Edge computing in healthcare

The COVID-19 pandemic exposed huge number of gaps in the healthcare systems globally. This prompted a massive increase in the demand for the expansion of medical facilities across the world. Currently, with medical infrastructure expanding globally and the demand for specialists rising, the healthcare business is evolving at a rapid pace. However, owing to the rising population and growing per capita income – which is a major factor influencing people's ability to avail quality healthcare – healthcare institutions find it challenging to offer the increased amount of ongoing care that patients require.

The COVID-19 pandemic imposed an unprecedented strain on healthcare infrastructure, highlighting the slim margins of error within which the industry operates. A small error in a healthcare system can mean the difference between life and death for a person. As a result, the adoption of digital healthcare is critical to achieving greater efficiency and collaboration between various healthcare departments. Adopting relevant technologies can help healthcare institutions meet the rising demand for healthcare services without any additional strain on their physical infrastructure, as well as smooth out the overall functioning of a healthcare facility.

From pop-up clinics and cancer-screening centres to patient-monitoring systems like pacemakers and insulin pumps, there are various scenarios in the healthcare industry that require low-latency, remote and real-time response solutions. This is where **edge computing** comes in. Edge computing refers to the concept of a distributed system that brings data storage and computation closer to the data sources (for example, IoT devices). This eliminates the need for centralised data storage and processing systems. Thus, real-time data analysis is not affected by slow network speeds and latency issues, thereby saving bandwidth.

The ability to leverage skills in edge computing will be a significant driver of digital healthcare. Edge computing is being adopted at a rapid pace in the healthcare sector. One application is the use of edge computing devices to remotely monitor patients, automate care delivery, and employ artificial intelligence (AI) systems to improve diagnosis speed and accuracy.

AI and edge computing are inextricably linked. Collecting data from patients isn't enough – doctors must also evaluate it and respond in real time. Edge computing is increasingly making this possible. Currently, AI-embedded edge computing systems are in place to detect anomalies and other key findings, including potentially life-threatening illnesses, from X-rays and other scans within a short span of time. This technology delivers insights faster at the imaging point, thereby allowing doctors to prioritise examinations in a timely and cost-effective manner. Therefore, the combination of edge computing and AI has considerable potential across the healthcare spectrum.

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Benefits of edge computing in healthcare

1. Using real-time imaging and analytics to improve triaging and clinician support
2. Complying with data locality and privacy requirements for personal/sensitive data
3. Decentralising internal data to reduce vulnerability to external attacks
4. Using low-latency edge devices to optimise collection and transfer of data
5. Accelerating data analytics and intelligence by bringing it closer to the source

Applications of edge computing in healthcare

In ambulances

In the present emergency care system, paramedics are usually only able to provide a brief about the patient to emergency doctors. Thus, such patients can only receive relevant diagnostic treatments once the ambulance arrives at the hospital. This can cause difficulties and delays in handover times and patient transfers to the proper wards, delaying patient diagnosis. Such delays can prove fatal, especially in emergency cases.

Edge computing at the network edge (**together with 5G**) can enable better and more precise treatment by on-site paramedics, as well as transmit more specific details on the status and location of patients arriving to the hospital owing to its low latency, mobility and data-processing capabilities.

In operation theatres (OTs)

Edge computing and AI have also ushered in a transformation in the operating room with AI-assisted surgery. For instance, nurses are required to keep track of every action during surgeries – from the moment a patient is brought into the OT, to the time the room is cleaned. Over the course of an operation, this approach may entail pressing dozens of buttons on a touchscreen.

However, in the case of AI-assisted surgeries, AI systems can automatically monitor and categorise each action within the OT using cameras and edge computing devices. Data from several identical surgeries can then be compiled and evaluated, allowing for more efficient operations and improved patient care.

In hospitals

Currently, monitoring equipment is often not connected to a central cloud or has a limited range of connectivity. When such equipment is used, the vast amounts of raw data it generates must be stored on a third-party cloud, posing security concerns for hospitals and patients.

An on-premise edge solution on the hospital's grounds may help in addressing this issue. Such a network will be able to combine data from numerous channels inside the hospital and retrieve relevant data while maintaining data privacy and compliance with regulations. Moreover, the AI-enabled edge solution will send clinicians real-time alerts about odd patient trends and behaviours, as well as store crucial data on a secure cloud system.

Adopting edge computing will thus help hospitals improve productivity, increase resource efficiency and lower costs per patient.

Remote care

One of the key goals of the digitisation of healthcare is to provide treatments to patients directly at their homes and expand access to healthcare while simultaneously lowering costs.

One way to facilitate this is to increase the use of wearable technology. These devices can provide doctors with real-time data on crucial patient vitals such as blood pressure and heart rate, alerting them about problems before they become serious. Health monitors can assist in remote care by gathering patient data and initiating actions based on it. For example, glucose levels can be measured at regular intervals, and this information can be transferred to a connected device like an insulin pump, which can then inject insulin. Sensors in wearable devices which use edge computing can be used to track patient movements at their homes at all times, alerting caretakers to any abnormalities in their conditions and allowing doctors to promptly adjust treatments as needed.

However, the most significant impact of this technology could be in the areas of telehealth services, remote patient monitoring, and drone delivery of lab results and medical supplies to individuals who have limited or no access to quality healthcare. In all these cases, edge computing can lower the cost of treating a patient, as well as decrease the time required for diagnosis and treatments.

Way forward

The healthcare industry is rapidly adopting machine learning, AI, and augmented and virtual reality for patient care and training purposes. To effectively yield useful and informative outputs in a healthcare system, all of these technologies require extensive real-time data-processing capabilities and proximity to the computational power offered by edge computing devices. Due to the high costs of transporting massive amounts of data to a central cloud network, networking limits and latency considerations need to be taken into account. To address this problem, organisations are integrating edge computing into their existing systems.

Edge computing is a new frontier in healthcare systems, one that is being fuelled and enabled by new mobile and point-of-care technologies. With continuous advancements, technologies such as 5G, quantum computing and IoT, combined with edge computing and analytics, will help to considerably improve processes within IoT applications by enabling significantly low latency. This will provide new opportunities to increase the functional, medical and financial value of the healthcare ecosystem.

How we can help you

PwC has a robust structure in place to help you understand the impact of technology on various business areas.

Through our tinkering workshops, we bring together consultants and industry professionals to help you understand this technology and chalk out your organisation's edge computing roadmap.

We can work with you to identify and prioritise edge computing use cases based on their potential for generating business value.

Rapid prototyping

Through our Technology Tinkering Lab, we help you explore potential applications demonstrations of real-world use cases.

Join us at the Technology Tinkering Lab to co-create impactful solutions for the healthcare industry.

We can help you identify problem areas and offer insights, guidance and solutions to address the complex challenges faced by multiple players in the healthcare field.

About PwC

At PwC, our purpose is to build trust in society and solve important problems. We're a network of firms in 156 countries with over 295,000 people who are committed to delivering quality in assurance, advisory and tax services. Find out more and tell us what matters to you by visiting us at www.pwc.com.

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