsy for image evaluation, then explain and demonstrate the evaluation contents and standards to the endoscopists in detail. In order to avoid bias, the sample pictures used are not among the pictures to be evaluated later. According to the classification of pathological studies, the nature of lesions is judged from the following four items: chronic superficial gastritis, chronic atrophic gastritis, intestinal metaplasia and gastric intraepithelial neoplasia.[14] If more than one lesion is observed in the picture, the lesion with the most serious pathological condition will be subject to subjective judgment. Score the boundary between the lesion and the surrounding normal pleura in endoscopic pictures. The scoring criteria are as follows: 0 (the boundary between the lesion and the surrounding normal pleura is unclear), 1 (between 0 and 2) and 2 (the boundary between the lesion and the surrounding normal pleura is obvious).

Statistical Method

SPSS software was used for statistical analysis. Classification variables are described by frequency, and compared by chi-square test or Fisher exact test. Continuous variables are expressed as mean standard deviation or median and interquartile interval. Taking the labeling results as the reference standard, the classification evaluation index and target detection evaluation index of each experimental group are calculated. The comparison of correct rate adopts χ^2 test. There is a significant difference in $P<$, and the $\alpha = 0.05$ correction is 0.00625 when comparing multiple groups of rates.

Collaborative Diagnosis of Cancer Polyps. Based on AI Training of Neural Network

Gastric cancer is one of the common malignant tumors in China, with more than 250,000 new cases and 140,000 deaths in China every year, accounting for 20% of gastric cancer in the same period in the world.[15,16] The outcome and prognosis of gastric cancer are closely related to the stage of the disease, and most early gastric cancer can be cured. However, because the pathological nature determines the possible further treatment for patients and the follow-up interval of gastroscopy,[17] at present, all gastric cancer polyps. that have been resected or newly discovered by endoscopy will be routinely examined for their nature, and their accuracy is far from the goal of diagnosis under direct vision, which limits the wide application of real-time judgment of polyp properties under direct vision.[18] In recent years, with the continuous development of AI technology, especially the emergence and application of DL and convolutional network nervous system in recent years, it has made continuous breakthroughs in the field of speech and image recognition, and gradually reached or surpassed the recognition level of human beings.

The shallow features of the image represent the texture, space and other information of the image, and describe the lower-level features such as the edge of the object. Deep features represent the high-level semantic information of an image and express a part of an object or a complete object, but they lack geometric invariance. According to the current scientific research, the training function adopts Fisher discriminant analysis, but due to the limitation of its method, this paper adopts the method of artificial neural network, in which artificial neural network is an AI technology that simulates the biological process of human brain, a multi-layer network structure abstracted from the electrochemical activities of brain neurons, and it is a complex nonlinear system formed by a large number of neurons interconnected.[19] In the field of medical images, shallow and deep features can also identify lesions, but because a single type of image features can't completely express image information, this paper adopts feature fusion, which can more comprehensively represent image information, obtain better recognition effect and better assist doctors in diagnosis.

In order to enrich the descriptor information of the image and improve the recognition accuracy of the image, this paper proposes a feature fusion model, which combines the shallow features and deep features of the image. The specific process is shown in Figure 1:

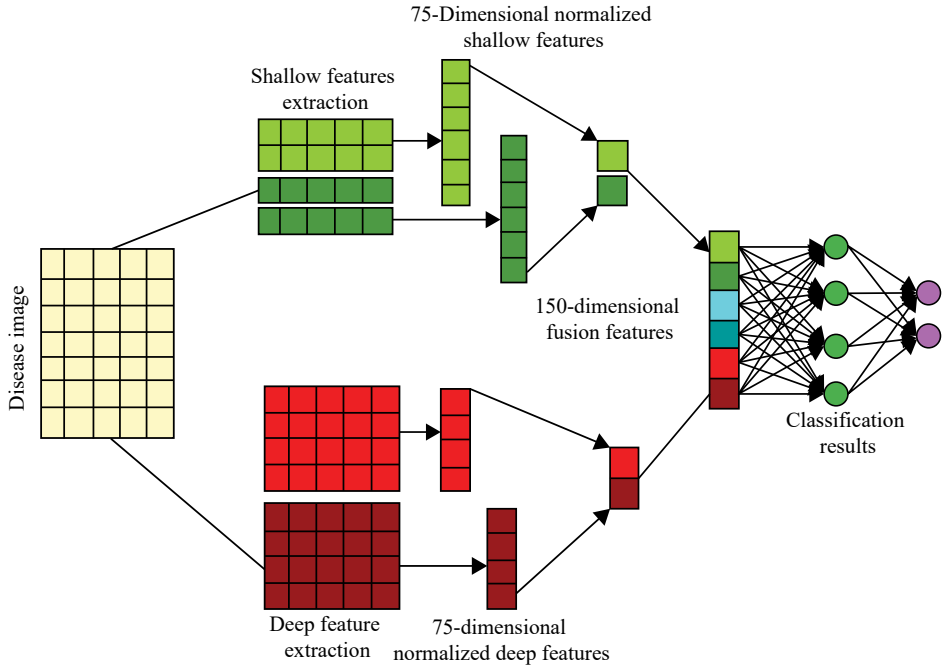

Figure 1. Classification process of gastric cancer polyps. based on feature fusion

The fusion features of images include shallow features and deep features, and the deep features are extracted by Google Net model with good classification effect. Shallow features and deep features are fused in series, kernel fusion, graph fusion and so on. Each feature in kernel fusion For a kernel, kernel fusion is to select features for the best linear combination.

Finally, according to the classification results given by the classifier, the classification methods of gastric cancer polyps. based on fusion features, shallow features and DL are analyzed and compared, and the significance of the fusion of shallow features and deep features to the classification results is analyzed.

In this paper, a kind of BPNN(BP neural network) is used for training. This is mainly because the basic idea of BPNN consists of two processes: forward propagation of signals and backward propagation of errors. Its significance is to invert the output error layer by layer through the hidden layer in some form, and distribute the error to all units of each layer, and get the error signal of each layer unit as the basis for correcting the weight of each unit.

The human brain is the highest product in the process of biological evolution, and it can be said that it is the most perfect and complex information processing system that can be found at present. At present, the combination of electronic components is used in the computer to complete some memory, judgment and memory functions of the human brain. Now the research shows that the feedforward neural network generally has a four-layer structure, which can obtain better generalization ability, namely, the input layer, two hidden layers and one output layer. Feedforward neural network can be used as a standard form of nonlinear approximation. Only when there are many samples, high precision and typicality, the prerequisite for using BPNN method to model is that there are enough typical and high precision samples. The training process of BPNN can be summarized as follows: before the start, the threshold and weight are randomly initialized from -1 to 1, and the error is judged by least square method. When the error is lower than the system error or exceeds the set number of iterations, the system terminates the training. The training process is over.

Use the input sample $P_k = (x_1^k, \ldots, x_n^k)$ to connect the weight ω_{ij} and the threshold θ_j to calculate the output of each unit in the middle layer, and then use s_j to calculate the intermediate output b_j through the transfer function, as shown in Formula (1):

$$b_j = f(s_j) = f\left(\sum_{i=1}^{n} \omega_j x_i - \theta_j\right), j = 1,2,\cdots, p \quad (1)$$

Use the connection weight value ω_{ji}, the generalization error d_i of the output layer and the generalization error e_j^k of the middle layer output b_j to calculate the generalization error E of the middle layer, as shown in formula (2):

$$e_j^k = \left[\sum_{i=1}^{q} d_i * \omega_j\right] b(1 - b_j) \quad (2)$$

The BPNN model with four-layer hidden layer structure designed in this paper can simulate medical diagnosis well, and the diagnostic accuracy is good. BPNN requires that the training of sample space needs more than 3000 times, otherwise it can't output high-precision results, which is the inherent deficiency of BPNN algorithm.

The system urgently needs a new algorithm to optimize it. The goal of optimization is to improve the convergence speed and avoid falling into local minima. At the same time, the algorithm can also provide a reasonable network structure and initial weight range for BP network. As we all know,

GA(genetic Algorithm) is a fast convergence algorithm. GA can be used to optimize BPNN.

When adopting GA for BPNN, we mainly pay attention to the following parameters: the number of hidden nodes, topology and control parameters of BP algorithm.[20] The first step of GA optimization is to encode the structural parameters of the network and convert them into binary strings and chromosomes. If the error between the output value and the expected value is taken as the fitness function, then the advantages of BPNN and GA can be combined to create a better network algorithm.

According to the above analysis, the fitness function is determined as follows:

$$F_i = C_{\max} - E_i \quad (3)$$

$$E_i = \frac{1}{2}\sum_k \sum_p \left(y_i^{'} - y_i\right)^2 \quad (4)$$

$C_{\max}$ to choose a constant with a large enough value, this paper sets it to 300; Let the number of chromosomes in the system be N, then $i = 1,2,\cdots,N$; k is the number of learning samples, which can be a natural number ranging from 1 to 500. p is the number of nodes in the network output layer, $p = 1$.

Through the previous operation, there are currently 14 chromosomes, so 4 chromosomes need to be eliminated. The selection criterion is the fitness of chromosomes. Eliminate the chromosomes with the least fitness, thus forming a new generation of population, the number is also 10.

Using the generalized error e_j^k of the middle layer and the input $P_k = \left(x_1^k,\ldots,x_n^k\right)$ of each unit of the input layer, the connection weight ω_{ji} and the threshold θ_j are corrected. If the learning is greater than the preset value, the network cannot converge. Finally, the training is over.

Construction of Cancer Polyp Detection System Under AI-Assisted Gastroscopy

Gastric cancer polyps. is a localized protuberance derived from Gastric mucosal epithelium. Patients are usually unaware of obvious symptoms, and polyps. are often found during endoscopic examination or imaging examination. Most gastric cancer originated from adenomatous polyp,[21] and it takes at least 10 years on average to change from small polyp to large polyp, and then to dysplasia and cancer. Although gastroscopy is considered as the most effective means to screen gastric lesions, the quality of examination is affected by many factors, so there is a certain missed diagnosis rate,[4] which is not conducive to gastric cancer screening and prevention. In recent years, more and more attention has been paid to the development of AI-assisted diagnosis technology. Polyp detection is to help gastroscopy examiners notice those polyps. that may be overlooked by automatically detecting whether there are polyps. during gastroscopy and marking their positions, thus improving the detection rate of polyps.

In order to improve the detection rate of gastroscopy, endoscopists should follow the standard operation: fully flush and attract fecal liquid and fecal residue in the intestine; Carefully observe every intestinal bend and fold; Ensure sufficient observation time.[10] However, because endoscopists have to face a large amount of gastroscopy workload every day, it is difficult to maintain the standard high-quality examination operation. The ideal quality control method should realize the real-time supervision of gastroscopy process without increasing labor cost, and at the same time assist endoscopists to find more polyposis. Therefore, based on the quality control model of AI gastroscopy developed in the early stage, this study formed an AI-assisted gastroscopy cancer polyp detection system, and prospectively evaluated the application value of this system in real clinical practice.

In this paper, an AI-assisted gastroscopy cancer polyp detection system is designed and implemented. The system integrates the patient's medical information, can identify the precancerous diseases of the patients who have been treated online, and provide visual clinical decision support for doctors. The overall framework of the AI-assisted gastroscopy cancer polyp detection system is shown in Figure 2:

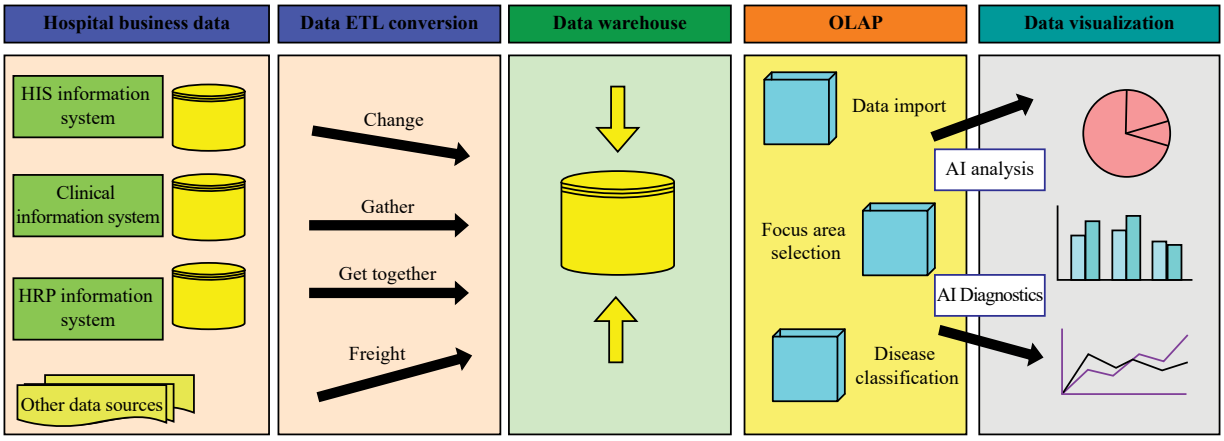

Figure 2. Overall framework of system

Medical staff perform visual operation through the interface of the Web system, the system calls the database to automatically extract the patient's medical information and visualize the gastroscope image, the medical staff browses the image to select the focus area, and calls the model for online pre-gastric cancer disease identification. The data stored in the database includes model data, imported medical information, prediction result data and intermediate process data.

Among them, the system settings set the operating parameters of the whole system, such as the IP address of the case base and the parameter settings of the human information collection equipment. Case inquiry has different inquiry rights for different users. Doctors can query all cases of undergraduate course room, system administrators can query all cases of the whole hospital, while ordinary users can only query their own cases. Message suggestion can show patients' opinions and suggestions on the hospital or the system to the system administrator, which is convenient for the improvement of the hospital and the system.

Home address and contact information are mainly used to facilitate hospital return visits, track the effect of medical diagnosis, provide better medical services for patients, and also provide more detailed reference cases for the next clinical treatment. The system generates multiple options of symptoms according to the input and the symptom keywords built into the system. Because there may be gaps in computer semantic recognition, patients can also supplement input symptoms. In order to facilitate the subsequent identification results to be associated with patients, each gastroscope image of each patient has a unique ID index, and each lesion marker frame in each gastroscope image also has its own unique ID index.

Result

Characteristics of Detected Polyps.

The distribution of polyps. is shown in Table 1:

Table 1. Distribution of polyps.

Location	Large Polyp (≥1cm)	Moderate Polyp (5-9mm)
Ascending Colon	16	7
Transverse Colon	13	15
Colon Descendens	11	10
Sigmoid	14	10
Rectum	10	12
Amount to	64	54

50 patients were confirmed to have 90 polyps. with a diameter of 0.5-3.5cm by gastroscopy. Among them, 10 patients each had 3 polyps., 21 patients each had 2 polyps. and 18 patients each had 1 polyp. 60 polyps. can be seen in supine position and prone position, while 11 cases can only be seen in supine position and 8 cases can only be seen in prone position. Polyps. with a diameter less than 5mm are not evaluated in this paper. The gastroscopy results of the remaining 10 people were normal.

Analysis of the Results of AI Model in Recognizing Gastric Cancer Polyps. Images

In this study, 7000 images were selected, including 4000 gastric cancer polyps. images and 3000 normal images. The optimal threshold of AI model for cancer polyp detection is 0.79, and the AUC under the curve is 0.882. See Figure 3 for the receiver operating characteristic curve of AI model for identifying endoscopic images:

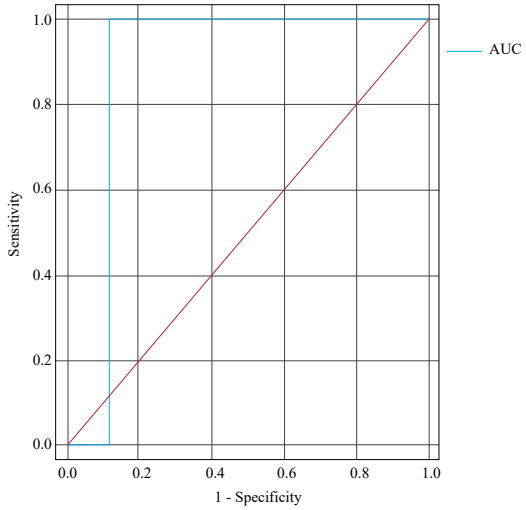

Figure 3. Identification of receiver operating characteristic curve of Endoscopic Images by AI Model

Property Identification Performance Evaluation

Taking pathological results as the gold standard, the characteristics of polyps. judged by AI system and endoscopists are as follows (as shown in Table 2 and Figure 4).

Table 2. Performance of different identification methods for gastric cancer polyps.

Identification Method	Sensitivity/%	Specificity /%	PPV/%	NPV /%	Degree of Accuracy/%
Endoscopist	84.006	79.588	82.843	82.892	80.937
NBI	82.847	84.677	91.792	83.153	78.381
White Light	83.637	81.298	84.22	73.41	83.559
AI Parallel Connection	88.8	74.802	79.469	76.461	73.752
AI Series Connection	73.54	95.238	93.778	71.249	77.938

Note: PPV: positive predictive value; NPV: negative predictive value.

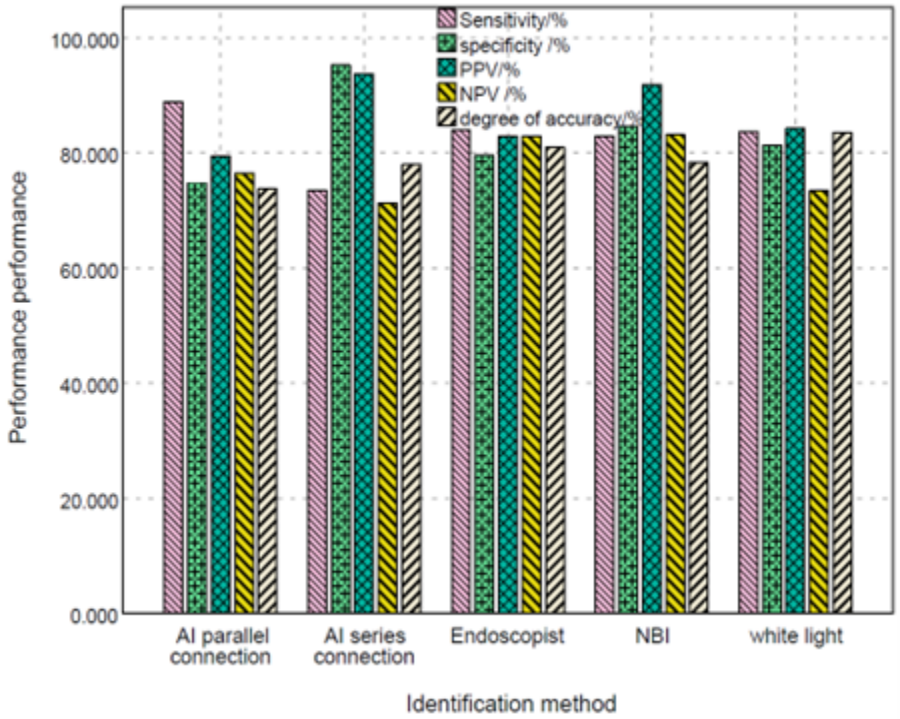

Figure 4. Statistical chart of performance of different identification methods of gastric cancer polyps.

Endoscopists showed the highest sensitivity to adenoma (84.006%), but the lowest specificity (79.588%). The specificity of NBI model was the highest (84.677%). Combining AI white light mode with NBI(narrow band imaging) mode, we can find that the sensitivity of AI parallel analysis is the highest (88.8%) and the specificity of AI series analysis is the highest (95.238%).

Discussion

Traditional CTC examination combined with multi-point biopsy of gastric mucosa at suspected lesion and blind examination of gastric mucosa with normal appearance is considered as the gold standard for detecting precancerous state of gastric cancer, but biopsy requires complicated and time-consuming preparation procedures, and the traumatic bleeding caused by it may affect the observation of nearby lesions. In addition, excessive biopsy will cause unnecessary risks to patients. Up to now, many important technical improvements have been made in digestive endoscopy to optimize and facilitate the detection of lesions. The high-definition intelligent electronic staining endoscopic system is the clearest and most complete endoscopic imaging system in the world. By examining the pictures, the endoscopist can judge the nature of the lesion based on the surface configuration, overall shape and vascular changes of the membrane. During the screening of each picture, count the number of lesions observed in this picture. NBI mentioned earlier is commonly used in the process as it can capture high-resolution images of gastric mucosa, which are analyzed by BPNN models to detect any abnormal patterns or structure that may be indicative of a lesion.

In recent years, the Chinese government attaches great importance to the prevention and control of cancer and the overall improvement of cancer diagnosis and treatment. At present, AI has rapidly developed from the experimental stage to the implementation stage in many clinical disciplines. Data-driven AI technology has created unprecedented opportunities for medical automatic diagnosis, especially in the automatic diagnosis and large-scale screening of clinical imaging,[11] in the digestion of esophageal cancer,[12] gastric cancer[13] and helicobacter pylori infection.[13] Clean, dry and fully expanded intestine is the key to the success of CTC examination. Because the feces remaining in the intestinal cavity can be mistaken for polyps. or polyps. as feces, improving the false positive rate and false negative rate has great influence on the screening or diagnosis of diseases. Carbon dioxide is the most ideal intestinal dilator, although it will feel uncomfortable when injected like air, it can reduce the uncomfortable reaction of patients after examination because of its absorption by intestinal canal, and it is the best choice for CTC. Currently, carbon dioxide automatic injection machine has been used abroad.[7]

Since the combination of AI technology and medical picture recognition, various medical related AI technologies have emerged, and the field of digestive endoscopy is no exception.[3] However, there are few studies on the application of AI technology in clinical gastroscopy. At present, there is no research on the AI-aided diagnosis system that can directly identify the nature of gastric cancer polyps. in real time under gastroscopy. [gnnm authors] propose that the MGNN model is effective in real-time detection of gastric polyps., however, it has limitations in identifying specific

gastric cancer polyps., which have a higher risk of malignant transformation. The pictures taken at the laboratory level are collected prospectively, and the unqualified pictures are filtered out, and then marked for the system to learn. The image quality is relatively high, and the test is a static test with a single image one by one. Although research observers often try to choose the best picture interpretation result when determining the final judgment result of AI system, this is inevitably influenced by the observer's subjectivity to some extent, and some polyps. are likely to be difficult to reach the best picture due to their angles and positions.

In recent years, with the incidence and mortality of gastric cancer increasing year by year, it is of great significance to actively carry out prevention and treatment countermeasures against gastric cancer.[14] Gastroscopy plays an important role in preventing gastric cancer by detecting and removing gastric adenoma. However, gastroscopy is an operator-dependent examination method, and the detection rate of gastric cancer varies among different endoscopists.[15] In recent years, with the rapid development of AI, the clinical application potential of AI-based computer-aided system is huge. For gastroscopy, computer-aided system of AI can intelligently control the quality inspection process in real time, or can effectively standardize the operation of endoscopists, thus improving the quality of gastroscopy. In this study, the above AI-assisted gastroscopy cancer polyp detection system was integrated first. After that, clinical trials were conducted to observe whether the AI-assisted gastroscopy cancer polyp detection system can improve the inspection quality during the actual gastroscopy.

In addition, the emerging DL technology was applied to the diagnosis of gastric cancer polyps., and the model was preliminarily explored to assist novice endoscopists to identify polyps. in clinical practice. In this study, 7000 images were selected, including 4000 gastric cancer polyps. images and 3000 normal images. The best threshold of AI model for cancer polyp detection is 0.79, and the AUC under the curve is 0.882. Endoscopists showed the highest sensitivity to adenoma (84.006%), but the lowest specificity (79.588%). The specificity of NBI model was the highest (84.677%). Combining AI white light mode and NBI mode, we can find that the sensitivity of AI parallel analysis is the highest (88.8%), and the specificity of AI series analysis is the highest (95.238%). It is proved that this model has good clinical effect in diagnosing gastric cancer polyps.

In the field of AI-assisted gastroscopy polyp detection, most of the research is at the methodological level, but there are few applied research reports. Real-time polyp detection highlights possible polyp lesions by color coding to evaluate the feasibility of the software used in gastroscopy and the improvement of polyp detection rate.[13] In view of the limited sample size and the poor detection results of small and flat polyps. in this study, the effectiveness of AI-assisted polyp detection needs to be compared and verified in subsequent studies, and the detection of small and flat polyps. should be further improved. In the study, conventional gastroscopy is equivalent to artificial polyp detection, and AI-assisted gastroscopy is equivalent to manual and AI system detection, which can help inspectors find polyps. that are easy to miss diagnosis. At the same time, this study also analyzed the pathological results of some polyps. detected, and found that the pathological types of polyps. detected by AI-assisted gastroscopy were consistent with those detected by conventional gastroscopy, and more adenomatous polyps. were detected.

In this study, an AI model aided diagnosis system for gastric cancer polyps. was initially established, and the detection effect of AI model aided novice endoscopists in identifying polyps. of different sizes and shapes was verified, but there were still some limitations. In this study, the data were collected retrospectively, and no prospective study was conducted. After the video was cut, the intestinal environment of the original gastroscopy video was more complicated, and the accuracy of real-time detection in the future may be different to some extent. Therefore, the results may not be generalizable to other populations or settings. The future research direction will be to collect endoscopic data from multi-center and multi-endoscope models, expand model training samples, collect interference images such as flat polyps., polyps. in colonic folds, foam and blur, and add model training samples, and the polyp verification grouping should be more specific, so as to strive for early cooperation with the endoscopic system, conduct prospective research and carry out real-time comparative study of clinical endoscopy. In addition, this study solely focused on the detection of polyps. and did not evaluate its effectiveness in other important aspects of gastroscopy. Further research is needed in the future for technological development as AI-assisted diagnosis technology will play an increasingly important role in other endoscopic fields, such as mucosal repair evaluation and dysplasia monitoring of inflammatory bowel disease, dysplasia monitoring of Barrett's esophagus, and etiological diagnosis of gastrointestinal bleeding. Lastly, the study did not compare the accuracy of AI-assited detection system with many other gastroscopy methods or imaging techniques, which hinders the ability to evaluate their diagnostic efficacy relative to traditional methods. Further exploration regarding this is needed.

Conclusion

In this work, the use of artificial intelligence (AI) in combination with narrow-band imaging (NBI) for polyp detection during gastroscopy is discussed. Research results show that AI-assisted real-time polyp detection can improve the results of gastroscopy polyp detection to some extent. In addition, combining AI white light mode with NBI mode can further enhance diagnostic accuracy considering that the sensitivity of AI parallel analysis is the highest (88.8%), and the specificity of AI series analysis is the highest (95.238%) in the results, which proves that this model has good clinical effect in diagnosing gastric cancer polyps. The study also demonstrated that using an AI-assisted detection system is safe and effective for detecting cancer polyps. in real-time of gastroscopy. However, there are several limitations to the study, including the need for larger prospective studies with more diverse populations and comparisons with other diagnostic

methods. Overall, the article highlight the potential of AI and NBI in improving cancer polyps. diagnosis and emphasizes the importance of onging research in this area to optimize these techniques for clinical use.

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