The Use of Artificial Intelligence in Healthcare in Medical Image Processing

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Abstract:

AI or Artificial Intelligence has been a significant tool used in the organisational backgrounds for an effective improvement in the management methods. The processing of the information and the analysis of the data for the further achievement of heightened efficiency can be performed by AI through its data analytics measures. In the medical field, AI has been integrated for an improvement within the management of the medical services and to note a rise in the levels of customer satisfaction. With the benefits of reasoning and problem solving, AI has been able to initiate a range of benefits for both the consumers and the medical personnel. The main benefits which have been noted in the integration of AI would be integrated into the study. The issues which are noted with the integrated AI usage for the medical sector would also be identified in the study. Medical Image Processing has been seen to integrate 3D image datasets with the medical industry, in terms of Computed Tomography (CT) or Magnetic Resonance Imaging (MRI). The usage of such medical devices have occurred in the diagnosis of the patients, the development of guidance towards medical intervention and an overall increase in the medical efficiency. The study would focus on such different tools, adhered with AI for increased medical improvement.

Keywords:
Artificial Intelligence, AI, Image processing, data analytics, improved decision making, healthcare sector.

1. INTRODUCTION

With the increase in the amount of data within the healthcare sector, the procession of the information proves to be extremely important [1]. The complex information and evidence related to the medical sector can be analysed in an effective manner through the inculcation of AI. A range of companies have been seen to invest with the software of AI and its related branches such as Machine Learning or ML, Cloud Computing or CC, Neural Networks or NN and several others [2]. With the help of AI-assisted diagnostic assessments, the rise in the improvement of the medical sector can be observed [3].
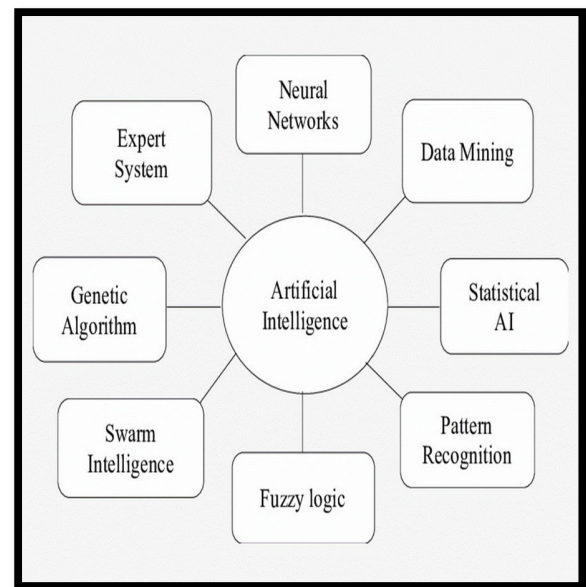

Figure 1: Various branches of AI [3]

Through the improvement within the quality and interpretability of AI, the medical sector has the ability to meet the needs and the demands of the patients and their families, as consumers of the sector [4]. AI has played a crucial part in the construction of clinically meaningful diagnosis with the help of medical image processing, which produces an extensive benefit for the diagnosis of the disorders [5]. Hence, the amalgamation of AI and image processing has been useful for the improvement of the care and customer satisfaction of the medical field.

1.1 Aim

The aim of the study is to lay an extensive examination of the utilisation of AI in the medical field for the process of image processing.

1.2 Objectives

The objectives to be accomplished in the study are as follows:

- To examine the usage of AI in the medical and healthcare sector
- To assess the pros and the cons in the application of AI within the healthcare sector
- To analyse the aspects of Medical Image Processing
- To scrutinise the utilisation of AI within the improvement of Medical Image Processing in healthcare sector

2. LITERATURE/BACKGROUND SURVEY

Usage of AI in medical field

In the medical field, the application of AI has been fruitful for increasing the efficiency for the interpretation of medical data [6]. The betterment in the health outcomes of the patients and the overall achievement of a heightened patient experiences can be noted with the help of AI in medicine [7]. Hence, for the achievement of a more improved healthcare task, AI integration in the medical process sectors are recorded.

One of the major aspects of AI, to be applied in the medical sector is that of Machine learning. With the help of neural networks and deep learning, the recognition of the diseases and the analysis of the data prediction can be initiated [8]. On the other hand, the accuracy of recognition can be examined with the help of the deep learning methods, where the assessment of the data for finding out the medical patterns can be noted [9].
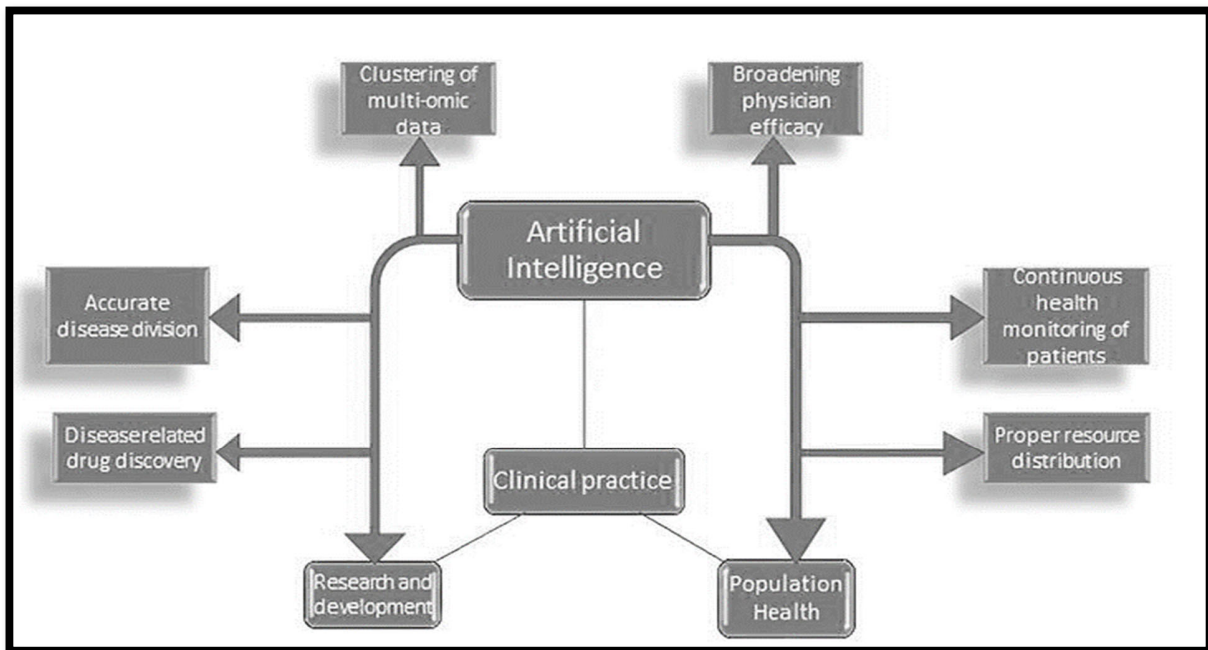

Figure 2: Branching of AI within the healthcare sector [10]

Radiology examinations, cancer detection and image processing can be enabled with the aid of AI [10].

Benefits and issues of AI and data processing in medical field

Natural language processing with the help of AI has been extremely prevalent for assuring an effective arrangement of clinical documentation [11]. For the rise in the effectives of the administrative purposes, Robotic process automation has also been utilised by the medical sectors [12]. Segregation of the information along with the

division of necessary from unnecessary data can be enabled with the help of Robotic process automation [13].
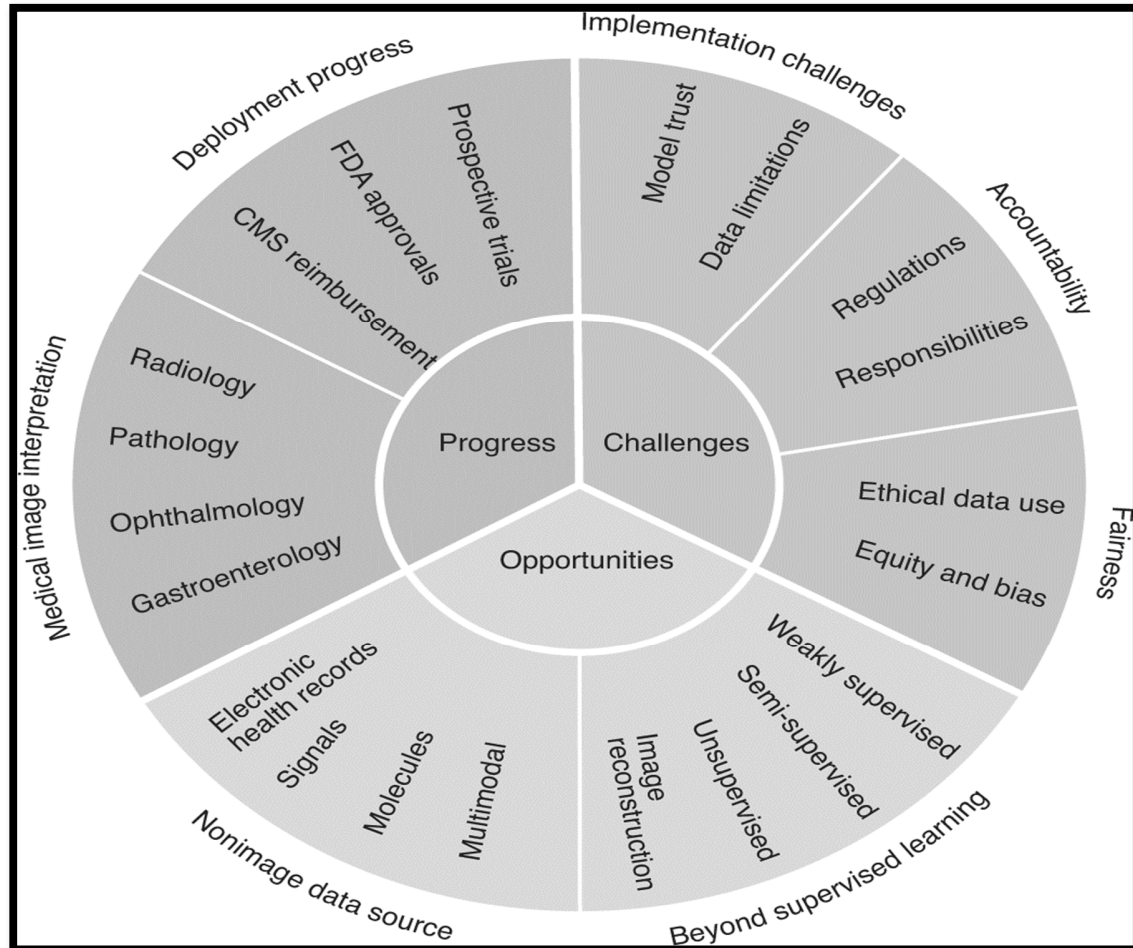

Figure 3: Pros and cons, along with opportunities of AI in the healthcare sector [14]

However, the issues which are identified with the AI application is the need of experts and skilled IT workers for the application of AI [14]. Along with such, the

advancement of the technologies for increasing the overall potential of the AI tools is also needed [15].

interventions and improved decision making can be performed by the doctors and the medical assistants [18].

3. METHODOLOGY

Understanding the anatomy of the patients with the help of image processing can be achieved through the incorporation of tools and devices [16]. The techniques have the potential for being drastically improved through the investment into AI [17]. In such an aspect, the medical
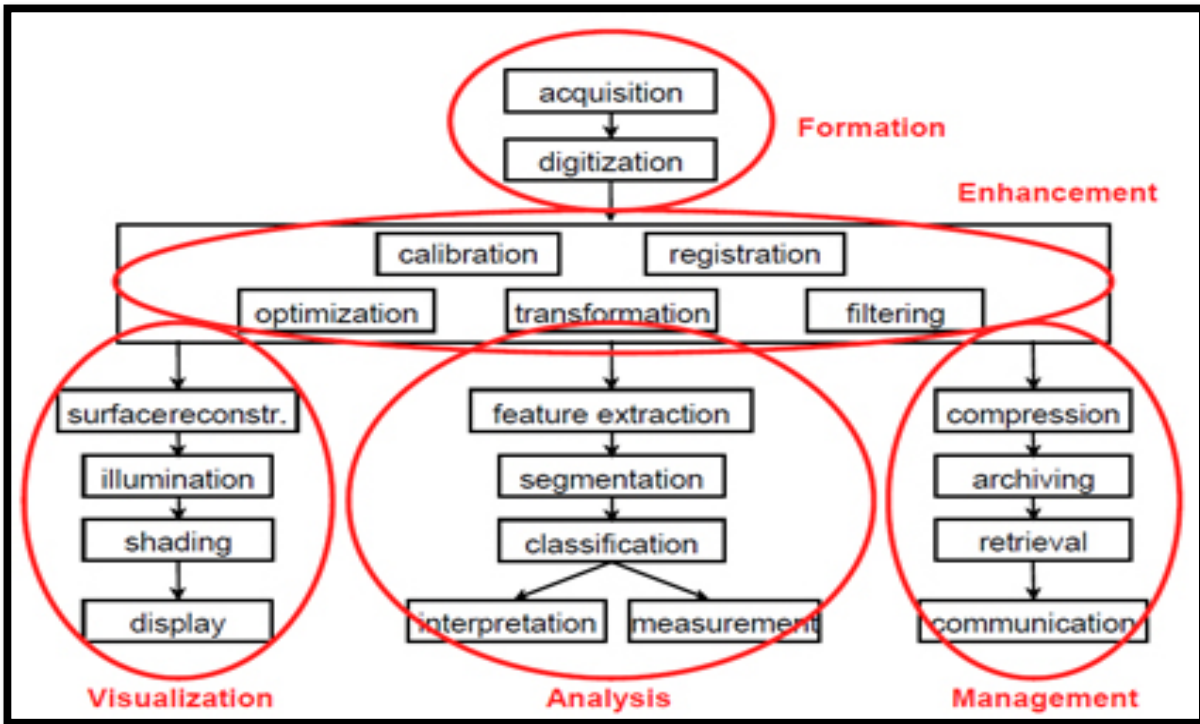
Figure 4: Processing of data and information in AI enabled medical scans [17]

With the creation of simulation models, the further improvement towards medical planning and the generation of the course of medical history can be easily identified by the doctors [19]. Such an aspect tends to be extremely important for handling the forthcoming satisfaction levels of the patients from the medical sector.

Concept of Medical Image Processing

Medical Image Processing consists of the applied 3D image datasets for the examination of the data [20]. Two of the most important image processing tools are CT and MRI [21].
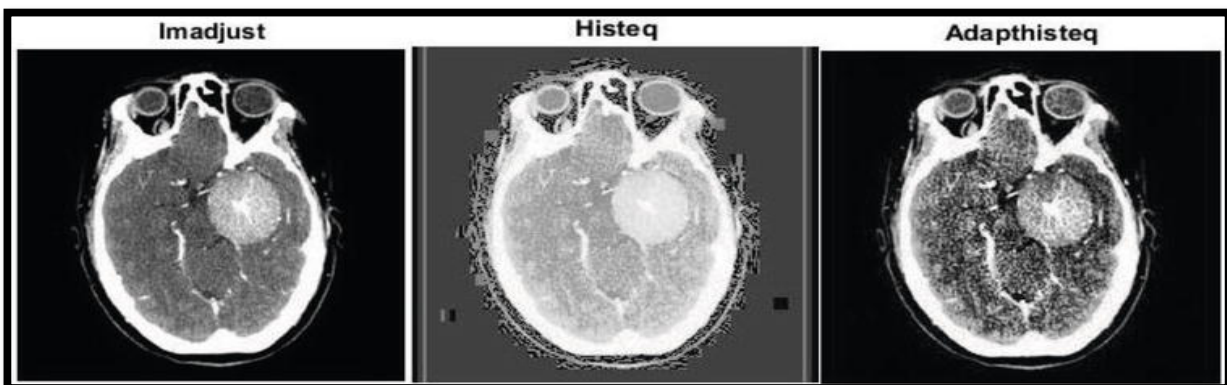
4. RESULTS/FINDINGS

Figure 5: Three kinds of image processing techniques implemented on the scan [22]

With the removal of the unwanted noise from the images using filters, the doctors and the medical personnel have the ability to assess the condition of the patient [22].

On the other hand, the automated techniques such as the AI enabled systems have the capacity to determine the traits and the algorithms for the overall improvement of the working process [23]. With the aid of such measures, the exporting of the data via the processed models can be ensured for achieving the results [24].

Application of AI in Medical Image Processing

In the case of medical imaging, the usage of AI has been beneficial as it helps in the collection and interpretation of data in an automated manner [25]. Disease detection from an early stage can be easily assumed with the aid of data and evidence present in the database of the AI systems [26].
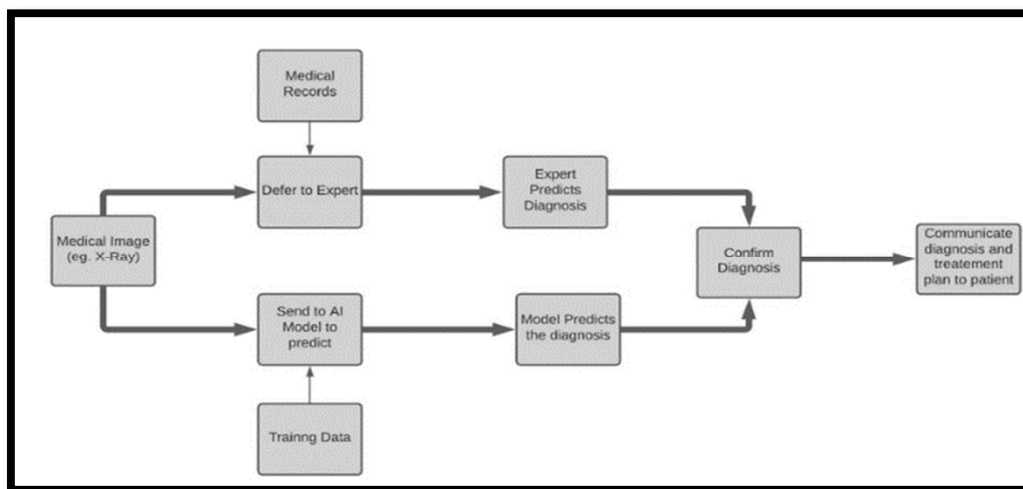

Figure 6: Flow of data for AI enabled image processing [22]

On the other hand, the decision making process for the doctors are greatly improved due to the assessment of the previsions set of information [27]. Majorly used in the

5. DISCUSSION

AI has been seen to bear the capacity to see an improvement with the effective management of the

various tools such as X-ray, PET and USGs, AI enabled medical processing allows effective identification of the radiographic characteristics and disease identification [28].

medical sector [29]. The usage of radiotherapy for the early detection and treatment of the patients have been greatly developed with the applied AI measures within the scanning processes [30].
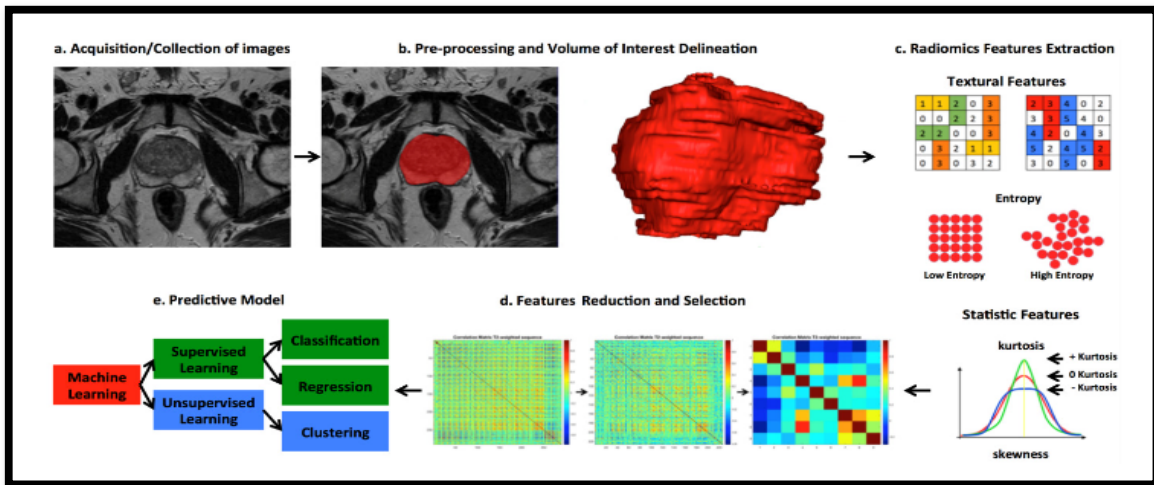
Figure 7: AI enabled molecular processing or image [31]

There has also been a rise in the efficiency of chemotherapy measures with the help of the pre-contained information from the data server of the AI clouds [31]. On the other hand, biochemical recurrences can also be studied from the presented information of the medical imaging, with the help of the inculcated AI [32].

6. CONCLUSION

Hence, the study focused on the application of AI in the medical sector. The growth in the efficiency of the workforce through the usage of AI in the medical image processing methods have been examined in the study. On the other hand, the pros and the cons regarding the integration of AI in the healthcare sector have been stated. The improvement in the decision making process for care giving by the medical professionals have also been integrated within the study.

7. FUTURE RESEARCH

In the future aspect of the research, the further improvement in the working affectivity of AI needs to be worked on. The development of strategies and innovations for raising the efficiency of the workers through the application of AI enabled medical image processing needs to be considered by the firms. On the other hand, the establishment of a strong workforce who are skilled enough to handle the different working aspects of the AI aspects in scanning and medical techniques needs to be

recruited. In such a manner, the medical firms would see a growth in their levels of patient satisfaction.

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