OLYMPUS

100* YEARS

The collaborative development project by Olympus, Oita University, and Fukuoka Institute of Technology played a role in the success of the world's first AI guided surgery*

~ Software developed for generating training data effectively of surgical endoscope images for AI ~

Along with Oita University and Fukuoka Institute of Technology, Olympus Corporation (President: Hiroyuki Sasa) participated in the project called "Development of Medical Devices and Systems for Advanced Medical Services" initiated by the Japan Agency for Medical Research (AMED), and succeeded in collaborative development of a "medical system using AI to assist the surgeon's decision making during surgery" (research head: Professor Masafumi Inomata, Oita University Faculty of Medicine). In this project, Olympus has developed software that effectively generates training data of surgical endoscope images of laparoscopic cholecystectomy (LC) for artificial intelligence (AI). The training data generated by this software is fed to AI developed by Fukuoka Institute of Technology, which resulted in the software automatically identifying landmark organs and blood vessels. In December, 2018, the milestone verification experiment of indicator systems during surgery using AI was performed at Oita University and contributed to its success.

During the procedure of LC, for which endoscopic surgery is most prevalent, it is crucial to be able to accurately locate the positions of landmark organs and blood vessels during the surgery. Approximately 0.5% of cases result in damages to the biliary tract, and 60 to 70% of these are due to misidentified organs and blood vessels location.

By exploring the possibility of reducing this misidentification by utilizing AI, Oita University, Fukuoka Institute of Technology, and Olympus began the collaborative development of a "medical system using AI to assist the surgeon's decision making during surgery" (research head: Professor Masafumi Inomata, Oita University Faculty of Medicine) as a part of the AMED project called "Development of Medical Devices and Systems for Advanced Medical Services" since November, 2017. In December, 2018, the world's first AI guided surgery was successfully completed at Oita University.
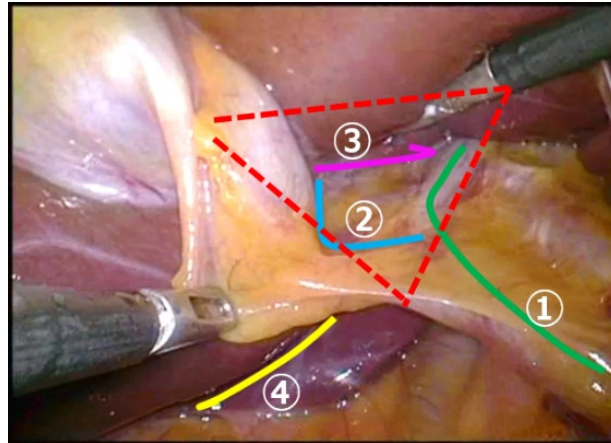
For this research, Olympus developed software that could easily link locations of landmark organs and blood vessels in endoscopic images during LC. Conventionally, linking information had to be manually entered into thousands of images, however, by using this software, the burden of such a task could be greatly reduced, producing improved data to provide to the AI for its learning.

【Image of the screen in using the software】
Equipped with a function that automatically tracks the linking area if the image is similar to the data previously learned.

The training data generated by this software was fed to AI developed by Fukuoka Institute of Technology, for learning. By using AI learned data, indicator functionality to locate landmark organs during the LC procedure was developed by three parties; Oita University, Fukuoka Institute of Technology, and Olympus; and it achieved over 95% of estimated accuracy.

Four landmark organs during LC
① **the bile ducts/hepatic ducts** ② **cystic duct** ③ **lower edge of liver S4** ④ **Rouviere's sulcus**

In the future, Olympus will apply the knowledge gained through this collaborative research to utilize AI in other areas of the body, such as the colon and stomach, toward diagnosis and treatment of ailments during laparoscopic surgery.

*The surgery was performed to verify the indicator systems during surgery using AI.

Olympus will celebrate its 100th anniversary on October 12 this year.
We would like to thank all of our customers and stakeholders who have supported the company's development throughout these years.
We look forward to continuing the tradition of contributing to society through Making people's lives healthier, safer and more fulfilling.

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