



Singapore: Government driven approach for AI in healthcare

Similar to the Netherlands, Singapore faces the challenge of a rapidly ageing population due to declining birth rates and increasing life expectancy. The disease burden is relatively high especially for cancers, metabolic & cardiovascular diseases and infectious diseases. A significant growth in public healthcare expenditure is expected in the coming years. Priorities for Singapore are healthy ageing, digitalization in healthcare and improving diagnostics and quality of life for priority diseases.

Singapore aims to lead in developing and deploying AI

The health and biomedical sector is one of the four domains of Singapore's current innovation strategy (RIE2020) and will continue to be a priority for RIE2025. The Ministry of Health (MOH) plays an important part in the strategy and prioritizing projects. MOH has a dedicated IT arm, Integrated Health Information System (IHIS), that works with knowledge institutes, healthcare providers and companies to develop and implement AI tools.

Singapore allocated 313 million Euro's for AI. In 2019 the Singapore government launched the National AI Strategy (NAIS). The country invests heavily in AI and the National AI Office (NAIO) oversees the consolidation of efforts. The five key areas of the AI strategy are: security, smart estates, education, logistics and healthcare. The national project for healthcare focuses on chronic disease prediction and management. Goal is to use AI to get better control over chronic diseases such as diabetes, hypertension and high blood cholesterol by developing and deploying tools for patient self-management and clinical decision support.

Governance of data and AI

In 2011 the Ministry of Health and IHIS started roll-out of the National Electronic Health Record (NEHR). The system collects health records across different healthcare providers and is owned by MOH. Singaporeans can access their records via HealthHub, a digital health portal. Next to health records, HealthHub can also be used to access services and to third party fitness trackers can be connected to HealthHub. MOH and IHIS are developing a AI Governance Framework specifically for the healthcare sector. Singapore also plays an active role in the global development in standardized assessment for AI for health, diagnosis, triage and treatment decisions via the World Health Organization.

Personal data in Singapore is protected under the Personal Data Protection Act (PDPA). In 2018 Singapore faced the biggest data breach in the country's history. The data breach affected healthcare records of 1.5 million people. This resulted in IHIS beefing up cyber security training and awareness within their own organization with help from the Cyber Security Agency.

AI for early detection of chronic diseases

One of the chronic diseases Singapore is struggling with is diabetes. Singapore National Eye Centre's (SNEC) Singapore Eye Research Institute (Seri) and the National University of Singapore's (NUS) School of Computing have developed a deep learning system to recognize signs of diabetic eye disease. Selena+ (Singapore Eye

Lesion Analyser Plus) does this by scanning the photographs for signs of diabetic eye diseases. Other than diabetic retinopathy, the AI technology can also screen for glaucoma and age-related macular degeneration.

Optimization of healthcare with AI

AI has not only proven to be a tool used to prevent and manage chronic diseases but is also applied to create more efficiency. IHiS together with the Tan Tock Seng Hospital developed a Command, Control and Communications (C3) system for healthcare. The system provides real-time visibility of the hospital's ground operations and uses AI to predict situations and optimize allocation of resources.

The National University Hospital Singapore (NUHS) and the National University of Singapore (NUS) developed the DISCOVERY AI platform. The platform is used to build AI tools leveraging multi-domain medical databases. One of the tools developed on the platform is to predict the diagnosis of appendicitis based on free text. An important element of the platform is the facilitation of collaboration between clinicians and computer scientists.

AI and the fight against covid-19

The investments in the health and biomedical sector over the past decades have made Singapore able to respond fast to covid-19. The country's thriving start-up ecosystem was evident and many AI tools were developed and deployed in the fight against covid-19. Temperature screening was an important part of Singapore's strategy from the start. Singapore start-up KroniKare developed iThermo, a solution for automated temperature screening. The solution was developed with IHiS and national accelerator AI Singapore.

Another application of AI that is increasingly being adopted during the pandemic is the acceleration of drug discovery. Singapore's national platform for drug discovery and development (EDDC) has partnered with pharmaceutical company Auransa, to leverage their predictive AI to fast track the discovery of new therapeutics for viral pandemics. A multidisciplinary team of researchers at NUS have developed 'iDentif.AI', a platform to identify effective combinations and dosing of billions of different drugs against infectious diseases.

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Sources

This article is based on public documents, online articles and conversations with several stakeholders in Singapore. Below a few links to articles that were used in writing the article.

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