

A study to analyse the impact of artificial intelligence in transforming Australian healthcare

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Abstract

Artificial intelligence (AI) is the biggest emerging movement and promise in today's technology world. AI, in contrast to natural (human or animal) intelligence, is intelligence demonstrated by machines. AI is also called machine intelligence, which aims to mimic human intelligence by being able to obtain and apply knowledge and skills. It promises substantial involvements, vast changes, modernisations and integration with and within people's ongoing life. It makes the world more demanding and helps to make prompt and appropriate decisions with real time. This article provides a main analysis of the health industry and healthcare system in Australian healthcare that are relevant to the consequences formed by AI. This article has primarily used the secondary research analysis method to provide a wide-ranging investigation of the positive and negative consequences of health issues relevant to AI, the architects of those consequences and those overstated by the consequences. The secondary resources are subject to journal articles, reports, academic conference proceedings, media articles, corporation-based documents, blogs and other appropriate information. This study found that AI provides useful insights in the Australian healthcare system. It is steadily reducing the cost of the Australian healthcare system and improving patients' overall outcome in Australian healthcare. AI can not only improve the affairs between public and health enterprises but also make life better by increasing efficiency and modernisation. However, beyond the technology maturity, there are still many challenges to overcome before Australian healthcare can fully leverage the potential of AI in healthcare – Ethics being one of the most critical.

Keywords: Artificial intelligence (AI), health industry, healthcare system, Australian healthcare.

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1. Introduction

Seeing the development of a field that is going to upset the well-being and life of billions of individuals is interesting. Artificial intelligence (AI), as opposed to natural (human) intelligence, is insight exhibited by machines. Computer-based intelligence additionally called machine intelligence, intends to copy human insight by having the option to secure and apply information and abilities (Mamoshina et al., 2018).

As indicated by the most recent Australian statistical survey, AI in healthcare services was esteemed at 2.1 billion USD in 2018 and is relied upon to be worth 36.1 billion USD by 2025. The most ground-breaking medicinal services organisations have just gotten that and have some time in the past consolidated it in their procedure. The development of organisations has resolved to have any kind of effect in that space. Be that as it may, rivalry will be wild, as AI covers a solid industry – the tech industry. It is not new, tech organisations have been mulling over moving to social insurance for a long time; however, as we progress through 2020, it will turn out to be progressively unmistakable and we will see the ascent of various beginning-period activities in a few applications, which might be a danger for the medicinal services industry, but it is not all fate and despair as it is additionally an incredible source of new worthy creation as the tech industry is making the most of unexploited and unforeseen chances (Harry, 2018).

This section mainly focuses on the research purpose and scope, objectives, research aim and the satisfaction of the research. This study analyses the impact of AI in Australian healthcare. Then, it develops benchmark strategies to help healthcare provide a more comprehensive atmosphere. This study also involves the proper investigation of considerable success factors in AI implementation all around Australian healthcare (James & Kevin, 2019).

1.1. Purpose and scope

This study mainly focuses on the different sectors in the health service industry in Australian healthcare, such as public hospital, private hospital, medical centre and multiple health providers. Australia is the chosen country for this healthcare research because it is a developed country with strengths of the ICT and AI industries.

1.2. Objectives

- Finding out the background of the ICT industry, AI technology, AI challenges and opportunity issues and business in health significance in Australian healthcare.
- To explain the evolution of AI in Australian healthcare from its early years until today.
- Finding out the reasons, challenges and opportunities of fastest improvement in the ICT and AI industries in Australian healthcare.
- Identifying the requirements for an effective evaluation in service SMEs.
- Establishing the current position of frame for measuring AI accepted in the health industry of Australian healthcare.
- Categorising common factors for customer and business satisfaction by using AI in the Australian healthcare sector (Walker & Enderling, 2016).
- Extending successful assessments for AI satisfaction for the health sector in Australian healthcare.
- Analysing economic, legal, social, ethical and political issues in the context of AI in Australian healthcare.
- Learning how secured ICT and AI can help in the economic growth of Australian healthcare (Harry, 2017).

1.3. Aim of the study

The aim of this study is to identify the impacts of AI that can influence a better and clear understanding of the extent of prospective development and advancement within the AI industry in Australian healthcare.

1.4. Research questions

This research aims to try answering the following research questions on the information gathered about AI adoption in Australian healthcare:

- What kind of insight and business value is possible if I use AI technologies in the health sector?
- How do I assess the cost of expanding current environment or adopting a new solution by using AI in the health sector?
- What is the impact on the existing AI governance?
- Can I incrementally implement an AI solution?
- What specific skills are required to understand and analyse the requirements to build and maintain the AI solution?
- Do I have an existing AI establishment that could be used to deliver business insight in the health industry?
- Can an AI solution help in the Australian healthcare economy?
- Are health consumers fully informed about the status of their health, their healthcare choices and the cost and quality of services and products in the health market?
- Are healthcare service providers sufficiently informed to provide appropriate and continuous care to each consumer?
- Do policy-makers have a complete picture of consumers' health data, the cost and quality of healthcare and probable future health market demand patterns to make informed decisions?
- Do healthcare funders in the public and private sectors have the right information to make evidence-based funding and payment decisions?
- Do researchers have access to appropriate levels of healthcare data to enable the research that will inform the nature, cost and quality of treatments, as well as healthcare planning and service delivery?

1.5. Significance of the study

Many health organisations wonder if the business insights they are seeking can be addressed by an AI solution. There are no definitive guidelines that define the insights that can be derived from AI. The scenarios need to be identified by the health organisations and they evolve over time.

2. Literature review

This part provides the basic and obtainable understanding of AI, overall impact of AI, opportunities and satisfaction.

2.1. Introduction to AI

Naomi Simson, Entrepreneur and Co-Founder of Big Red Group says, 'AI, is a term first coined by John McCarthy in 1956 when he invited a group of researchers to the Dartmouth Summer Research Project workshop to discuss what would ultimately become the field of AI. The researchers came together to clarify and develop the concepts around thinking machines'. According to The Encyclopaedia Britannica, 'AI today is the ability of a digital computer or computer-controlled robot to

perform tasks commonly associated with intelligent beings'. Intelligent beings are those that can adapt to changing circumstances.

2.2. How AI is beating disease – prostate cancer

Few Australian health companies offers a digital clinic which streamlines the assessment and diagnosis of prostate cancer, using AI technology tailored to clinicians and patients. Its web-based platform analyses medical data, including medical imaging, blood and genomic data, to manage the risk of prostate cancer. It aims to reduce the cost of prostate cancer testing and treatment and to diagnose the disease as early as possible. Professor Elliot Smith said, 'We use AI to analyse all the data that they have and any data that comes in the future through our testing process, and using that we can give them the most accurate screening or diagnosis possible,' Professor Elliot Smith also said, 'The AI can read more into the data than a physician usually would.' The platform is designed to be easy to use and as unobtrusive as possible.

Smith Baxter (June 18, 2019) said, 'All these things come together to give a very personalised and very in-depth picture of risk of prostate cancer. That will be paired with a clinician who would see the output from the AI, review that and communicate to you through the platform about what your current risk is and what the recommended next step is.' He also said, 'It's a long process and there's a lot of paperwork involved but if you're doing the right things and building a quality piece of technology, and employing the high-quality engineering practices, then it's not that hard' (Smith Baxter, June 18, 2019).

'AI and clinicians will together manage the risk of a number of high-risk diseases, and you know that if any diseases were to pop up, you'd know about them far enough in advance to have the best treatment options and for them to stop becoming life-threatening,' Smith said. While a central concern around AI technology is that it will replace humans, leading to job losses and ethical quandaries, Smith said the platform is very focused on AI and doctors are working together to produce the best result for the patient.

Doctors and AI will in general work best together. Interestingly, if individuals look crosswise over Australia, there is most likely more interest for the information capacity of doctors than they can at present supply, particularly in provincial settings. AI is an incredible apparatus to expand the capacity of current clinicians to get them there, yet it is far from debilitating the stock of clinicians.

2.3. AI into Australian healthcare

The West mead Applied Research Centre has as of late won Australia's debut \$1 million respects to AI Impact Challenge for a translational computerised well-being programme that will utilise advanced devices to counteract coronary episodes. The computerised well-being programme, which at first revolved around Western Sydney's well-being administrations, will convey custom fitted guidance and pokes utilising AI to members who have presented at the medical clinic with chest torment, bridling their advanced impression to decrease the danger of a coronary episode. By consolidating clinical and shopper inferred information, for example, from cell phone applications and wearable's, with AI, it is accepted that the precision of hazard evaluation will be improved while making progressively versatile computerised well-being arrangements (Irena, 2016).

University of Sydney Vice-Chancellor and Principal Dr Michael Spence said, 'AI has the potential to transform healthcare globally – from crisis management to prevention – and people are delighted to be working with industry and with government to look at new ways of tackling society's growing health burden.' Federal Minister Andrews said: 'AI is the perfect example of how technology, combined with human know-how, can deliver incredible real-world benefits. Digital healthcare will not only save lives and reduce costs, it also has the potential to grow the economy and create new jobs.'

2.4. AI in healthcare

Professor Tim Shaw from University of Sydney said, ‘We are starting to come off the peak of the hype cycle regarding impact of AI and Digital Health. There was a definite focus on implementation of perhaps less blue sky but more immediately practical solutions to improve functioning and efficiency of healthcare delivery using AI to reduce unnecessary readmissions’. There was a lot of talk around ensuring solutions fit workflows and practices. There was much talk about the emergence of Natural Language Processing being key to many of these solutions. As expected, there was much talk about the need to capture social determinants of health data and integrate this into managing health and wellness. Interestingly, there was also talk about the failure of many small AI companies and the need for consolidation.

2.5. AI tool can predict breast cancer up to 5 years early, it works equally well for the patient

Multiple science and health laboratories have developed a new deep learning-based AI prediction model that can anticipate the development of breast cancer up to 5 years in advance. Australian researchers are comprehensively working on the product, which also recognised that other similar projects have often had inherent bias because they were based overwhelmingly on specific patient populations and specifically designed their own model so that it is informed by ‘more equitable’ data that ensures its ‘equally accurate for multicultural women.’ The women from Africa and some from North America are more than 42% likely than European and Western women to die from breast cancer, and one contributing factor could be that they are not as well-served by current early detection techniques. Darrell Etherington (2019) from MIT says that ‘its work in developing this technique was aimed specifically at making the assessment of health risks of this nature more accurate for minorities, who are often not well represented in development of deep learning models’. The AI project is intended to help healthcare professionals put together the right screening programme for individuals in their care and eliminate the heartbreaking and all-too common outcome of late diagnosis. Darrell Etherington (2019) also hopes the technique can also be used to improve the detection of other diseases that have similar problems with existing risk models with far too many gaps and lower degrees of accuracy.

Using AI in healthcare shows promise, but only when it comes to supporting patients with repetitive and predictable tasks. According to author Robert Murphy (2019), ‘Good treatment is complex and requires creativity, flexibility, improvisation and spontaneity’. He also has mentioned that ‘Doctors need the abilities to think logically and apply common sense, compassion and empathy to deal with the everyday non-academic issues and problems that arise in the workplace’. AI helps to simulate human perception and decision-making. It can solve novel problems without having pre-programmed knowledge of the task to be performed.

2.6. How will AI help prevent heart attacks

Digital health interventions and therapeutics, such as text messages and Smartphone apps, has been the cornerstone of innovative research. AI-driven adaptive digital solutions connecting health services could transform care for patients and populations because they lead to earlier identification of at-risk individuals, enable better access prioritisation based on risk and provide greater customisation of management and monitoring intensity based on individual risk. Dr Harry Klimis from the University of Sydney, a cardiologist and researcher (2018) at WARC, says: ‘AI could harness data to create digital health programmes which allow greater efficiency in health care delivery.’

2.7. AI's hardest problem? Developing common sense

This is just a short statement that reflects on the difference between humans and AI systems. Humans are great at guessing or having inspiration or just creative thinking. How do humans do this? Is it linked to the unconscious mind or to normal consciousness and use of memory? The problem for AI is to mimic or copy the way humans use data and the environment to decide what to do or not do. Another issue is that humans constantly make errors or incorrect decisions, but they can realise in many cases and correct the problem and learn from the experience. How can you build rules/algorithms for a machine to act and think like a human? If that is what you want to do with AI, maybe this is not the goal (Petryni, 2016).

3. The research methodology

In this study, the secondary research method was chosen. It started by reviewing published secondary sources to provide a wider picture of the topic and a broad investigation of the consequences relevant to AI in Australian healthcare, the architects of the consequences and those affected by the consequences.

This study also took on qualitative method (Qualitative research is concerned with the collection and analysis in a non-numerical form, e.g. the collection of people's opinions about an event and the subsequent analysis of the data to establish the range of opinions) based on the interview system to conduct this study. It also included the initial analysis of literature review (Dekkers, 2014).

3.1. The strategy

In this study, the qualitative approach is chosen for future purpose as the leading design, as it provides a huge number of quality data. It gives a better approach to this research field. As mentioned, this study started by reviewing published secondary sources to provide the wide picture of the topic. New information about the AI in Australian healthcare enterprises are produced by analysing the secondary data from the documents and other reports. The participants were examined in order to identify the problems of AI satisfaction and to get the probable solutions from the secondary sources. The subsequently stage of the data collection was under the qualitative research approach, in which interviews were conducted to collect important information from ICT, AI and security experts, government and non-government officials, ICT students and university academics (James, 2018).

3.2. Document analysis

In this study, it is the best approach to find the general scenario of AI and its impacts by assessing the existing documents and reports and it will be the best advancement. Also, the researcher compared the previous and current scenarios of the research study. In addition, the researcher visited the government and non-government organisations to obtain comprehensive data. The researcher also visited some international agencies to obtain some statistics and publications. In conclusion, it is straightforward to say that the aim of document analysis is to get a better scenario of the research topic (James, 2018).

3.3. The qualitative method

Once the universities and organisations were finally listed, the key people for the interview were informed by email. To obtain consent from the organisations and universities, the researcher approached them. In that case, the researcher also contacted the Business, Health and IT faculties to obtain a positive response. In terms of candidate selection process, the lecturers communicated with

the students to volunteer. Once the project was officially approved, the researcher contacted the departments/faculty of the universities by sending a request letter to identify potential students. Fifteen potential students were selected who responded positively and comprehensively by email and telephone (Dekkers, 2014).

3.4. Data analysis

All the interview sessions took 30–45 minutes per session. The interviews were recorded digitally. iPad and Laptop were used, and Skype was used as the Internet software. All data were sorted and analysed. Qualitative data analysis with relevant computer software (NVivo) was used. The researcher categorised all the transcripts into alphabetical order of interviewees' surnames. Key issues were checked thoroughly and noted in the list. Also, the researcher prioritised the contributors and the respondents who provided significant contributions (Dekkers, 2014).

4. Data collection and research analysis

4.1. Qualitative results

This section defines the qualitative results from in-depth interviews. The results are developed from the potential interviewees, such as IT experts, the government and non-government officials, academics and IT students, identified as I1, I2, I3, I4, I5....., G1, G2, G3, G4, G5....., A1, A2, A3, A4, A5 and S1, S2, S3, S4, S5....., respectively (Dekkers, 2014). The interview data, mainly about AI impacts in the Australian healthcare industry, are the subjects of analysis resulting in the following vital key issues: the impact of secured AI on Australian healthcare, the main reasons contributing strongly to the non-operation of AI in the past in Australian healthcare, business restrictions existing in the development of AI in Australian healthcare, Australian healthcare consumers' concerns about AI, economic importance of AI to Australian healthcare, the economic impact of AI on business costs and productivity which facilitates the development of business of Australian healthcare, the current situation of the network infrastructure in Australian healthcare, industrial solutions to give consumers confidence about security in AI, the role of the private sector and public sector in developing AI, and Australian healthcare enterprises' role to make fast and easy going communication between the buyers and sellers (Dekkers, 2014).

4.2. Data collection and analysis

This section provides an analysis of the collected data together with the relevant literature. It discusses the background of IT, AI challenges and opportunities, overall impacts on Australian healthcare, about the current views of the impact of AI in Australian healthcare, the reasons of the improvement in IT and AI industries in Australian healthcare, Australian healthcare consumers' concerns about security and privacy issues in connection with the implementation of AI, Australian healthcare consumers' presence in the promotion and development of AI, industrial solutions to give Australian healthcare consumers' confidence about AI, how AI can help in the economic growth of Australian healthcare, and how Australian healthcare can build up the opportunity to develop AI for its own economic growth (Dekkers, 2014).

5. Research results and key findings

AI is viewed as a noteworthy resource for improving the Australian healthcare economy. Australian healthcare needs to comprehensively fit the move for AI, since it has the potential and it simultaneously cannot be forgotten. Australian healthcare has propelled a few activities to advance AI activity.

This section has valued some basic key findings which are explained in the following sections.

5.1. The fields of AI applications in Australian healthcare

5.1.1. Client Insights

AI can gain from the information, foresee fate conditions and follow-up on the produced bits of knowledge. With the union of AI and data analytics/business intelligence, AI empowers human services organisations to more readily connect with the clients.

5.1.2. Robotised data and document management

Daily activities create a colossal measure of information and documentation that can expand the measure of time human services experts spend on managerial undertakings. AI can oversee information and archives precisely and appropriately allowing for human services experts to concentrate on esteem undertakings and patients (Durant, Lobo, Hammelman & Levin, 2016).

5.1.3. Patients diagnosis

With advancements, for example, Google Cloud Intelligence Video, AI will also have the option to help HCPs in therapeutic picture investigation, perceiving for instance malignancy through an X-Ray. Among numerous different ways, Electronic Health Records is another way AI could help with the analysis of patients (Petryni, 2016).

5.1.4. Medicines effectiveness

Companies are taking a gander at utilising AI to foresee how singular patients are probably going to react to explicit medications. An Australian investigation organisation, Max Kelsen, in a joint effort with organisations, like GenomiQa, utilised AI and genome information to anticipate the adequacy of malignant growth medicines (Harry, 2017).

5.1.5. Medication discovery

AI looks at driving and quickening new logical disclosures. On December 2019, a Google organisation called Deep Mind in Australia reported their capacity to utilise AI to produce 3D states of proteins dependent on their hereditary arrangement. Protein collapsing is key in getting illnesses and medications and has been a significant test for mainstream researchers as it tends to be exorbitant and tedious. What that model methods for analysts is that AI could empower them to be progressively proficient in the medication disclosure process (James & Kevin, 2019).

5.1.6. Human augmentation

AI can be utilised to increase human abilities. This field opens a wide scope of rather cutting-edge applications at the individual level, yet additionally hierarchical level, where the market could see a split between AI-empowered organisations and the others. Advances in AI are changing the human services industry and patient consideration. Nonetheless, past the innovation development, there are yet numerous difficulties to defeat before we can completely use the capability of AI – Ethics being one of the most basic (Durant et al., 2016).

5.2. Artificial intelligence: a joint narrative on potential use in healthcare

- AI is a joint account on the potential use in paediatric stem and invulnerable cell treatments and regenerative medication (Irena & Jerard, 2018).
- AI mirrors the insight shown by machines and programming.
- It is a profoundly attractive scholastic field of numerous present fields of studies (Petryni, 2016).
- The focal objectives of AI examined are thinking, information, arranging, learning, common language preparing (correspondence), discernment and the capacity to move and control objects (James & Kevin, 2019).
- The multidisciplinary AI field is interdisciplinary, covering various quantities of sciences and callings, including software engineering, brain research, etymology, reasoning and neurosciences (James, 2018).
- AI has been the subject of huge good faith; however, it has additionally endured dazzling difficulties (James & Kevin, 2019).
- Emphasis is put on the acknowledgement and utilisation of AI procedures in the advancement of prescient models for customised medicines with built undifferentiated organisms, insusceptible cells and recovered tissues in grown-ups and youngsters (James & Kevin, 2019).
- These keen machines can analyse the entire genome and separate the resistant particularities of individual patient's sickness in only minutes and make the treatment that is altered to patient's hereditary explicitness and insusceptible framework capacity.
- AI strategies could be utilised for improvement of clinical preliminaries of creative immature microorganism and quality treatments in paediatric patients by exact arrangement of medicines, foreseeing clinical results, streamlining enrolment and maintenance of patients, gaining from input information and applying to new information, in this manner bringing down their unpredictability and expenses (James & Kevin, 2019).
- AI began to upset a few territories in medicine from the structure of proof-based treatment plans to the usage of ongoing logical advancements (James, 2018).
- There is developing familiarity with AI abilities and enthusiasm for applying algorithmic, computational and measurable models to produce life-sparing biomedical research results. Presently, there are huge quantities of progressing ventures concerning the AI usage in numerous zones of science, pharmaceutical and medicinal services (Petryni, 2016).

5.3. Artificial intelligence project

- To structure tolerant physical attributes dependent on DNA and to couple the total genomes with full body examinations and nitty-gritty restorative registration (James, 2018).
- To look at genomic information of thousands of patients in the worldwide system of medical clinics and to make customised findings and treatments (James & Kevin, 2019).
- To precisely characterise the applicable practical status of qualities engaged with bosom malignancy, and as a result to forecast and precisely stratify patients into responders and non-responders.
- To map the contrasts among sound and infection-inviting situations (James, 2018).
- To keep up the consistency of information in the consistently developing rundown of records by forming them in squares, which are bolted together by cryptogenic instruments.
- To combine square chain innovation with the latest AI advancements to quicken the advancement in biomedical research and well-being (James & Kevin, 2019).
- To guarantee that research facilities and medical clinics meet administrative report necessities at altogether diminished expenses (James & Kevin, 2019).
- To accelerate and make financially savvy pharmaceutical advancements (James, 2018).

- To help the improvement of well-educated clinical preliminaries, joint effort between AI experts and clinicians is required to enable subjective speculations to take on a quantitative measurement (James & Kevin, 2019).
- A potential answer for every potential downside can be determined utilising AI, mechanisation and automated gadgets (James, 2018).
- AI has become a significant region of research in basically all fields. A portion of the significant uses of AI in tissue building and regenerative medication field, including the utilisation of computational models dependent on neural systems for complex tissue designing applications and the forecast of tissue building results, the utilisation of the robot-based quick prototyping framework for platform creation, particularly in musculoskeletal applications and the robotised cell handling automated frameworks (Petryni, 2016).
- It is normal that AI robotisation went with utilising mechanical technology can reform the ordinary tissue designing and regenerative medication treatments, bringing new trust in patients.
- AI is science engaged with having PCs assembled and data assessed whether that data are put away or is accumulated continuously, or blends thereof – and to settle on choices dependent on that data towards some pre-decided result or goals (Petryni, 2016).
- Each choice made prompts an encounter which is chronicled and added to the data that are put away to assist settle on with bettering choices later on.
- AI is crawling into individual and expert lives step-by-step, yet it is powerful (Petryni, 2016).
- Man-made consciousness (AI) can possibly expand our prosperity; lift our economy; improve society by, for example, making it increasingly comprehensive; and help the earth by utilising the planet’s assets even more economically.

6. Conclusion and Recommendation

AI has an unbelievable potential in a few territories of medicine, particularly in successful conveyance of invulnerable and regenerative treatments. Progressing research on AI strategies is now improving and supplementing numerous territories, from diagnostics to structuring treatment plans and human services. The up and coming age of AI advancements would additionally quicken the advancement in biomedical and pharmaceutical research and in human services. There is convincing proof that AI could assume an indispensable job helping clinicians convey their administrations productively in the 21st century. However, it is normal that AI would reform medicine and human services, just when accessible to the normal standard clients. In the interim, today what is the most energising is a move past AI systems (apparatuses to free-up specialists’ audit of tedious information) towards profound learning approaches that make new and obscure associations between the information. Who will win this new information race is not simply dictated by how a lot of cash is spent, but how successfully and conjointly analysts, clinicians and different organisations will send these new information mining instruments to their cooperative undertakings. Such community techniques may likewise conquer the issue of scholarly properties.

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