

# Chapter 6

## Artificial Intelligence and Reliability Metrics in Medical Image Analysis

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### **ABSTRACT**

*Artificial intelligence (AI) in medical imaging is one of the most innovative healthcare applications. The work is mainly concentrated on certain regions of the human body that include neuroradiology, cardiovascular, abdomen, lung/thorax, breast, musculoskeletal injuries, etc. A perspective skill could be obtained from the increased amount of data and a range of possible options could be obtained from the AI though they are difficult to detect with the human eye. Experts, who occupy as a spearhead in the field of medicine in the digital era, could gather the information of the AI into healthcare. But the field of radiology includes many considerations such as diagnostic communication, medical judgment, policymaking, quality assurance, considering patient desire and values, etc. Through AI, doctors could easily gain the multidisciplinary clinical platform with more efficiency and execute the value-added task.*

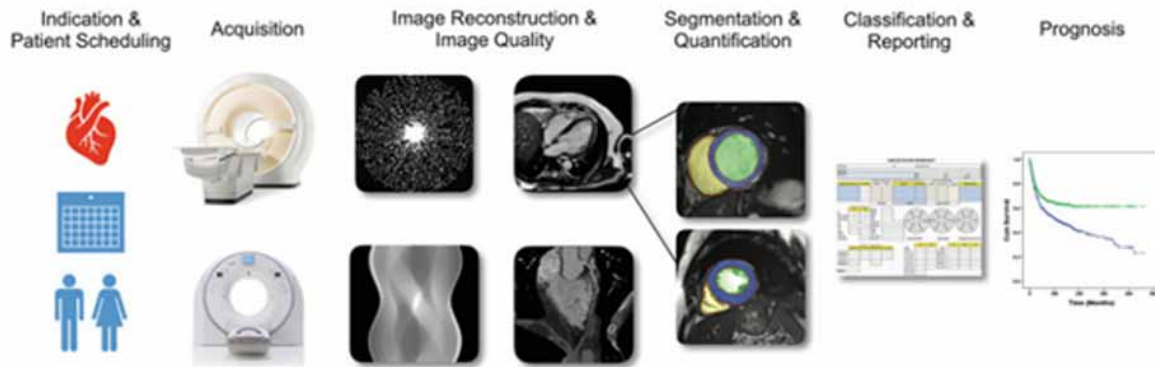
### **INTRODUCTION**

AI plays a vital role in the field of medical imaging systems that deal with the interpretation, image processing, data mining, data storage, diagnosis, image acquisition and many more applications. Several techniques are involved in the field of AI, which refers to the field of computer science that makes the system to perform the task without the necessity of human intelligence by the integration of several technologies. A sub-branch of AI is said to be the Machine Learning (ML) technology, which involves the system to learn from the occurred data that does not need any explicit programming applied in the field of imaging. An example of AI stages undergone throughout the entire medical imaging system is shown in figure1.

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Figure 1. Stages underwent through the medical imaging process through Artificial Intelligence



Certain industries should learn from certain platforms that follow their rule in order to maintain their person's safety (e.g. Aviation). Therefore, continuous improvements should be met by the organizations, which are found to be the key for maintaining the reliability in healthcare. This roadmap is followed and being experimented with the Stanford University Hospital, Thedacare and Stanford Children's. This manages and leads several ways by applying several principles and tools, which were operated in the field of healthcare manufacturing process. This relies on dealing with everyday problem by relying the development of frontline staff and then the frontline worker gets connected with their purpose of the organization(Sharma et al. 2018).

Highly reliable playbook had been designed as a principle that becomes an outcome for the field of Indian health care organizations with the quality and the cost problems in the clinic and in the hospitals. At last, the cost effective with the safest system could be the result for every person. The question arises whether the health care system could be more reliable than the airline industry? In recent years, stakeholders, payers, providers and healthcare consumers have demanded better business outcomes and patients care by achieving better reliable performances and organization status. This industry should catch with other consumer-based industries and invest with several efforts and resources that could maintain a solid track to get operated with the reliable organization model to enhance the patient's care outcomes and business result performance as shown in table 1.

For the practical application, deep learning methodologies are not gullible for the practical platforms but theoretically, they have higher performance criteria of the simple machine learning networks. Computer-Aided Diagnosis and detection (CAD) are found to be very familiar among the radiologists from the year 1960 that could be used in the examination of chest x-ray and mammography applications. At a higher-end level with superior decision making and functionality, AI could be used at a wide range to make effective usage of the computational resources. An overview of AI, ML and DL are shown in figure 2. This chapter provides a basic use case for artificial intelligence in the imaging world, and how can AI tools amend workflows to advance the detection and diagnosis of potentially fatal conditions?

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