

Google Cloud AI and its Transformative Role in Modern Healthcare

How Google's AI Solutions Are Impacting Both Patient Care And Caregivers

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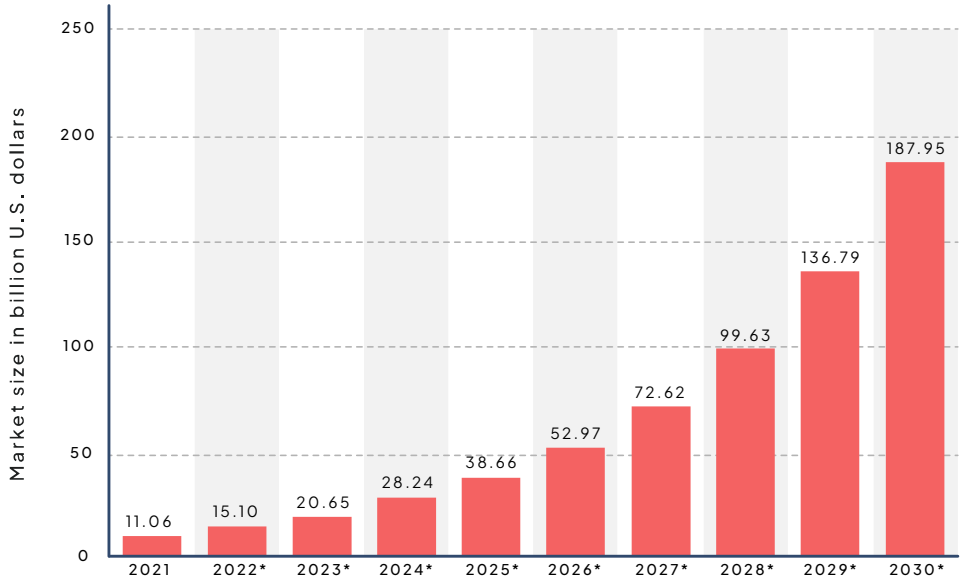
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Executive Summary

Artificial Intelligence (AI) has exploded into our modern day reality - and is not just another buzzword. AI is a broad field that encompasses Machine Learning and Generative AI. However, the global healthcare industry has been extremely cautious at adopting this technology.

Gradually, things are changing as more evidence is being developed. According to Statista, the global market for AI in healthcare is set to grow from $20.65 billion in 2023 to $187.95 billion by 2030, at a CAGR of 36.1%



Statista

The U.S. is the largest market for AI technology with a revenue share of 58% - while the Asia-Pacific region has the second-highest share with 40.9%. Clinical trials and medical imaging are among the most common use cases of AI technology in the healthcare industry.

In this eBook, we shall discuss the transformative role of Google AI solutions in the healthcare industry – along with how Responsible AI can meet and exceed healthcare security and regulations.

Introducing Google AI in Healthcare

While highlighting the healthcare industry trends in 2022, Joe Miles of Google Cloud discusses how the COVID-19 pandemic transformed the trajectory of the healthcare and life science industries. Joe further focuses on how AI technology is transforming the healthcare sector by enabling:

- New vaccine development in weeks – instead of many years
- Telehealth transformation of the physician's and patient's experience
- Individuals embracing connected devices to monitor their health

In 2022, Google laid a foundation of AI in healthcare with the release of Med-PaLM – the company's PaLM (Pathways Language Model) tool designed to answer medical questions (Nature publication). Med-PaLM leverages Google's large language model (LLM) in the medical domain.

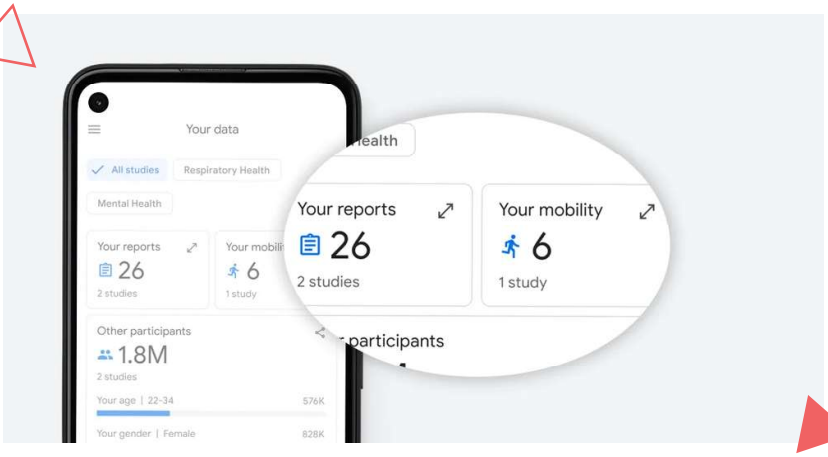
What is LLM? Simply put, it's a type of language model known to understand and generate general purpose language. With its first version, Med-PaLM became the first AI-powered system to achieve the pass mark for questions in the U.S. Medical License Exam (USMLE). Med-PaLM 2 achieved an accuracy of 86.5% on the USMLE questions.

Among recent developments, Google Cloud announced the launch of Generative AI-powered search capabilities to enable clinicians to search information from various sources - including stored clinical notes, electronic medical records, and scanned documents. This AI-powered capability enables medical professionals to:

- Learn about the patient's comprehensive medical history
- Evaluate if patients meet the criteria for a clinical trial
- Reduce their paperwork

About Google Health

Google Health is the company's initiative to enable people to be healthier through connection to their medical information. Now Google is integrating AI-powered technology solutions in the healthcare industry (AI & Health).



Google Keyword

The Google Health team is committed to creating AI-powered tools and solutions to support multiple stakeholders including:

1. **Patients**
   - Access useful information about healthcare and medical assistance
   - Participate in healthcare surveys and research studies
   - Meet personal health goals

2. **Caregivers**
   - Transform healthcare services through AI solutions
   - Improve the screening of cancer patients, especially breast cancer
   - Help doctors and clinicians improve healthcare delivery

3. **Communities**
   - Provide data-driven insights to local communities
   - Share critical health-related information
   - Assist healthcare research studies

4. **Researchers**
   - Improve the effectiveness of genome analysis
   - Share research work for advancing healthcare



Google AI in Healthcare – Real-world Applications

Google Cloud continues to explore how AI technology in the healthcare sector can help in the early detection of critical diseases and improve patient care. At their annual "Check Up" event, they shared the latest updates on research studies conducted in the Medical LLM domain.

Here are some of the real-world applications of Google AI solutions in healthcare:

Medical Imaging

AI-powered medical imaging tools are being developed to augment the capabilities of clinicians in medical diagnosis. This AI-enabled technology is equipped to transform "traditional" approaches such as CT scans and MRIs. Dr. Vandana Khullar of PSRI Hospital talks about the "far-reaching implications of Google AI in cardiovascular healthcare."

Google AI in medical imaging can also address the growing shortage of qualified radiologists around the globe -- around 80% of healthcare systems have reported a shortage in their radiology department. The U.S. healthcare industry is likely to face a shortage of 42,000 radiologists and pathologists by 2034.

AI-powered medical imaging tools can provide benefits in the form of:

- Faster intervention and medical diagnosis
- Real-time tracking of patient's health for improved care
- Reduced workload on the existing team of healthcare practitioners
- Improved patient outcomes through precise diagnosis



Digital Pathology

Digital pathology is transforming medical pathology services by digitalizing "conventional" glass slide pictures into whole slide images (WSIs), which are easier to share and manage. The leading challenge for pathologists is "how to store and manage large volumes of pathological data." Utilizing Google Cloud's Healthcare API, healthcare organizations can easily store and manage WSIs originating from different data sources. Dr. Karen DeSalvo of Google also highlights Google's work in digitalizing pathology in the fight against breast cancer.

AI-powered digital pathology will also help address the growing shortage of pathologists across the globe by aggregating the data faster and providing clinical decision support to pathologists for more accurate and faster reviews. According to this 2022 LinkedIn article, there are a total of 13.2 million doctors and over 102,000 pathologists globally. That translates into just 1 pathologist for every 125 doctors.

Personal Wearables

The global market for AI-enabled wearables is expected to be valued at $69.31 billion in 2028. This marks a global growth rate of 27.6% CAGR between 2023 and 2033. In association with the World Health Organization (WHO), Google is trying to address public health challenges by advanced utilization of medical information.

AI-powered wearables are making the healthcare sector more "patient-centric and personalized." Globally, the healthcare industry generates 30% of global data – mainly from AI-powered wearables and IoMT devices.

In partnership with Fitbit Health Solutions, Google Cloud is enabling healthcare companies to extract personal health data from the connected Fitbit device. With this AI-powered solution, healthcare providers can gain a holistic view of their patients outside typical clinical care settings.

Bioinformatics

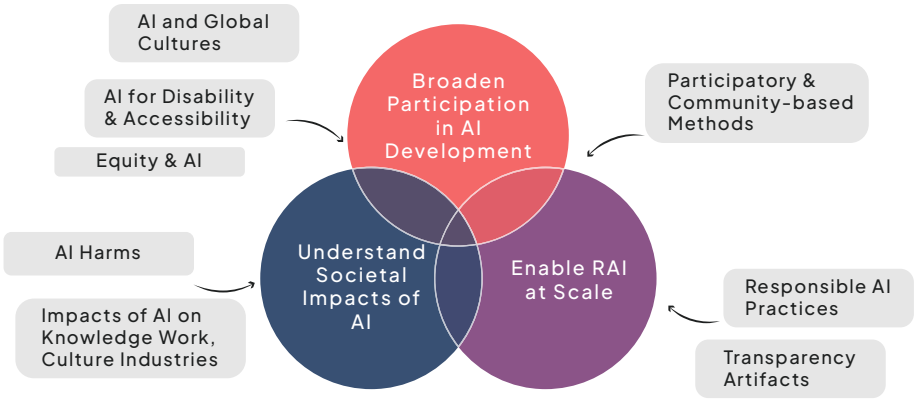
Bioinformatics is the scientific subdiscipline to collect, store and analyze biologic information. According to the latest research studies, the global market for AI technology in bioinformatics is projected to reach around $37 billion in 2029. Growing expenditure in healthcare is driving the demand for this market. Machine learning, a subset of AI, is fast emerging in the bioinformatics domain with the following applications:

- Gene editing for predicting the outcomes of research experiments
- Identifying the protein structure and evaluating protein models
- Identifying genes most prone to selected diseases

Google's sister company, DeepMind has successfully used AI technology to develop AlphaFold which predicts the 3-D structure of known proteins. With its AI system, DeepMind has provided a free open-source database for global scientists and researchers.



Responsible AI in Healthcare



Google Research

The growing use of AI technology in the healthcare sector is raising genuine concerns about AI ethics and operational transparency. AI solutions in healthcare are posing numerous challenges related to patient safety, data privacy, and human bias. Here are some of the common questions about the responsible use of AI in the healthcare domain:

- How reliable are AI algorithms when it comes to the life-death situation of any patient?
- How do you ensure that AI technology is used for its intended objectives?
- How can healthcare companies ensure that AI technology does not discriminate against people of selected communities or ethnicity?

Responsible AI in healthcare can address these challenges – and much more. Here are some of the best practices of Google's Responsible AI in the healthcare industry.

Human-Centric Design

With a human-centric design, healthcare companies build an effective AI model that can provide accurate predictions and recommendations – based specifically on the user's experience. This involves practices like:

- Designing built-in AI features with clarity – crucial to improving user experience.
- Designing a system to provide multiple answers or user options – to cater to diverse use cases.
- Incorporating an efficient user feedback system early in the designing phase.
- Addressing a diverse set of users and use cases – thus building user perspective into the AI project.

AI Metrics

To implement a Responsible AI system, there must be a defined and agreed upon set of metrics. Healthcare firms should identify multiple AI metrics – instead of focusing on a single metric. As a best practice, include feedback metrics from user surveys and system performance metrics such as customer lifetime value and click-through rates. Include AI metrics that are relevant to your company's business goals and objectives.

Monitoring of Raw Data

AI and machine learning models are only as accurate or effective as the quality of data fed into them. As a recommended practice, healthcare companies must monitor their raw data for accuracy and relevance. They must consider:

- Is the data accurate and free from errors?
- Are we using the correct data sample that represents the target user?
- Is there any skewed data during model training – and how to identify them?
- Does your AI model have any redundant features?

AI Model Limitations

Most AI models are a reflection of their training data. Companies must understand and communicate the scope of model training – thus identifying the limitations of the models. Additionally, they must communicate these model limitations to applicable users – along with the limitations of the used dataset.

AI System Testing

Quality testing is the only way to ensure that all AI systems are performing as intended or designed. AI system testing involves practices like performing:

- Unit testing to check every component of the AI system
- Integration testing to check how every AI component interacts with the other components
- Iterative user testing that can satisfy a variety of user's needs and expectations
- Updating the test cases to meet changing users and use cases

With an efficient testing cycle, healthcare firms can minimize the level of system failures and inaccurate outcomes or predictions.

How Onix's AI Solutions are Transforming Healthcare

With over 40 years of collective experience in the healthcare industry, Onix is enabling this industry to significantly improve the patient experience through its innovative solutions. Onix was recently recognized by Google Cloud for exceptional healthcare experience from strategy to implementation with the 2023 Partner of the Year award for Healthcare and Life Sciences.

Onix has many trusted partners that can bring innovative solutions to healthcare. For example, in partnership with CapsicoHealth, Onix has developed an AI-powered population health platform – with over 10 million patient records and 40 billion data points. By analyzing billions of data points, this AI platform delivers the following benefits:

- 60% reduction in manual operating costs
- 40% reduction in chart reviewing costs
- 90% accuracy in data identification and quality

Onix is able to offer the following benefits to our Healthcare and Life Science clients:

- Understanding of and experience within the whole healthcare ecosystem, including Providers (hospitals), biotech, pharma, research and Payers (insurance)
- Accelerated sales cycle and identification of new business opportunities in healthcare sector
- Expertise in AI and machine learning technologies – as well as serverless frameworks
- Named as the top vendor in healthcare compliance solutions in 2022 by Healthcare Business Review

Do you want to learn more about Onix's AI solutions in healthcare? Please visit our site and fill out the form to connect with one of our HCLS experts.

