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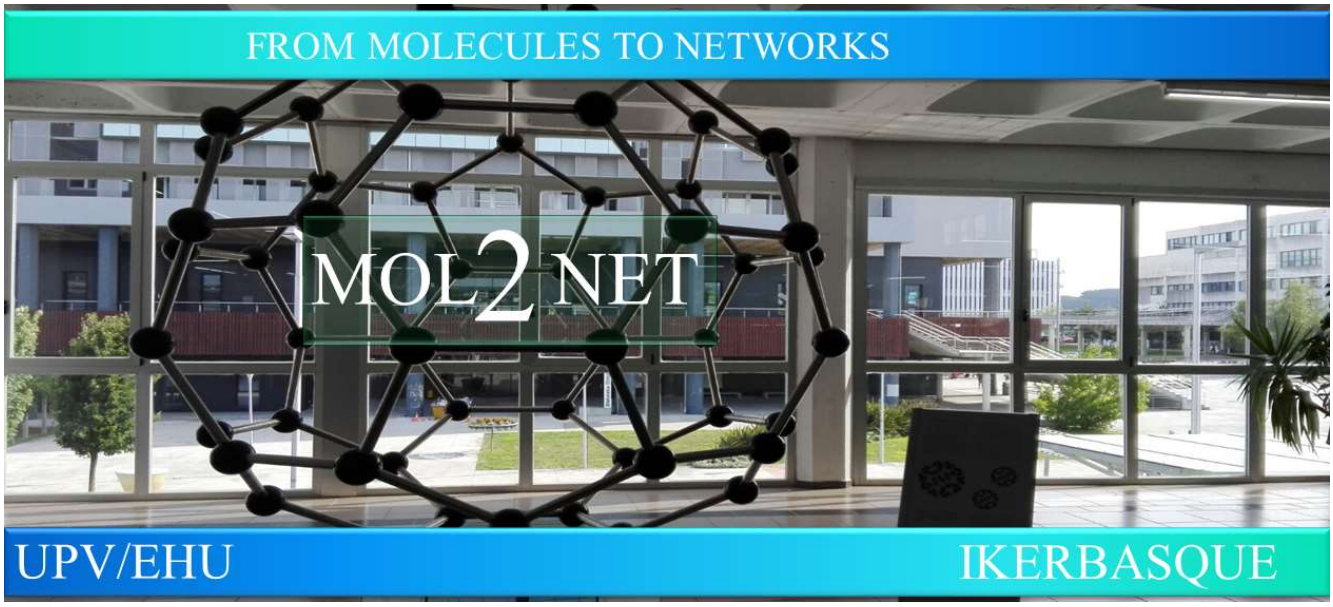

Artificial Intelligence and Medical Imaging

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Abstract.

Artificial intelligence (AI), particularly deep learning algorithms, is gaining extensive attention for its excellent performance in image-recognition tasks. They can automatically make a quantitative assessment of complex medical image characteristics and achieve an increased accuracy for diagnosis with higher efficiency.In this review medical imaging for different applications will be discussed. In addition, different startup, spin-off, Small and Medium Enterprises (SMEs), and also some BigPharman and or Tech companies are developing AI-based medical imaging technologies. This communication also lists some of these startup companies.

Artificial intelligence (AI), particularly deep learning algorithms, is gaining extensive attention for its excellent performance in image-recognition tasks. They can automatically make a quantitative assessment of complex medical image characteristics and achieve an increased accuracy for diagnosis with higher efficiency. AI is widely used and getting increasingly popular in the medical imaging of the liver, including radiology, ultrasound, and nuclear medicine. AI can assist physicians to make more accurate and reproductive imaging diagnosis and also reduce the physicians' workload. The development of deep learning methods and in particular the use of convolutional neural networks (CNNs), have led to substantial performance gain over the classic machine learning techniques. Multiple usages are currently being evaluated, especially for thoracic imaging, such as such as lung nodule evaluation, tuberculosis or pneumonia detection or quantification of diffuse lung diseases. In this review medical imaging for different applications will be discussed.

Firstly, Zhou *et al.* [1] recollected information about medical imaging on the liver. Itincluded traditional machine learning and deep learning algorithms, especially convolutional neural networks, and their clinical application in the medical imaging of liver diseases, such as detecting and evaluating focal liver lesions, facilitating treatment, and predicting liver treatment response. They saw that AI is becoming an extremely promising aid in liverimage tasks, leading to improved performance in detecting and evaluating liverlesions, facilitating liver clinical therapy, and predicting liver treatment response. In fact, machine-assisted medical services will bethe optimal solution for future liver medical care.

Secondly, Le *et al.* [2] reviewed current limitations and future opportunities for the application of computer-aided detection (CAD) systems and artificial intelligence in breast imaging. Currently CAD systems have been shown to adversely affect some radiologists' performance and increase recall rates.Actually, start-upsTherapixel and Kheiron Medical Technologies are using Deep-Learning (DP) for breast cancer screening. Taking this into account, specific artificial intelligence (AI)-CAD systems are emerging to include iCAD's PowerLook Tomo Detection and ScreenPoint Medical's Transpara. Nevertheless, clinical implementation of AI-CAD tools requires testing in scenarios mimicking real life to prove its usefulness in the clinical environment. Besides, this requires a large and representative dataset for testing and assessment of the reader's interaction with the tools.As a final point, they stated that AI-CAD systems should incorporate explainable AI in accordance with the European Union General Data Protection Regulation.

Lastly, Chassagnon*et al.*[3] reviewed artificial intelligence applications for thoracic imaging. Current algorithms are able to detect up to 14 common anomalies, when present as isolated findings. Besides, Chest computed tomography is another major field of application for artificial intelligence, especially in the perspective of large scale lung cancer screening. They saw that multiple applications are currently being developedwith deep learning-based approaches and will require prospectiveclinical evaluation. Additionally, radiologists can benefit fromworkflow optimization, and gain performance for detection, characterization and quantification tasks, especially in the field of thoracicimaging.

In addition, different startup, spin-off, Small and Medium Enterprises (SMEs), and also some BigPharman and or Tech companies are developing AI-based medical imaging technologies. This communication also list in the following Table 1 some selected startups in the area (see next and click on the name of company to visit the web). These are some of the more interesting startups mentioned by Rawat [4] on his review, please follow the link to this reference to see a more larger list.

Table 1. AI-driven medical imaging startups

Startup name	Topic	link
AIDOC	AI-based decision support software for the healthcare industry	https://www.aidoc.com/
SIRONA MEDICAL	Sirona Workspace to Support radiologists to making diagnoses.	https://sironamedical.com/
GLEAMER	Automatic and transparent second reading to increase diagnostic precision in X-ray imaging.	https://www.gleamer.ai/
ARTERYS	provides a platform for medical imaging AI that support physicians decision making.	https://www.arterys.com/
ENLITIC	Apply AI in radiology to ease staff time and reduce costs	https://www.enlitic.com/
RT MEDICAL SYSTEMS	Handle medical imaging problems of oncology using AI.	https://rtmedical.com.br/

To conclude, I think that in the future the applications of artificial intelligence on medicine science will be huge. In fact, it is really useful for medical imaging as we saw previously. Certainly, these developments should be considered as an opportunity for the creation of new startups.

References

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