Data Analytics in Healthcare: Opportunities & Challenges

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The increasing rate of digital transformation across the Asia-Pacific region has created heaps of data ranging from online customer transactions to footfall traffic, making data analytics more critical than ever to leverage all that data. In the healthcare industry, a large amount of data is already being collected to generate insights on emerging conditions and to improve patient care. Yet, like other industries, the healthcare sector continues to grapple with issues such as data silos and security challenges that stand in the way of harnessing insights. In this e-guide, read about the promises of healthcare data analytics, the challenges faced by healthcare providers in digital transformation and what some cloud providers are doing to assuage the security concerns of cloud among healthcare service providers.

Aaron Tan | Executive Editor, APAC

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Healthcare claims data analytics detects emerging conditions

Scott Robinson, Director of business intelligence

Predictive analytics are revolutionising healthcare, as wearable IoT and sophisticated mobile apps collect data on individuals to inform them and their caregivers about their health. This data is invaluable for spotting incipient conditions of concern and nipping them in the bud. But IoT, wearables and mobile apps aren't the only sources of data that can predict health issues: Old healthcare claims data is a great source, and potentially a richer one.

Health snapshots, health documentaries

While IoT and mobile apps capture an individual's health parameters in the moment, claims data can contain a staggeringly detailed health history. That historical claims data aggregates more than vital signs.

Wearable IoT and mobile apps that track pulse, respiration and blood pressure in the moment and record weight, diet, footsteps logged and other activities over time, are fine, in and of themselves. Added together, they amount to a scrapbook, but of snapshots only.

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A patient's claims history contains snapshots like those above and much more: diagnostic data, prescriptions consumed, test results, and often rich demographic details.

It's more than a scrapbook of daily activity snapshots; it's a full-blown health documentary that includes all the other players, such as physicians, care managers and family members. There is more to work with because this data fleshes out the context of the patient's life in ways daily health snapshots can't. This provides a rich and informative backdrop that can shine light on the path to an emerging pathology or risky condition when mined for data.

When a provider or care management organisation uses healthcare claims data for predictive analysis, they can study their entire patient population to identify indicators that can flag the possibility of problems in a current patient's health.

Seeing red flags

Any given population of patients will include groups that have presented specific ICD diagnostic codes for any number of diseases and disorders, and each person with a positive diagnosis will carry a rich history of peripheral details. Identifying those groups, and then analysing their claims histories for those peripheral details -- some of which may be commonalities

shared with others -- can potentially produce a set of indicators that serve as warning flags to look for in future patients.

How is this achieved? Cluster analysis is the preferred analytical approach (principal component analysis and K-means cluster analysis are two highly effective methods). The idea is to isolate particular risk conditions or known groups of conditions, into a subset of data to be analysed --for instance, all patients in the population who have been diagnosed with hypertension -- and apply cluster analysis to that data set to see what preconditions might consistently present.

Once this occurs, demographic data can then be examined in the positive results. Many socioeconomic factors -- socioeconomic status, marital status, race, domestic violence, history of alcohol or substance abuse -- may commonly appear, as clusters, with enough frequency to be considered red flags in the subject population. Assuming statistical significance, it becomes possible to watch for these factors in the claims stream, flagging those of concern -- and then alert physicians and care managers early on to watch for signs of anxiety or depression, addressing them before they lead to a potentially fatal case of hypertension.

This style of analysis can establish a risk ratio -- a specific, numeric likelihood of a risk condition's emergence -- based on its historical occurrence in the population.

This is just one of many thousands of possible scenarios.

Prevention, not cure

This predictive approach is already being employed by care management organisations servicing Medicaid populations in several states and can potentially save billions of dollars in healthcare expenses annually. If analytics can detect a risk condition before it becomes an illness or disorder, the cost of intervention is far less than the eventual cost of treatment.

How is this better than the existing system, where physicians and care managers have patient history in front of them as they are evaluating and advising a patient under care, catching risk conditions as they emerge? It's better because a digital system can review the data before a human performs the evaluation. Healthcare claims data can be reviewed automatically, day in and day out, and every single patient is reevaluated with each new day's additional data. IT can place patients under constant scrutiny, while human beings can only evaluate one patient at a time, on the day they are in the office.

Healthcare has always been an odds problem: What is the likelihood that any particular person is going to develop any particular condition, given any particular circumstances? A rich body of healthcare claims data can build out that entire landscape and build a superb predictive model that spots

emerging conditions before they become serious. This allows healthcare providers to intervene early to suppress the problem before it even occurs.

A new layer of metadata

These analytics can create a new layer of metadata around every patient, facilitating more effective care and tremendous efficiencies in the healthcare system. The patient is no longer defined as "age x," "gender y," or "income level z;" now the patient is defined as "incipient diabetic" or "at risk of cardiac event" with a specific severity level. That's something the physician and care manager can work with.

It's no longer a question of demographics and the surface pattern of patient behavior that defines a patient; it's a deeper set of features that can trigger preemptive care and attention, to the benefit of the patient and the system overall.

For many organisations, the data is sitting there, waiting to be explored -- and the patients are there, ready to be treated more effectively. That means money saved, workload reduced, value realised and lives changed.

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Data silos hinder IoT in healthcare; tech giants could help

Makenzie Holland, News Writer

The Internet of Things in healthcare may not be a new idea, but it's the key to creating a more connected world within healthcare, according to one analyst.

The Internet of Things, or IoT, is the connection of a group of digitised objects that can collect, send and receive data. Digital medical device use was born out of clinical need, often circumventing IT for approval or advice, said Gartner analyst Gregg Pessin. Now healthcare organisations are dealing with silos of IoT devices and data.

"In the past, the CIO or the IT department has had little input into what happens in that acquisition process, so you end up with IoT solutions, many of them from many different companies, that all work in their own little world inside that clinical environment," Pessin said.

That is changing. Healthcare organisations are beginning to see value in breaking down silos and bringing IoT data together to create a single view of a patient. Tech giants like AWS are pushing into the healthcare market

providing platforms to gather and analyse IoT data while making it more accessible.

CIO's perspective on IoT in healthcare

IoT data silos and the lack of interoperability in healthcare are major challenges, according to Craig Richardville, CIO of SCL Health, based in Broomfield, Colo. They must be overcome for a healthcare organisation to make better use of the IoT data it's collecting.

In healthcare, integrating vast amounts of IoT data into provider workflows is a complex, uphill battle, Richardville said. But as the healthcare industry matures, he said, there is growing opportunity to standardise and integrate IoT data back into provider workflows to create a more complete view of a patient.

"That's really the ecosystem we all want to create," he said. "The end game is [a system] that is fully connected all the way through, safely and securely, that allows us to consume or digest that information and get that back into someone's professional workflow so they can take advantage of the information. The outcome of that is we make better decisions."

Richardville believes IoT is the future of healthcare, further enabling a healthcare organisation's connection to patients in their homes. IoT in healthcare can grow an organisation's capabilities when it comes to remote

patient monitoring, social determinants of health and other areas of healthcare. IoT data can help providers and healthcare leaders "make more precise and intelligent decisions," he said.

Richardville said IoT could provide greater connection to patients but that privacy and security should remain top of mind for healthcare CIOs as that connection to patients and data collection grows. It's also important that a healthcare system has the capability to analyse the data coming from connected devices -- an area where tech giants could play a significant role.

Companies like Amazon, Apple, Google and Microsoft, all of which continue to push into healthcare, could provide healthcare organisations with IoT data gathering and analytics capabilities, Richardville said. SCL Health has a "strong relationship" with Google, which he sees as an "accelerator" to the digital healthcare work the organisation is doing.

"When you look at the companies, whether it's Amazon or Google or Microsoft, all getting into this space ... it actually allows us to be able to lift our game," Richardville said.

When it comes to IoT, Gartner's Pessin said there is strong motivation in healthcare to move toward platform products, which offer tools to gather and analyse IoT data.

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Tech giants further enable IoT in healthcare

Healthcare organisations are buying more patient data-collecting and IoT-enabled devices, which is creating a "tidal wave of data" healthcare CIOs have to deal with, Pessin said.

The amount of computing and storage power required to process that much data is likely more than an on-premises data center can handle. That's where external, third-party players like tech giants come in, according to Pessin.

"What are they great at? They're great at scaling resources and they're adding all of these great, specific kinds of platform solutions like IoT services that they can sell on the platform," Pessin said.

AWS, for example, has AWS IoT services that health IT and medical device manufacturer Philips Healthcare is using. Philips created a customer-facing HealthSuite digital platform to provide customers with the capability to "connect devices, collect electronic health data, aggregate and store data securely, analyse data and create solutions on the cloud," according to the Philips HealthSuite digital platform website.

Dale Wiggins, general manager of the HealthSuite digital platform, said Philips chose AWS to be its cloud provider to store large amounts of data and large X-ray and MRI image files from Philips medical devices. The next

step for the Philips HealthSuite platform is to use AWS IoT services for remote support management of Philips devices, Wiggins said.

AWS IoT provides Philips with a more cost-effective way to offer remote support capabilities on Philips devices to healthcare customers, he said.

"We're looking at using IoT to solve a lot of legacy issues with our existing remote support capabilities with new, cutting-edge, always on, always available services that AWS really supports through what they provide with IoT," he said.

AWS IoT offers device software, control services and data services, depending on customer needs, according to Dirk Didascalou, vice president of AWS IoT. AWS provides the infrastructure for IoT services and is HIPAA-compliant, but it does not have access to customer data through AWS IoT, Didascalou said.

Partnerships with tech giants and healthcare organisations, medical device manufacturers and even EHRs are becoming the norm, according to Pessin. Healthcare organisations create the data and tech giants can provide tools to collect, analyse and store that data. Pessin said healthcare CIOs have to be ready to develop partnerships between the two.

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"The advances in digital care delivery that are coming are going to require massive resources, and it's those large digital giants that have that available," Pessin said.

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Healthcare providers should press on with digital transformation

Aaron Tan, Executive Editor, APAC

Healthcare service providers should not slow their digital transformation efforts in the face of growing cyber threats.

Speaking to Computer Weekly in Singapore, Arkadiusz Czopor, managing director at T-Systems Asia South, said that with more patients demanding digital experiences, healthcare providers have little choice but to adopt digital technologies.

“When we go to hospitals, we expect similar experiences to when we are shopping or at the bank,” said Czopor, adding that in countries with an ageing population, hospitals will also need to automate their processes to cope with rising demand for healthcare.

But digitisation and automation come with potential risks to patients, which Czopor said can be mitigated if healthcare organisations focus on keeping interconnected systems operating smoothly while addressing cyber threats.

“If the systems are not working correctly and something goes wrong, a doctor could make a wrong decision based on wrong data and cause the

death of a patient," he said. "The risk of data leakage can also affect healthcare institutions if the systems are not secured."

According to a recent study by Frost & Sullivan, cyber attacks could cost healthcare organisations in the Asia-Pacific region an average of $23.3m.

In July 2018, the Singapore government revealed that the non-medical personal details of 1.5 million patients had been illegally accessed and copied in a deliberate, targeted and well-planned cyber attack against the SingHealth public healthcare group.

In the aftermath of the attack, Singapore paused the development of new IT systems in the public sector for a few weeks and mandated stronger network security measures for organisations in critical sectors, such as aviation and financial services.

Australian healthcare organisations were also not spared from data breaches. Nearly a quarter of data breaches reported under Australia's mandatory data breach regime took place in the healthcare sector, shortly after the notification rules took effect in February 2018.

Czopor said T-Systems, with its roots in Germany, which has one of the world's strictest privacy regimes, is well positioned to help healthcare providers address their security challenges.

"We can leverage the security experience in Germany and make that available in Singapore, but only the pieces that make sense for local markets," he said.

Meanwhile, T-Systems has opened a healthcare competency centre in Singapore that will enable healthcare providers to test healthcare applications from SAP using their own data and see what a full implementation could look like.
The centre will offer a digital sandbox for healthcare providers to use to perform stress-testing, what-if scenario analysis and configuration testing for new deployments under the guidance of T-Systems' experts.

For non-SAP customers, Czopor said T-Systems is open to partnering with other IT suppliers depending on the needs of its customers. "We are doing that for a nursing home in Singapore with different partners in a project that does not include SAP," he said.

According to a Microsoft-IDC Asia-Pacific study, healthcare organisations embracing digital transformation have seen improvements of 14-21% in patient outcomes and disease prevention, as well as patient experience, integrated care coordination, cost reductions and innovation of care teams.

They also expect to reap further enhancements of at least 30% by 2020, with integrated care coordination expected to see the biggest gain.

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Singapore sets national AI strategy with focus on skills and ethics

Aaron Tan, Executive Editor, APAC

Singapore is ramping up efforts to harness artificial intelligence (AI) across its economy through a national strategy that encompasses skills training and industry partnerships while promoting the responsible use of AI.

Unveiling the national AI strategy at the Singapore Fintech Festival, Singapore's deputy prime minister, Heng Swee Keat, said AI is the country's next step in its smart nation initiative, noting that AI is already being used in several aspects of daily life.

To bring the strategy to fruition, the government has identified five national AI projects to address key national challenges, and to deliver social and economic benefits to Singaporeans. These projects include intelligent freight planning in logistics, smart estates, chronic disease management in healthcare, personalised education and border security.

Heng said the national AI strategy will be rolled out iteratively, to respond to the rapidly changing technology landscape and to tap new opportunities brought about by AI. The government will continue to apply AI in areas that will deliver impact to Singaporeans, beyond the five national projects.

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Key to Singapore's national AI strategy are partnerships between the research community, industry, and government to speed up and commercialise AI offerings. This will build on Singapore's existing research and development capabilities, and an existing S$500m investment to further AI developments under the Research, Innovation and Enterprise 2020 plan.

The government will also prepare Singaporeans to take on high-quality AI jobs, strengthen the ability of both public and private sectors to manage and exchange data securely, and address AI ethics through initiatives like the AI governance framework developed by Singapore's Personal Data Protection Commission and Infocomm Media Development Authority.

Separately, the Monetary Authority of Singapore (MAS), the country's central bank, is working with the financial industry to develop a framework for financial institutions to promote responsible adoption of AI and data analytics.

David Hardoon, special advisor for AI at MAS, said: "AI has the potential to transform financial services, but it must be used in a safe and responsible manner. Good governance is essential to AI adoption in the financial industry."

Singapore's national AI strategy was welcomed by industry players such as SAP. "AI is an exciting field in technology that has the potential to transform

the way we conduct business and how societies are run," said Khor Chern Chuen, managing director of SAP Singapore.

"The key to unleashing the promise of AI lies in collaboration – this means researchers, regulators and businesses must align objectives and establish a common approach in harnessing AI. The national AI strategy is a great starting initiative that involves all stakeholders within the ecosystem, rallying all parties to shape the way AI is deployed on a national level."

Jean Francois Gagné, co-founder and CEO of Element AI, the Canadian AI unicorn that the Singapore government had consulted on national AI initiatives, said: "Singapore is becoming a leader in AI, with its increased focus and investments across its burgeoning AI ecosystem which is supported by its sound governance and regulatory frameworks."

Earlier in the year, Apache Singa, the Singapore-developed distributed computing platform for training deep learning models over large datasets, was conferred top-level project status under the Apache Software Foundation.

With its focus on healthcare applications and scalable architecture that can run on a range of hardware including graphics processing units, Apache Singa is already being used by National University Hospital and Singapore General Hospital to analyse MRI and X-ray images to better identify health problems.

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Alibaba Cloud earns security credentials in automotive and healthcare sectors

Aaron Tan, Executive Editor, APAC

Alibaba Cloud has bolstered its security credentials with new security and compliance accreditations in the automobile and healthcare industries in a bid to gain a stronger foothold in the global cloud computing market.

In the automotive sector, the cloud supplier earned the highest level 3 certification in Germany's Trusted Information Security Assessment Exchange (Tisax), a framework used by European automobile companies to assess their service providers' compliance with information security requirements.

The Tisax certification was awarded after an independent audit by PricewaterhouseCoopers, which inspected Alibaba Cloud's German datacentres and interviewed Alibaba executives on the company's security controls and management practices.

Alibaba Cloud said the certification will help automotive companies reduce the cost and effort involved in conducting their own assessments of Alibaba's ability to handle highly sensitive information. The accolade is also

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significant given the future of autonomous driving platforms and their use of data, it added.

In the healthcare sector, Alibaba Cloud said it has also met the Good Practice (GxP) quality guidelines and regulations on electronic records and signatures administered by the US Food and Drug Administration.

The GxP audit was conducted by RSM, a US-based supplier of audit, tax and consulting services. Alibaba Cloud's GxP compliance will apply to all its customers across multiple jurisdictions, however.

"At RSM, we understand the importance of protecting sensitive information, and we were happy to participate in the completion of important compliance efforts to further the robust security programme within Alibaba Cloud," said Greg Vetter, security principal at RSM.

"As we see with many of our clients, adherence to GxP, including regulations such as HIPAA [Health Insurance Portability and Accountability Act] and 21 CFR Part 11, is one of the cornerstones of a robust cloud solution."

Zheng Yuanbin, head of security compliance and privacy at Alibaba Cloud, said the latest accreditations will expand the company's business influence, particularly in automotive and healthcare, which offer some of the biggest opportunities in cloud computing.

Earlier this year, Alibaba Cloud also completed an assessment for compliance with broker-dealer media requirements by the US Securities and Exchange Commission and the Financial Industry Regulatory Authority, extending its reach to more customers in the global financial industry. Earning security certifications is key for public cloud suppliers to win over public sector and enterprise customers that have strict data protection and compliance rules.

Besides Alibaba Cloud, other public cloud suppliers, including Amazon Web Services and Microsoft Azure, already comply with Tisax and GxP.

David Burt, senior compliance manager for trust and compliance at Microsoft Azure, said that as the automotive industry rapidly evolves to incorporate new technologies such as the internet of things (IoT), information security, and privacy are more important than ever, making specialised compliance offerings as Tisax critical to winning customer trust.

“Azure’s Tisax compliance allows many companies in the European automotive sector to leverage Azure services more easily, as well as exchange data with suppliers that are also Tisax compliant,” he added.

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