

## **Computer Vision and Healthcare**

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### **What is Computer Vision?**

According to SAS Institute, “[c]omputer vision is a field of artificial intelligence that trains computers to interpret and understand the visual world. Using digital images from cameras and videos and deep learning models, machines can accurately identify and classify objects — and then react to what they ‘see’”.<sup>1</sup>

Facial recognition software is being used every day by Apple iPhone users to unlock their phones; by Google Photos to identify and organize our personal photo collections based on the friends and family captured in these photos; and, by law enforcement to cross-reference suspects with their databases.

Automobile companies, including Tesla and others, have incorporated computer vision into their self-driving vehicle technologies to quickly identify objects and take appropriate action to avoid accidents.

These early examples of computer vision are only the tip of the iceberg in a fast-developing field of AI that is already leading to a much wider range of applications. The global computer vision market is expected to grow at a 7.7% CAGR, reaching USD 18.24 billion in 2025, according to Grand View Research.<sup>2</sup> One of the key areas of growth in this field is in healthcare.

### **Computer Vision and Healthcare: Quicker Diagnoses and Treatments**

CT scans and MRIs constitute important tools in the diagnosis of disease. But, false positives and false negatives are a problem when it comes to the interpretation of these imaging tools by doctors. Doctors may either not recognize signs of a condition in these images if they are unsure about what to look for, or they may miss the signs if they are simply too small to be detected by the human eye. In this latter case, computer vision may be able to detect conditions at earlier stages than currently possible.

For breast cancer alone, computer vision could be game-changing. Doctors Erin V Newton, MD and Marie Catherine Lee, MD, FACS on Medscape.com point to data from the Breast Cancer Detection Demonstration Project (BCDDP) that shows the false-negative rate of mammography is approximately 8-10%.<sup>3</sup>

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<sup>1</sup> “Computer Vision: What it is and why it matters”. SAS Website. Available at:

[https://www.sas.com/en\\_us/insights/analytics/computer-vision.html](https://www.sas.com/en_us/insights/analytics/computer-vision.html). Accessed on October 1, 2020.

<sup>2</sup> “Machine Vision Market Size Worth \$18.24 Billion By 2025 | CAGR: 7.7%”. Grand View Research. October 2018. Available at: <https://www.grandviewresearch.com/press-release/global-machine-vision-market>. Accessed on October 1, 2020.

<sup>3</sup> Newton, MD, Erin V, et al. “What is the prevalence of false-positive and false-negative mammography results in breast cancer screening?” Medscape. April 10, 2019. Available at: <https://www.medscape.com/answers/1945498-167946/what-is-the-prevalence-of-false-positive-and-false-negative-mammography-results-in-breast-cancer-screening#:~:text=According%20to%20data%20from%20the,may%20still%20have%20breast%20cancer.> Accessed on October 1, 2020.

Mount Sinai Hospital is one of many that use computer vision to analyze CT scans. Using AI that can provide a diagnosis within 1.2 seconds compares to the days or weeks that it can normally take; resulting in time savings that can mean a faster start to the appropriate treatment and saving more lives.<sup>4</sup>

### **Computer Vision and COVID-19**

Working together with M Health Fairview<sup>5</sup> and Epic<sup>6</sup>, University of Minnesota researchers have recently developed and validated an AI algorithm that can evaluate chest X-rays to diagnose possible COVID-19 cases.<sup>7</sup>

Chest X-rays for patients with suspected COVID-19 symptoms are automatically evaluated by the algorithm. If the algorithm, which takes seconds to run, recognizes patterns associated with COVID-19 in the X-ray, it is then known that the patient likely has the virus.

Christopher Tignanelli, MD, assistant professor of surgery at the University of Minnesota Medical School and co-lead on the project noted that this added diagnostic tool “may help patients get treated sooner and prevent unintentional exposure to COVID-19 for staff and other patients in the emergency department. [Further, it] can supplement nasopharyngeal swabs and diagnostic testing, which currently face supply chain issues and slow turnaround times across the country”.<sup>8</sup>

Prior to this development at the University of Minnesota, the potential offered by computer vision to support the diagnosis of COVID-19 was well recognized. For example, the Israeli and US based company, Aidoc<sup>9</sup>, had received approval from the U.S. Food and Drug Administration earlier this year for the use of its AI to detect ‘incidental findings’ associated with COVID-19.<sup>10</sup>

This same company, Aidoc, which specializes in providing AI solutions for radiologists, closed a USD \$20 million extension to its series B round of investment. The company has now raised a total of USD \$60 million. According to the CEO and co-founder, Elad Walach, the funds will be used to support new customers following a tripling of revenue since the beginning of 2020.

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<sup>4</sup> Spurdens, Katherine. “How Computer Vision Is Making the World a Healthier Place”. Newswire. September 24, 2020. Available at: <https://newswire.net/newsroom/blog-post/00124308-how-computer-vision-is-making-the-world-a-healthier-place.html>. Accessed on October 1, 2020.

<sup>5</sup> M Health Fairview: <https://mhealthfairview.org/>

<sup>6</sup> Epic: <https://www.epic.com/about>

<sup>7</sup> “University of Minnesota develops AI algorithm to analyze chest X-rays for COVID-19”. University of Minnesota: News Release. October 1, 2020. Available at: <https://twin-cities.umn.edu/news-events/university-minnesota-develops-ai-algorithm-analyze-chest-x-rays-covid-19>. Accessed on October 1, 2020.

<sup>8</sup> *Ibid.*

<sup>9</sup> Aidoc: <https://www.aidoc.com/>

<sup>10</sup> Wiggers, Kyle. “FDA permits use of Aidoc’s AI to detect ‘incidental findings’ associated with COVID-19”. VentureBeat. May 8, 2020. Available at: <https://venturebeat.com/2020/05/08/aidoc-obtains-fda-clearance-for-ai-that-uses-ct-scans-to-help-diagnose-covid-19/>. Accessed on October 1, 2020.

More details on Aidoc and this recent funding is available in a recent VentureBeat article dated September 16, 2020: [Aidoc raises \\$20 million more for its computer vision medical tools](https://venturebeat.com/2020/09/16/aidoc-raises-20-million-more-for-its-computer-vision-medical-tools/).<sup>11</sup>

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<sup>11</sup> Wiggers, Kyle. "Aidoc raises \$20 million more for its computer vision medical tools". VentureBeat. September 16, 2020. Available at: <https://venturebeat.com/2020/09/16/aidoc-raises-20-million-more-for-its-computer-vision-medical-tools/>. Accessed on October 1, 2020.