Deloitte.

Transformative cloud computing: Accelerating health care with AI and GenAI

Contents

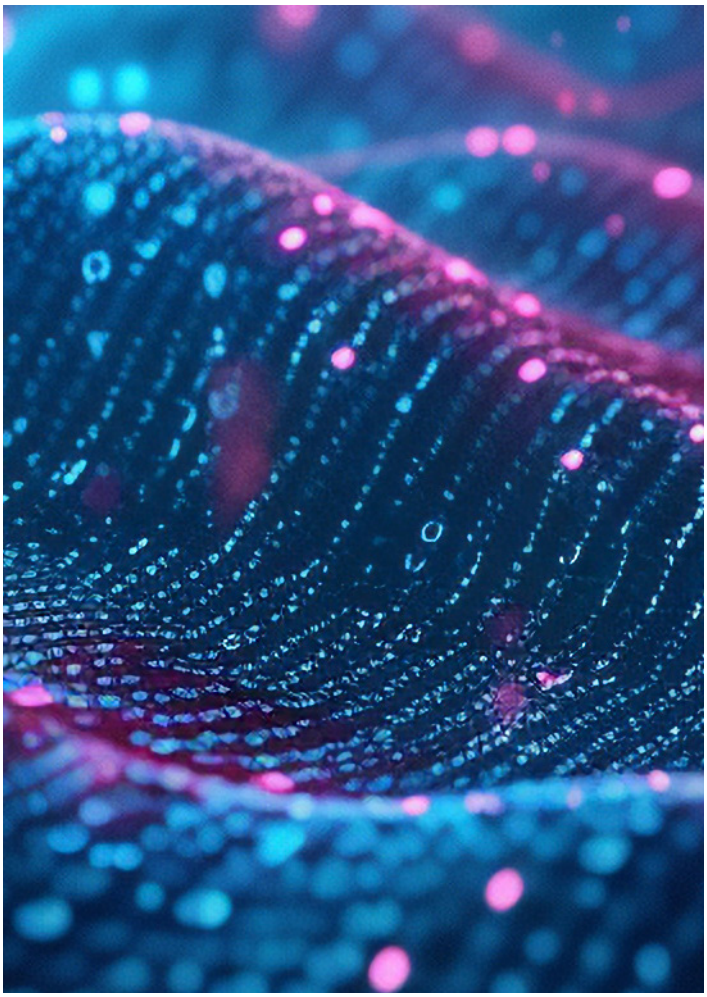
Introduction

Health care stands at the threshold of transformation through computational and data-driven innovation. Among the innovations reshaping health care, there is palpable enthusiasm behind artificial intelligence (AI). This enthusiasm is driven, in part, by the democratization of AI algorithms, toolkits, and the availability of high-performance computing (HPC) in the cloud. Whereas the ability to train and deploy AI algorithms was once reserved for organizations with significant HPC hardware capital investments, the cloud lowers the barrier to entry and enables everyone from individuals to multinational corporations to lean in on AI development.

Opting for the cloud over on-premise solutions can offer several advantages. It eliminates the need for substantial upfront capital investments in hardware and its ongoing maintenance, allowing organizations to focus their resources on core business operations. Furthermore, the cloud's scalable nature helps ensure that as a business grows, its IT infrastructure can scale up to match, without the time and cost implications of physical hardware upgrades. Cloud providers invest heavily in robust security measures, providing a level of data protection that, at minimum, matches best-in-class on-premise solutions.

Many health care organizations, specifically, are embracing cloud technology to leverage state-of-the-art AI, including Generative AI (GenAI), to realize wide-ranging ambitions from precision medicine and point-of-care decision support, to relieving the administrative burden of clinical care and creating new patient and staff experiences.

The cloud's scalable nature helps ensure that as a business grows, its IT infrastructure can scale up to match.



Cloud computing for large language models (LLMs):

The advent of GenAI and large language models has introduced exciting possibilities for health care. These models hold the potential to wrangle complex biomedical data and address a growing list of challenges in health care delivery spanning point of care, administrative processing, and revenue cycle, to name a few. However, the computational demands of LLMs necessitate high-performance computing capabilities, which cloud technology enables without the need for costly, on-premises hardware acquisitions.

For organizations currently using local LLMs, considering a hybrid approach that combines on-premise and cloud-based solutions takes advantage of scalability and reliability. This model allows for scalability as computational needs increase, providing the flexibility to run certain applications locally while offloading high computational tasks to the cloud. A hybrid model also helps ensure continuity, allowing local workflows to continue even in the event of cloud downtime. A hybrid approach could offer a balanced solution, merging the security and control of on-premise solutions with the scalability and cost-effectiveness of cloud technology.

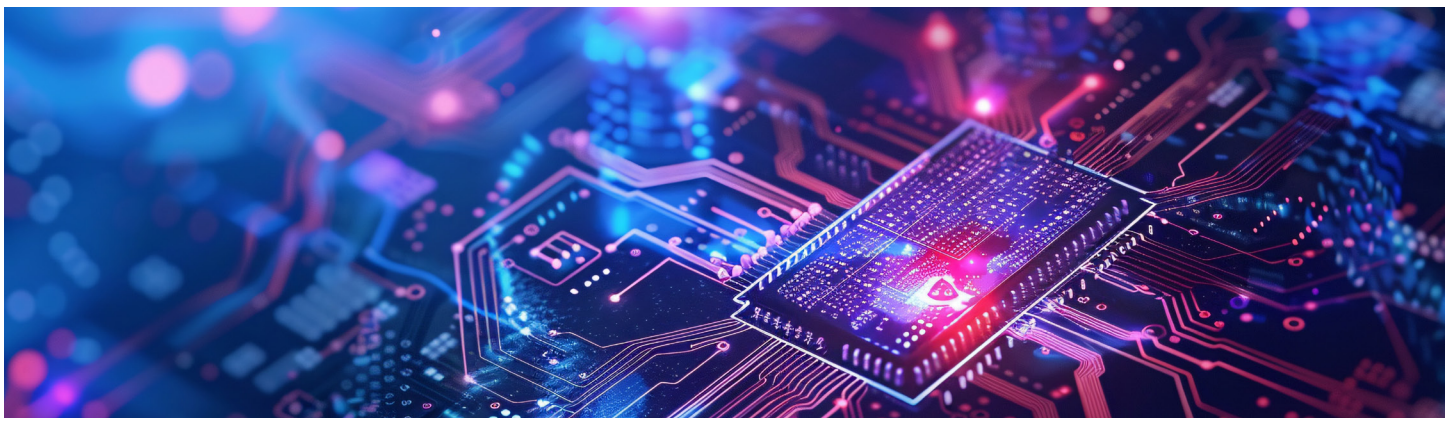
By harnessing the cloud's resources, health care organizations can develop and serve sophisticated GenAI algorithms and derive actionable predictions from diverse troves of medical data.

Efficient data management:

Germane to the GenAI opportunity is the storage and management of massive datasets essential for data processing and model development.

Cloud data platforms offer a comprehensive solution, enabling health care providers to aggregate, analyze, and leverage data at an unprecedented scale. Whether it's genomic data, patient records, or medical imaging archives, the cloud provides a scalable, flexible, agile, cost-effective, secure, and globally accessible repository for invaluable health care information. By leveraging cloud data platforms, health care professionals can realize their GenAI ambitions fueled by their data.

Deciding between on-premise and cloud data storage is an important consideration for health care organizations aiming to leverage GenAI. On-premise solutions offer a sense of control and potential for customization, but they often require significant upfront capital investments and ongoing maintenance resources. In contrast, cloud data storage provides scalability, flexibility, and the ability to access large amounts of data from anywhere, which is especially crucial for GenAI applications that require robust computational resources. However, data privacy and security concerns might be more prevalent in cloud-based solutions, considering the sensitive nature of health care data. Incorporating cache mechanisms can help balance these concerns by providing temporary storage of frequently accessed data, which not only improves system performance and speed but also reduces reliance on constant cloud connectivity, thus potentially mitigating some security risks. The decision between on-premise and cloud data storage should be guided by a comprehensive evaluation of an organization's GenAI requirements, data privacy and security measures, financial resources, and IT capabilities.



Coordination and enhanced security:

Cloud technology not only amplifies the development and application of GenAI in health care by facilitating collaboration and providing extensive computational resources but also offers advanced security capabilities to safeguard sensitive health care data. The coordination of model training across various cloud services epitomizes the transformative power of cloud technology in health care. With GenAI applications distributed across multiple cloud environments, health care providers can leverage diverse computational resources and accelerate GenAI model development. Moreover, the cloud platform's security architectures ensure the confidentiality and integrity of sensitive health care information, safeguarding patient privacy and regulatory compliance.

Many cloud platforms come equipped with advanced security features that are designed to maintain the confidentiality and integrity of sensitive health care data, thus safeguarding patient privacy and adhering to regulatory compliance standards. From physical security measures and data encryption protocols to sophisticated network security controls and identity and access management systems, most cloud services offer a multilayered security approach that provides comprehensive protection against potential cyberthreats.

In addition to these, cloud platforms also offer enhanced security capabilities such as automated compliance audits, intrusion detection systems, and AI-powered threat intelligence services. These advanced features not only provide real-time alerts about potential threats but also suggest proactive measures to mitigate these risks. Cloud services constantly monitor the security landscape and automatically update their security protocols to stay ahead of evolving cyberthreats. This promotes trust and confidence in the health care data ecosystem but also allows health care providers to concentrate their resources on improving patient care and driving GenAI innovation, secure in the knowledge that their data is well-protected.

Use cases in personalized medicine, precision diagnosis, and medical imaging:

The potential applications of GenAI in health care are as diverse as they are transformative. GenAI algorithms can analyze multimodal data including clinical and genomic data, identify genetic predispositions, and recommend tailored treatment regimens based on individual patient datasets. GenAI-powered diagnostic tools can augment human medical image analysis with unparalleled speed, and guide clinicians toward higher accuracy diagnostics. Moreover, in medical imaging processing, GenAI algorithms can enhance image resolution and streamline image analysis workflows to increase clinician efficiency.

The convergence of cloud computing and GenAI heralds a new era of possibility in data-driven innovation in health care. By embracing cloud technology and GenAI, health care organizations can minimize traditional data and computational roadblocks, unlock new frontiers for investigation, and support clinicians toward more efficient and streamlined patient-centric care.

Authors

Matt Crowson, M.D.
Specialist Leader, Deloitte Consulting LLP
Strategy and Analytics
mcrowson@deloitte.com
+1 617 437 3717

Dr. Matt Crowson, M.D., a practicing surgeon and board-certified clinical informatician, is based in Boston, MA. He specializes in utilizing data science and artificial intelligence to catalyze innovation in healthcare delivery. His expertise extends to collaboration with health systems, hospitals, medical device manufacturers, and pharmaceutical companies. His unique fusion of clinical knowledge and informatics, along with his commitment to enhancing healthcare effectiveness, uniquely positions Dr. Crowson at the nexus of medicine and technology, driving a shift towards accessible, inclusive, and value-based care.

Sahithi Bayana
Health Care Cloud Go-to-Market Leader
Managing Director, Deloitte Consulting LLP
sabayana@deloitte.com
+1 469 417 2718

Sahithi Bayana is a Managing Director within Deloitte's Application Modernization & Innovation practice. With a keen eye for digital strategy and cloud transformation, Sahithi has led numerous technology-enabled business transformation engagements across various industries. Her expertise spans from Cloud-enabled Enterprise Transformations and Strategic App Assessments to Financial Business Case Development. Her leadership and innovative approach make her a pivotal part of any technology-driven business transformation.

Bill Fera
Life Sciences & Health Care Artificial Intelligence Leader
Principal, Deloitte Consulting LLP
bfera@deloitte.com
+1 412 338 7500

Bill Fera, MD, is a principal, Deloitte Consulting LLP, who specializes in technology-enabled transformation to support the advancement of population health strategies. As a practicing physician, health system executive, and consultant, Fera has worked across health plans and health systems to drive toward a value-based, patient-centered model of care.

Deloitte.

9013527