

Tokyo Shinagawa Hospital

AI-based chest CT image analysis—helping the fight against COVID-19



The COVID-19 pandemic continues to spread around the world. As isolation and treatment at an early stage is crucial to preventing the spread and severity of the disease, people on the front lines of healthcare have been working hard to achieve more prompt and accurate diagnosis. In cooperation with Tokyo Shinagawa Hospital, which has been pioneering the use of computer tomography (CT) image diagnosis to contribute to the early identification of disease, Fujitsu has developed AI that supports image diagnosis. By providing this as a solution service, Fujitsu aims to reduce the burden on healthcare providers, helping to realize safe and secure living even in a society with COVID-19.

Challenge

While chest CT image diagnosis is helping the early diagnosis of COVID-19, AI support can make advanced knowledge and specialist expertise in this field even more widely available. Through co-creation with Tokyo Shinagawa Hospital, with its advanced expertise in this area, Fujitsu is now developing new AI technology that supports faster, more accurate image diagnosis.

Solution

- An AI solution that accurately indicates the likelihood of COVID-19 infection by detecting and digitizing the pattern of abnormal shadows observed in chest CT images
- By shortening the time required to visually check hundreds of CT images, the solution has reduced the workload for physicians and helped ensure the early isolation and treatment of infected people.

Outcomes

- AI support also enables non-specialists to perform the diagnostic imaging, contributing to improving the efficiency of diagnostic and overall medical operation
- Continuous joint development with medical institutions will further improve this functionality, for example helping to predict infection severity and applying AI diagnosis to other diseases.

"We expect that by more widely deploying our accumulated expertise in image diagnosis through Fujitsu's AI, we can mitigate people's anxieties regarding COVID-19, and reduce the burden on healthcare providers."

Masaharu Shinkai, Vice-Principal, Tokyo Shinagawa Hospital



Improving analysis and detection of COVID-19

How AI supports chest CT image diagnosis

More than a year has passed since the emergence of COVID-19. Although the number of newly infected people is decreasing in some regions, it continues to increase in many other areas. As the number of people who become seriously ill continues to grow, the burden on healthcare professionals increases further, creating a pressing need around the world to establish more efficient and effective diagnosis technologies.

To contain the spread of COVID-19, we need to identify, isolate and treat infected people at an early stage. Along with genetic tests such as PCR tests and blood tests, image diagnosis by chest computer tomography (CT) is increasingly important. While chest CT tests, where images can be obtained instantly and abnormalities detected rapidly, contribute to the early discovery of infection, they require hundreds of images per patient to be checked visually, creating a major workload for physicians. In addition, image diagnosis requires advanced expertise, often creating a diagnostic capability gap between different medical institutions.

Tokyo Shinagawa Hospital, which has deep expertise and a wealth of experience in CT image diagnosis, saw a sharp increase in requests from neighboring medical institutions for help in analyzing CT images of suspected COVID-19 infections. In light of this, Fujitsu contacted the hospital in May 2020 to propose the joint development of a new AI solution to support image diagnosis.

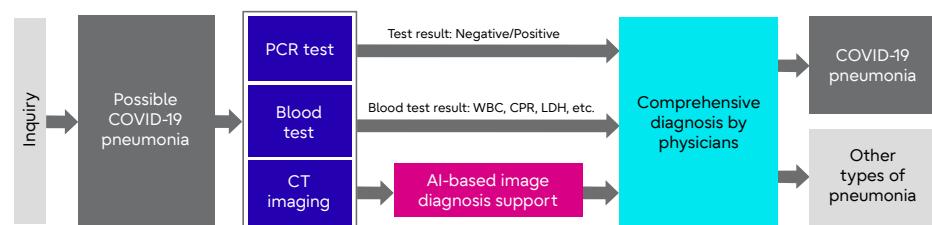
"The burden on healthcare providers was reaching the limit and the offer from Fujitsu was therefore very timely. We expected that by sharing our accumulated expertise in image diagnosis more widely through AI, we could mitigate people's anxieties regarding COVID-19, in addition to reducing the burden on healthcare providers," says Masaharu Shinkai, Vice-Principal of Tokyo Shinagawa Hospital.

Leveraging the research and development of diagnosis support AI

The medical AI technology that Fujitsu had previously been researching and developing provided the basis for the joint development. This technology detects pulmonary opacities from chest CT images, visualizing and quantifying them in three dimensions to help doctors with accurate diagnosis. Fujitsu and Tokyo Shinagawa Hospital believed that they could jointly develop an AI solution to rapidly identify COVID-19 infections from chest CT images by allowing the Fujitsu AI solution to acquire image diagnosis knowledge, using 'teacher data' from Tokyo Shinagawa Hospital.

Tokyo Shinagawa Hospital now plans to introduce this image diagnosis support AI across its healthcare operations, and to develop processes that enable comprehensive judgments working in combination with AI, PCR tests and blood tests (see Fig. 1). In addition to containing the spread of infection through early diagnosis and isolation, this solution is expected to prevent patients from developing severe symptoms through early treatment, in particular as new variant viruses are spreading.

Fig. 1 Flow of testing and diagnosis at Tokyo Shinagawa Hospital



Industry: Healthcare	Founded: 1945
Location: Japan	
Website: toko-shinagawa.jp/dock/englishpage.htm	

About the customer

Tokyo Shinagawa Hospital was established in April 2018 through a business transfer from Toshiba Hospital, which was opened in 1945. Inspired by its guiding principle of 'mastering skills and storing knowledge in the mind while treating patients with love', the hospital has enhanced its facilities and functions to cope with emergency operations 24 hours a day, 365 days a year, increasing its capacity to 400 beds. With the aim of becoming a core hospital for its local community, the hospital is also strengthening its collaboration with neighboring medical institutions, care welfare institutions and administrative agencies. Led by Vice-Principal Masaharu Shinkai, who plays a key role in the Japanese Respiratory Society, physicians at Tokyo Shinagawa Hospital have developed a wealth of knowledge on respiratory diseases, including COVID-19, and regularly receive requests for help from neighboring clinics.



Reduced strain on overworked physicians, improving their well-being

Mitigating the anxiety caused by COVID-19

"Having been interested in AI for many years, I think this is an extremely significant project, both in terms of sharing expert technical knowledge more widely and in transforming the workstyle of healthcare providers. By combining the achievements of the joint development with other research activities carried out within the hospital, we are helping physicians to diagnose and treat COVID-19, creating an important contribution to society," said Shinkai, reflecting the potential societal impact of image diagnosis support AI.

Fujitsu now plans to make this AI into a healthcare service. At the same time, the joint research continues to strengthen functionality, including the ability to predict severity of disease, the accuracy of identifying disease, the application of AI for other lung diseases and its potential connection to electronic health record systems. Fujitsu's future vision is to enhance this service to create a comprehensive image diagnosis support system, handling all kinds of diseases and thereby supporting a wide range of healthcare providers.