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Non-Invasive Quantification of Human Throat Analysis in Endoscopy Scanning Method

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ABSTRACT--

An upper GI endoscopy or EGD (esophagogastroduodenoscopy) is a procedure to diagnose and treat problems in your upper GI (gastrointestinal) tract. The upper GI tract includes your food pipe (esophagus), stomach, and the first part of your small intestine (the duodenum). This procedure is done using a long, flexible tube called an endoscope. The tube has a tiny light and video camera on one end. The tube is put into your mouth and throat. Then it is slowly pushed through your esophagus and stomach, and into your duodenum. Video images from the tube are seen on a monitor. You may have an upper GI endoscopy as an outpatient or as part of your stay in a hospital. After the procedure, you will be taken to the recovery room to be watched. Once your blood pressure, pulse, and breathing are stable and you are awake and alert, you will be taken to your hospital room. Or you may be discharged to your home. If you are going home, someone must drive you. You will not be allowed to eat or drink anything until your gag reflex returns. This is to prevent you from choking. You may have a sore throat and pain for a few days when you swallow. This is normal. You may go back to your normal diet and activities, unless you have other instructions.Call your healthcare provider if you have any of the following:Fever or chillsRedness, swelling, or bleeding or other drainage from the IV siteBelly pain, nausea, or vomitingBlack, tarry, or bloody stoolsTroubleswallowingThroat or chest pain that gets worseyour healthcare provider may give you other instructions, depending on your situation.

Keywords- Endoscopy, Pressure sensor, Temperature sensor, IoT.

INTRODUCTION

Over the last couple of decades, the quality of endoscopic imaging in gastroenterology has increased dramatically. All current state-of-the-art endoscopy systems are equipped with high-definition white light endoscopy (HD-WLE) and preprocessing optical chromoscope techniques. As a result, the diagnostic challenge in endoscopy has shifted from visualization to interpretation. This paradigm shift, in combination with increasing computational power of modern-day computers, has cleared the way for the application of machine learning in endoscopy to aid the endoscopist in the interpretation of these high-quality, multimodality images. In several medical domains, such as radiology and pathology, the use of machine learning has already shown promising results.1–5 Recently, there has been a vast increase in machine learning in endoscopic literature.6–12 The introduction of deep learning with artificial neural networks has fueled this increase even further.13 Although deep learning offers a powerful tool for machine learning, its application is associated with pitfalls. The relative novelty of this field and an increasing number of machine learning studies pose a challenge for reviewers and readers of endoscopy GI journals, since the quality of reported studies varies significantly.14 To appreciate scientific quality and novelty of machine learning studies, understanding of the technical basis and commonly used techniques is required. Clinicians often lack this technical background, while machine learning experts may be unfamiliar with the clinical relevance and implications for daily practice. This review aims to guide reviewers and readers alike of peer-reviewed GI journals in how to interpret machine learning studies in endoscopy and to allow for critical appraisal of the most relevant quality requirements of these studies. We will first explain the most relevant universal aspects of machine learning in endoscopy. We focus on common trends and their potential pitfalls, and subsequently propose corresponding basic quality requirements. This is clustered into six overarching themes: terminology, data, algorithm description, experimental setup, interpretation of results and machine learning in clinical practice.

NEED OF PRESENT

1. It will not be able to swallow the saliva that may collect in your mouth during the procedure. This happens because the tube is in your throat. The saliva will be suctioned from your mouth from time to time.
2. it may feel some pressure or swelling as the tube moves along. If needed, samples of fluid or tissue can be taken at any time during the test. Other procedures, such as removing a blockage, may be done while the tube is in place.

LITERATURESURVEY

A. ANESTHETIC EFFECT OF MIDAZOLAM IN ENDOSCOPIC RETROGRADECHOLANGIOPANCREATOGRAPHY

Endoscopic retrograde cholangiopancreatography (ERCP) is an advanced upper endoscopic procedure and is useful for the diagnosis and treatment of pancreastobiliary disorders. The technique involves imaging of the biliary tree and pancreatic duct following endoscopy and is used to aid the diagnosis of obstruction, for example by gallstones or cholangiocarcinoma. However, ERCP is an invasive procedure of considerable duration and causes substantial discomfort to patients. Thus, a deeper level of sedation may be necessary to ensure the success and safety of the procedure. Although the incidence of sedation-related complications is low, it is closely associated with endoscopy related morbidity and Mortality. The use of propofol for endoscopic sedation has increased due to its useful pharmacokinetic profile. However, no reversal agent is available and cardiovascular and respiratory complications can result. Use of midazolam in conjunction with opioid has been reported to be a higher quality of sedation, better patient satisfaction and no significant increase in the development of hypoxia and arrhythmias. And its reversal agent, flumazenil can immediately reverse the sedation effect of the midazolam and lead to faster recovery and fewer postoperative adverse events. Objectives: The aim of this study was to compare the effects and safety profile of ERCP using propofol and oxycodone vs. those of ERCP using midazolam and oxycodone. Methods: Sixty ASA (American Society of Anesthesiologists) II or III patients undergoing Endoscopic retrograde cholangiopancreatography (ERCP) were randomly allocated to one of two groups. Group P (n = 30) received propofol target-controlled infusion (TCI, target site concentration 3mug/ml at induction, reduced to 2-3mug/ml during general anesthesia maintenance and titrated to a BIS (bi spectral index) of 40-60) and 0.1mg/kg oxycodone for anesthesia.

B. AUTOMATIC DETECTION OF TNTESTINAL BLEEDING USING AN OPTICAL SENSOR FOR WIRELESS CAPSULE ENDOSCOPY

Wireless capsule endoscopy (WCE) has been an effective and safe way to diagnose gastrointestinal (GI) disorders, such as, colon cancers, polyps and bleeding. The detection of bleeding and other anomalies is currently determined through conventional visual inspection of the WCE images by the physicians. An on-chip bleeding sensor is thus required, that can perform an automatic prescreening of the bleeding areas in real-time using blood's optical properties to assist the diagnosis. In this study, a spectrophotometer was initially used to evaluate the chromatic properties of blood. It is found that the reflection ratio pairs of 700 nm to 630 nm and 480 nm to 530 nm provide important statistics to separate blood from non-blood samples. It has been implemented hardware using small LEDs and photodiodes to validate the results. Therefore, the proposed sensor system works as a good candidate to be integrated in a WCE device to detect GI bleeding quickly and in real-time.

C. SINUS ENDOSCOPY - APPLICATION OF ADVANCED GPU VOLUME RENDERING FOR VIRTUAL ENDOSCOPY

For difficult cases in endoscopic sinus surgery, a careful planning of the intervention is necessary. Due to the reduced field of view during the intervention, the surgeons have less information about the surrounding structures in the working area compared to open surgery. Virtual endoscopy enables the visualization of the operating field and additional information, such as risk structures (e.g., optical nerve and skull base) and target structures to be removed (e.g., mucosal swelling). The Sinus Endoscopy system provides the functional range of a virtual endoscopic system with special focus on a realistic representation. Furthermore, by using direct volume rendering, we avoid time-consuming segmentation steps for the use of individual patient datasets. However, the image quality of the endoscopic view can be adjusted in a way that a standard computer with a modern standard graphics card achieves interactive frame rates with low CPU utilization. Thereby, characteristics of the endoscopic view are systematically used for the optimization of the volume rendering speed. The system design was based on a careful analysis of the endoscopic sinus surgery and the resulting needs for computer support. As a small standalone application, it can be instantly used for surgical planning and patient education. First results of a clinical evaluation with ENT surgeons were employed to fine-tune the user interface, in particular to reduce the number of controls by using appropriate default values wherever possible. The system was used for preoperative planning in 102 cases, provides useful information for intervention planning (e.g., anatomic variations of the Rec. Frontalis), and closely resembles the intraoperative situation.

D. INTRAOPERATIVE BOWEL CLEANSING TOOL IN ACTIVE LOCOMOTION CAPSULE ENDOSCOPY

Capsule endoscopy (CE) can be considered an example of “disruptive technology” since it represents a bright alternative to traditional diagnostic methodologies. If compared with traditional endoscopy, bowel cleansing procedure in CE becomes of greater importance, due to the impossibility to intraoperatively operate on unclean gastrointestinal tract areas. Considering the promising results and benefits obtained in the field of CE for gastrointestinal diagnosis and intervention, the authors approached the bowel cleansing issue with the final aim to propose an innovative and easy-to-use intraoperative cleansing system to be applied to an active locomotion softly-tethered capsule device, already developed by the authors. The system, that has to be intended as an additional tool for intraoperatively cleansing procedure of the colonic tract, is composed by a flexible tube with a metallic deflector attached to the distal end; it can be headed to the target area through the capsule operating channel. Performances of the colonoscopic capsule and intraoperative cleansing capabilities were successfully confirmed both in an in-vitro and ex-vivo experimental session. The innovative intraoperative cleansing system demonstrated promising results in terms of water injection, colonic wall cleansing procedure and subsequent water suction, thus guaranteeing to reduce the risk of inadequate visualization of the mucosa in endoscopic procedures.

E. A NAVIGATION AND PRESSURE MONITORING SYSTEM TOWARD AUTONOMOUS WIRELESS CAPSULE ENDOSCOPY

Obstructive Sleep Apnea (OSA) is one of the main under-diagnosed sleep disorders. It is an aggravating factor for several serious cardiovascular diseases, including stroke. There is, however, a lack of medical devices for long-term ambulatory monitoring of OSA since current systems are rather bulky, expensive, intrusive, and cannot be used for long-term monitoring in ambulatory settings. In this paper, we propose a wearable, accurate, and energy efficient system for monitoring obstructive sleep apnea on a long-term basis. As an embedded system for Internet of Things, it reduces the gap between home health-care and professional supervision. Our approach is based on monitoring the patient using a single-channel electrocardiogram signal. We develop an efficient time-domain analysis to meet the stringent resources constraints of embedded systems to compute the sleep apnea score. Our system, for a publicly available database (Physio Net Apnea-ECG), has a classification accuracy of up to 88.2% for our new online and patient-specific analysis, which takes the distinct profile of each patient into account. While accurate, our approach is also energy efficient and can achieve a battery lifetime of 46 days for continuous screening of OSA. Continuous navigation information for medical insertion methods including wireless capsule endoscopy is an important feature to guide a medical instrument/object to the targeted location within a hollow organ or internal cavity of the patient in the best possible way. Also, an autonomous medical insertion or swallowable device with a self-contained navigation system would reduce the role of the high-level operator and hence reduce the human-factor mistake and risk of injury. The navigation techniques suggested for Wireless Capsule Endoscopy are image-based that are required to transfer and process a significant amount of data in real-time operation. This would increase the complexity of the system and would be more difficult in dark or liquid environments. A novel navigation system for Wireless Capsule Endoscopy/ordinary endoscopy that does not depend on any external source for operation and can handle the uncertainties of the path even in a dark or liquid environment (i.e., mucosa) of the human body is presented in this paper. The key element of the system is based on a capacitive-based pressure sensor array mounted on the capsule with the shape of semi-hemisphere. The place of each node is arranged to represent the variation in the latitude and the longitude of the travelling path. The system can acquire the required information to navigate the capsule in three-dimensional space and enhance the safety of the locomotion by monitoring the pressure between the capsule and the ambient environment. The system determines the variation of the path 180° in longitude and latitude with less than (<0.004%) percentage of error. Working algorithms for flexible and rigid environments are described in this paper.

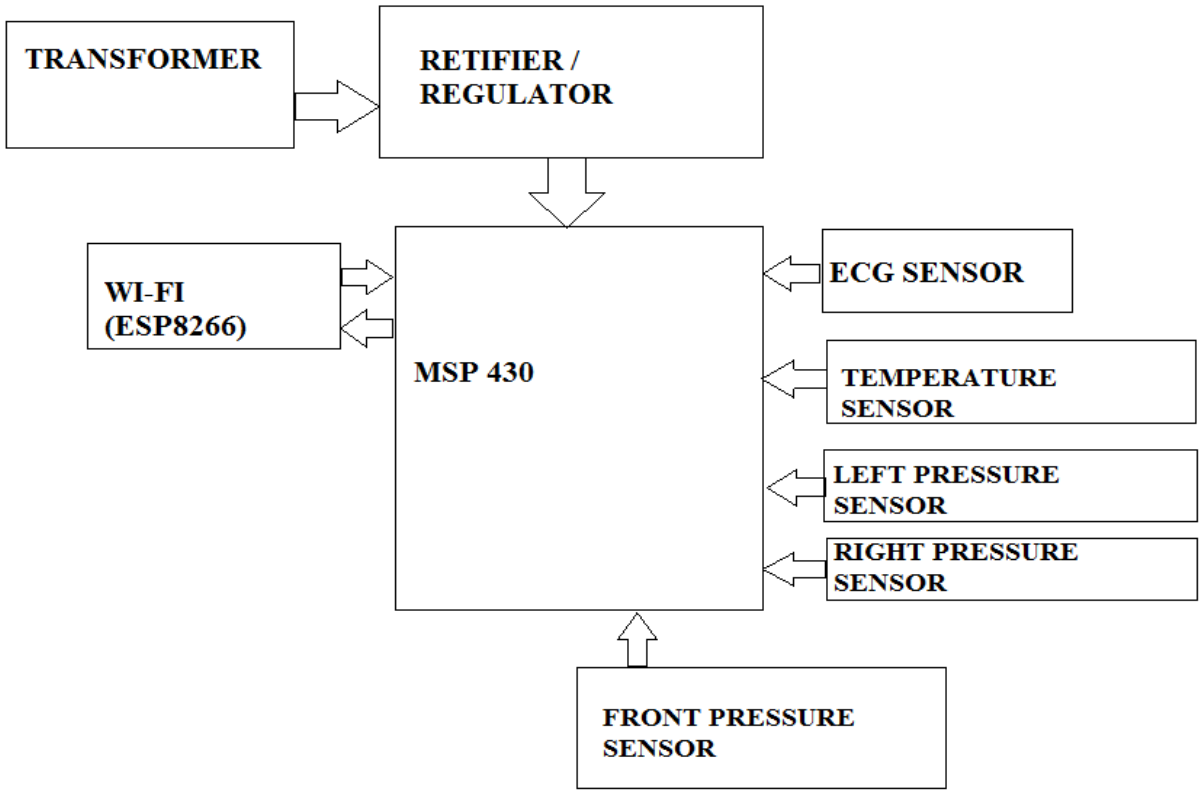
EXISTINGSYSTEM

Postoperative sore throat (POST) is a common complaint that is classified as the 8th most undesirable events after general anesthesia. Endotracheal intubation has been estimated to be the commonest factor causing POST. We aim to review the risk factors and preventive measures to reduce the incidence and severity of POST following endotracheal intubation. Although sore throat can be induced by many perioperative factors, endotracheal intubation remains the commonest cause that can induce endothelial injury and a subsequent sore throat. Many risk factors for this association has been reported. The most common risk factors include ages less than 60 years of age, female sex, cough, and asthma, underlying chest diseases, type and timing of the operation, type, and size of the used endotracheal tube. Moreover, the experience of the personnel intubating the patients may have been another risk factor. Medical prevention of POST can be achieved by several agents as steroids, non-steroidal anti-inflammatory drugs (NSAIDS), N-methyl-D-aspartate (NMDA) receptor antagonists, careful monitoring of the tracheal cuff pressure, and licorice application.

PROPOSED SYSTEM

In this paper, we propose a novel strep throat detection method using a ThinkSpeak, MATLAB with an add-on gadget. Our smartphone-based strep throat detection method is based on the use of pressure sensor and MSP430 controller. The proposed algorithm acquires throat image using a smartphone with a gadget, processes the acquired streptococcal pharyngitis (or strep) throat from healthy throat using machine learning techniques. Our developed gadget was designed to minimize the throat pain during some Scanning Method like Endoscopy Scanning. The scope of this paper is confined to binary classification between strep and healthy throats. Specifically, we adopted k-fold validation technique for classification, which finds the best decision boundary from training and validation sets and applies the acquired best decision boundary to the test sets. Experimental results show that our proposed detection method detects strep throats with 93.75% accuracy, 88% specificity, and 87.5% sensitivity on average.

PROPOSED BLOCK DIAGRAM



SOFTWAREREQUIREMENTS:

- Energia
- IoT- Platform
- Embedded C

HARDWAREREQUIREMENTS:

- Transformer
- Regulator IC
- Controller (MSP 430)
- Pressure Sensor
- ECG Sensor
- Temperature Sensor

CONCLUSION

Sore throat symptoms are individual to each patient and this survey also found a range of attitudes to products. Treatment choices will be driven not only by symptoms – especially severity but also by individual attitudes and lifestyles. The needs of patients with sore throat are likely to change throughout the day. For example, whilst convenience may be a primary consideration during working hours, it is intuitive that a long-lasting solution may be particularly relevant for night-time symptoms when re-dosing is less practical or not wanted. It comes as no surprise that the current data suggest that medicated product use is frequent before bed, a likely reason being an attempt to control symptoms to enable sleep. There is a range of sore throat treatments and formulations available over the counter, including lozenges, gargles and sprays, each with different attributes, to cater to these various needs.

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