Progress report 2024

Next-Generation Endoscopic Computer Vision

Project Associate Professor: Project Research Associate:

Project Specialist

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Introduction and Organization

This Social Cooperative Chair was launched in January 2023 with the investment of AI Medical Services, Inc. As an affiliated chair of the University of Tokyo Graduate School of Medicine, it is also supported by the Department of Gastroenterology (Prof. Mitsuhiro Fujishiro).

The main research project of the department is the use of AI in gastrointestinal endoscopy. As a result of the introduction of the option of endoscopy in populationbased gastric cancer screening (a public medical service aiming at reducing mortality from gastric cancer) from 2016, the number of endoscopic examinations has dramatically increased, and the increased workload on physicians and the risk of missing gastric cancer have become major issues. At the same time, since endoscopy is an examination method that depends on the skill of the physician, the difference in skill is also an issue. Recently, many attempts to apply the latest AI technologies such as Deep Learning to the medical field have been reported, and there are high expectations for the application of AI in the field of endoscopy. The purpose of our department is to conduct research and development for the utilization of AI in endoscopy and evaluate the results in clinical practice.

Research activities

Our department will conduct research, development, and clinical evaluation of software programs that assist physicians in diagnosis using the latest image analysis technology. Specifically, the following two points will be the main focus of the research:

(1) We will develop AI equipped with endoscopists' knowledge to improve the quality of endoscopic

diagnosis by equalizing the endoscopic diagnosis and reducing missed diagnoses.

(2) To establish next-generation endoscopic diagnosis and treatment methods using AI, we will acquire, process, and classify data based on actual clinical experience. We will resolve issues related to the small number of data on rare cases, annotation cost, etc., which are challenges in the social implementation of endoscopic AI, from the perspective of image analysis technology.

To develop an endoscopic diagnosis support AI, a large amount of high-quality "training data," i.e., a large number of high-quality endoscopic images and videos of diseases, is first required. In addition, information such as the location of the disease, the extent of the disease, and the final diagnosis must be linked to the image data. For this reason, we are building a system for training AI by accumulating a large number of endoscopic images as high-quality video data in collaboration with the University of Tokyo and other facilities. Currently, we are conducting research on the impact of a newly developed endoscopic AI, constructed based on accumulated endoscopic images, on endoscopists in the diagnosis of gastric cancer. Particularly, although Japanese endoscopists possess high technical skills, there is growing attention on whether the use of AI can further improve diagnostic accuracy or, conversely, cause confusion and affect diagnostic performance. Our study has shown that the use of AI in diagnosis improves diagnostic performance not only for inexperienced endoscopists but also for experienced endoscopists (Mizutani H et al, under review).

References

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