User Report

When experience and the human eye are no longer enough

The Department of Radiology at the Medical University of Innsbruck tracks down lung anomalies with the support of AI

With the help of artificial intelligence (AI), SEARCH Lung CT from contextflow detects, visualizes and quantifies a multitude of lung anomalies and nodules to support clinical decision-making. PD Mag. Dr. med. univ. Gerlig Widmann, managing senior physician at the University Department of Radiology at the Medical University of Innsbruck, has been working with contextflow SEARCH Lung CT since October 2021 and is very satisfied with the results.

With more than 80 radiologists and neuroradiologists, the Department of Radiology at the Medical University of Innsbruck is one of the largest institutions for radiological diagnostics in Austria. Working in close cooperation with the departments of oncology, thoracic surgery, pneumology and the lung department of Natters Hospital, it provides care for the vast majority of lung patients in the state of Tyrol. In addition, the department is part of the Innsbruck Thoracic Oncology Group, where specialists in thoracic oncology cooperate at the Innsbruck site and throughout the Tyrol region. The group is also a radiological reference center for the treatment of interstitial lung diseases and infectious diseases of the lung. Approximately 15,000 thoracic CT examinations are performed here each year.

SEARCH Lung CT offers a large portfolio of texture analysis for lung anomalies, including nodules. "The segmentation of anomalies such as shadowing, reticular patterns or emphysema works extremely well. The interface is clearly laid out, easy to use, and also provides references to current medical literature, pattern descriptions, and information to help with possible differential diagnoses. There is a valid reference dataset behind this AI," says Dr. Widmann. Furthermore, "The quality of reporting and the ability to find relevant

information from CT images improves significantly with this new tool." Judging what percentage of interstitial changes exist in a lung CT is very difficult with the naked eye. While the disease can be categorized based on radiologist experience as mild or moderate to strikingly severe, the interpretation cannot always be based on hard facts at the moment. And there is another point in favor of the system: the radiologist can scroll through a patient's scan, and specific anomalies are displayed in color, thus offering the possibility of a visual check when reading the case.

AI used properly

Radiologists see major advantages in the use of AI in texture recognition, automatic segmentation of structures, and quantification of these findings. In addition, SEARCH Lung CT detects lung nodules, which can then be verified by the radiologist. "The safety of diagnostics is improved by clinical decision support systems with artificial intelligence, and the diagnostics themselves are accelerated," says Dr. Widmann.

On the other hand, the expert is critical of this tool being used by clinical subdisciplines. "Artificial intelligence belongs in the hands of radiologists and should support them in their daily work. It is not a substitute for the work of the radiologist. This is because there is currently no software on the market that could capture and map the entire spectrum of all potential abnormalities and changes in diagnostics," Dr. Widmann elaborates.

Requirements for AI solutions

Seamlessly integrated workflows and rapid availability of findings are two relevant criteria for the successful use of AI. In addition, data from these tools should automatically flow into the standard findings in the radiology information system (RIS) in the form of a pre-populated structured report. This requires a well-functioning connection to the RIS. Transparency with respect to scientific evidence is another component, especially in the research area, to ensure safe data export to larger databases: How was the software calibrated and with which thresholds? "Knowing these facts is central to ensuring that the data generated can be used scientifically," says Dr. Widmann. And for radiology in particular, it is important to work with standards that are valid across departments and sites (ideally internationally), to allow data to be quickly exchanged on a large scale and across borders.

Already very good, but additional features are desired

The good news from Dr. Widmann: "SEARCH Lung CT has already proven itself and is a very good qualitative support in everyday clinical practice." Additionally desirable, however, would be the integration of the findings into the text structure of a RIS and the option to deselect findings. Although nodules are detected very well, they cannot always be classified as such, since they can also be tiny scars or small post-inflammatory changes, for example. Optimal, but currently not possible, would be to select and process these findings retrospectively.

Another wish is to have a tool available for follow-up examinations so that they can be viewed side-by-side. Changes in shadowing, reticulation or honeycombing could thus be viewed at the touch of a button and provide valuable information - particularly important in infectious and interstitial lung diseases - about the progression of the disease and the response of the patient to the treatment. "This would give us more certainty as to whether, for example, treatment with a very expensive anti-inflammatory and antifibrotic drug is advisable at all in the current situation or not," says Widmann. contextflow is currently working on a feature to quantify these changes over time.

There are also open items related to nodule detection: "The software detects nodules independently and volumetricizes them. However, it is not yet possible to define a nodule in the contextflow platform on one's own, i.e., to add it, for example, because the software has not detected it, or to make a correction and adjust the segmentation of the nodule. Especially in the case of subsolid nodules, this can be an important issue in order to be able to show the temporal course in a follow-up examination. It would be very attractive if the results of the system could also be backed up with the recommendations of the British Thoracic Society or the European Position Statement on Lung Cancer Screening," admits Dr. Widmann.

Successful collaboration

Boehringer Ingelheim offered the Innsbruck radiologists the opportunity to work with SEARCH Lung CT for an initial period of one year. "For us radiologists, this was not a question; of course, I accepted immediately because I was very interested in it

scientifically. I wanted to see how an AI system could be integrated into everyday work and what the outcomes would be," confirms Dr. Widmann. The implementation into Dedalus Healthcare's PACS went smoothly. The IT departments of the hospital and contextflow implemented the integration very cooperatively. The two systems work flawlessly together. After an examination, a click on the PACS link is sufficient to display the quantifiable insights detected by the software. This is the basis for the structured radiological report. Another mouse click then enables access to the SEARCH Lung CT platform so that the data can be compared again: Are there still open questions regarding differential diagnosis? Do the physician's assessment and the software's suggestions lead to the same results? If everything fits, the information is returned to the PACS at the push of a button.