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Review Article

Future of Medicine and Artificial Intelligence

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ABSTRACT

Artificial Intelligence (AI) has been investigated in multiple fields. Advanced new processors with significant processing speeds have allowed researchers develop algorithms that allow deep analysis (Deep learning) by the machines. Today all industries have started to use AI in their collective functions. Medicine is one field that we are starting to see application of AI being investigated in either administrative, diagnostic, treatment tasks and assisted living. The understanding of potential uses of AI in medicine and over view of how it may help medical practitioners apply AI will be discussed in this article.

Keywords: Medicine; Artificial Intelligence; Machine Thinking

REVIEW

Artificial Intelligence history dates back to 1950s. Alan Turning[1] question of "can machines think?" was topic of fascination at the time. It wasn't until the Dartmouth Conference of 1956 when a computer scientist adopted the term "Artificial Intelligence". However, the technology was not capable of such tasks and AI progress was halted until 1990s when computers were starting to become more advanced. By mid 2000s the medical information starts to get more digitalized with the foot steps necessary for AI. In late 2018, the technology finally had caught out with the task at hand. The invent of faster processors started the evolution of "Machine Thinking". The ability to create neuron like connection up to 10 layers has allowed Deep learning and improvement in machine learning over array of fields from manufacturing, auto industry, food industry, military, medicine and more. All these industries are currently working on AI to advance their fields. Multiple companies such as IBM Watson and Google Deep mind are being used to manage health care related functions. IBM Watson is being investigated in cancer and diabetes care and new drug research while Google deep being evaluated for diagnostic imaging and patient care functions.[2,3]

The applications of AI in medicine are far reaching. The use of AI in administrative functions to improve patient access can allow better management of patients' needs and reduce staff inefficiencies. The ability of new electronic medical records is improving the access to digital data in various medical functions and capacities. New laws requiring digital documentation of patient's admissions, disease, laboratory results, and treatment outcomes allow Artificial intelligence functions to gradually improve. This integration however involved multitude of integrated tasks combined with clinicians and administrators. Gathering of data across networks and

different administrative applications and integrating all into a cohesive data is an enormous task that will have to be organized for AI integration.[4,5] The AI is truly based on data analysis. The more data available for a specific task, the more accurate the analysis for use in particular function. This is no different in medicine. Multiple studies are focused on application of AI in fields of radiology, pathology and anesthesia. Article in New England Journal of Medicine[6] reported that AI will eventually displace much of the work of radiologist and pathologist. These functions require a vast data to analyze. Each particular diagnosis requires data from the same diagnosis and patterns in order for the computer to generate an algorithm that is looking at specific patterns and discern specific diagnosis. So far certain diagnosis such as detection of lung cancer and breast cancer are being heavily investigated. Arasu et al[7] looked at 13628 patients that were screened for breast cancer following the Breast Cancer Surveillance Consortium (BCSC). All five models of AI algorithms performed better than BCSC over the whole 5 years and more cancer was detected by AI. Other studies have looked at ability of AI to detect breast Cancer.[8] These studies have shown that computer models at times are more efficient than radiologist in detection of certain small cancers. The patterns are analyzed on Xray and compared to existing data to guide clinicians in detection of such cancers. Liu et al[9] looked at diagnosis of lung cancer which is mainly relies on manual section analysis of pathology specimens. In this study, AI assisted diagnostic computer tomography was able to determine lung cancer diagnosis more accurately and assist early detection by the clinician. Early detection had a significant value for patient prognosis exemplifying the assistance aspect of AI in clinician's armamentarium. Ardila et al[10] in May 2019 reported that the ability of computer algorithms to detect 5% more lung cancer among 42000 patients. The probability of false positives was reduced by 11%. AI functions based on analysis of data fed into learning algorithms. These algorithms analyze the patterns of anomalies and compare the patient's data whether in radiology and anatomic pathology to the data available from multiple patients and predict possibility of certain diagnosis. The potential of computer analysis to predict standard diagnosis has shown promise. However, one diagnosis in sea of multiple possibilities limits the potential of AI at present time. Each diagnosis requires enough previous data to be a better predictor of the result and therefore significant time is necessary to accommodate such data.

Another great potential for AI is patient access to health care in remote areas. The integration of these systems may allow health care providers access to underserved areas. The ability of AI to provide access by medical professional and existence of telehealth technology assists the possibility of care in remote areas. In future however, with new emerging technologies such as robotic surgery, some procedures may also be feasible remotely with practitioners located in other locations and still be able to provide care remotely in inaccessible areas. It worth mentioning that it is important to pursue AI carefully to ensure proper integration without compromising patient care.

The potential of AI is limit less but more data and computer analytic power and algorithms is necessary to achieve such goals. The continuous addition of digital data and advent of more powerful and faster computer chips will eventually provide enough data and processing power for AI to become significantly powerful. It is possible that at some point in future to delegate medical functions, physician task or administrative functions to AI. It is important to mention the importance of infrastructure to supervise and be responsible for its actions and integration of policies that manage the interface between AI and health care. This integration has to be planned carefully to ensure patient safety. The ability of AI to provide health care access cannot be overstated.

CONCLUSION

The pace of development of AI versus human intelligence starting to cross. In early stages of AI, human intelligence was necessary to augment AI performance. Today, we are noticing the AI performance for narrow tasks are matching or exceeding human abilities. It is more and more obvious that at certain point in near future with development of the deep learning, AI will exceed human function of specific tasks. It should be mentioned that countries around the world are concerned about future AI capabilities and attempting to have a control over the risks associated with autonomous machines. It is essential for some regulations to prevent possible risks with AI and autonomous systems. However, AI is here to stay and clinicians and administrators need to adapt to on coming changes and use AI to better provide care for the patients as a whole.

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