

Compassionate Machines in Healthcare: Challenge to Intertwine AI and EI

Anupama Sihag

*Assistant Professor, Department of Psychology,
G.M.N. College, Ambala Cantt.*

ABSTRACT

Artificial Intelligence and cognitive psychology are closely associated with the fact that artificial intelligence processes information in the similar manner as human cognition. Artificial Intelligence, like human brain enables the robots or machines to handle tasks of learning and problem solving through the architect of neural network via computer algorithm. The domain of modern artificial intelligence is trying to inculcate the role of emotions in machines or robots giving way to emotional intelligence in robots. Efforts from the fields of neuroscience, mathematics, psychology and computers can support in the development of machines having components of emotions and empathy. In healthcare systems, it is important for the robots to understand the emotions in sensitive areas like childcare, old age care and ICUs and deal with them in a compassionate manner. Healthcare is a place of pain, grief, and sufferings, where anger is inevitable especially during bereavement at loss of life. Robots used in healthcare are expected to be skilled in identifying such emotions for serving the patients and their attendants in an efficient manner. Moreover, prognosis and treatment of patients suffering from mental illnesses can also be made possible. Telehealth and remote monitoring are other areas of healthcare where the role of emotional artificial intelligence can simplify the work with higher efficiency and accuracy. There is a need to identify the psychological barriers towards the analysis of emotions in machine learning. This can be done through the quality data sets or algorithms and ways of supervised learning. Reinforcement learning and transfer learning can have its own role towards the achievement of this goal. In order to simplify the healthcare experience, incorporation of emotional intelligence (EI) in artificial intelligence (AI) has been considered on a strategic priority at global level.

KEYWORDS: Artificial intelligence, emotional intelligence, human cognition, healthcare, mental illnesses.

INTRODUCTION

Globally, organizations and industries are making breakthrough innovations and advancements in the field of artificial intelligence. As opposed to human intelligence which is natural, artificial intelligence is the intelligence associated with machines. It is something like giving brains to the machines whereby the machines can process information of their own based on the data provided. It has been made possible through the efforts of disciplines like mathematics, computers, psychology and many other related fields that the concept of artificial intelligence has brought technological revolution in 21st century. Initially focus was on step-by-step algorithmic deduction on the basis of how humans solve problems, but later economics and concepts of probability strengthened the accuracy and efficiency in the use of artificial intelligence. Consequently, initiatives like self-driving cars, drones, online gaming like Deep Blue, and assistants like Siri and Alexa have been made possible through the application of artificial intelligence. Neural networks in such machines are similar to neural cells in humans that operate with algorithms. Neural networking and programming depends upon the complexity of the task the machine is expected to perform.

ARTIFICIAL INTELLIGENCE

Artificial Intelligence is associated with machines that can receive information, process that information like human mind, and deliver output by resolving problems that come across while processing the information. This includes the reasoning process as well towards a rational decision making. Artificial intelligence has been perceived as something dangerous for the reasons that it can be programmed to do destructive and devastating tasks especially in case of weapons and wars. The fear and apprehensions about super intelligent machines turning evil is another concern. Though it is important to understand that no machine can turn out to be dangerous unless it is designed so.

The concept of reinforcement learning has widely been used for making better predictions, where short-term and long-term memory contributes in better efficiency. However, the consciousness and thinking with feelings and emotions cannot be achieved through artificial intelligence, and thereby limiting the concept of artificial intelligence to narrow artificial intelligence only. Though scientists have continuously been striving to add the emotional content for creating a more effective machine whereby the machines can be

made self-aware and can outperform humans at emotional tasks as well. The targeted artificial super intelligence systems would be better at rational decision making with due consideration towards the emotional content.

MACHINE LEARNING

As a part of computer science and artificial intelligence, machine learning deals with the ways machines are made to respond the way human respond in domains of thinking and learning. Machine learning uses data of past as the input for predicting the output. Deep learning as the subset of machine learning uses algorithms and data, where human interventions are not required in learning process. Machine learning can be both supervised as well as unsupervised machine learning. It is through supervised learning that the spam folder is created separately from the inbox. Through unsupervised learning, the differences and similarities are identified by machines as in case of pattern recognition or cross comparisons of items for selling and marketing purposes. Semi supervised learning is a mix of both supervised and unsupervised learning. Reinforcement learning is also used to complete a process that has multi-stages, where algorithms are used. Speech recognition, customer service using online chat box, speech to text services, etc. can be done through machine learning.

AFFECT OR EMOTIONAL INTELLIGENCE

Emotions have an enormous impact on the behavior of human beings. one can easily sense the intensions and motives through the understanding of emotions. Emotional understanding of content empowers the human potential over machines. The affective component in computing can pave its way to artificial emotional intelligence, whereby the computers can be strengthened to read and analyze emotions in better decision making. This would facilitate more qualitative interaction between machines and humans. Understanding the tone, gestures, and expressions is related to the emotions of human beings would bring an empathetic concern in machines. Emotional intelligence deals with self-awareness, managing emotions, motivating oneself, empathy and handling relationships (Goleman, 1998). Machines when equipped with such components can facilitate the organizations, especially healthcare with affect content. Emotional intelligence can be a valuable input in artificial intelligence, especially when it comes to customer satisfaction and relationships. A better personalized experience and evaluation of behavior can be generated with the use of emotions.

NEED OF COMPASSIONATE MACHINES IN HEALTHCARE

Artificial Intelligence is going to have a strong impact on the social life and

overall lifestyle of society at large. It is poised to have a transformational impact on the healthcare. It is expected that artificial intelligence can have a beneficial role in the care of patients. In case of neurological diseases, brain computer interfaces can help in restoring speech and movement. Fraudulent behaviors and activities can easily be caught through face recognition techniques. The purpose of Artificial Intelligence is to support human potential in accomplishment of high-level tasks and to achieve targets with efficiency and better outcomes. It is through this technological advancement that reduction in human errors can be made easy and the accessibility to various services can be made 24x7. Robots enabled with Artificial Intelligence are used in various healthcare setups and industries. Machine learning is a learning through experience or their own output, whereas deep learning is a subset of machine learning that uses simulations.

Healthcare has immense tasks and volumes of data that can be difficult to manage through human efforts. A more accurate output can be expected with the use of machines through the development of innovative ways to solve the problems. Moreover, understanding emotions by machines would also facilitate the mental health experts whereby the signs of anxiety and moods can be traced through the use of emotionally intelligent machines. More studies and research work would be made possible with the advent of such machines and transformational technologies, whereby volume of data can be gathered, analyzed and interpreted.

It would be easy for doctors to perform any kind of test and keep a record of the patients through easy ways of analysis and interpretation of test results. Matters of Medi claim can also be handled with ease through narrow artificial intelligence. Tasks that are repetitive in nature can be accomplished through machines in an effective manner, where the staff can focus on emotional content like empathy and communication for better output in healthcare.

Artificial intelligence is a boon to the healthcare where work can be accomplished with more efficiency and quickly than humans. Internet of Medical things is supporting the patients to manage a healthy lifestyle for their well-being. It is through the technological advancement of artificial intelligence that a better feedback, diagnosis and treatment of diseases has been made possible. Accuracy in detection of diseases like cancer and heart diseases in the initial stages has made the diagnosis and treatment easy and treatable (Bush, 2018). Precision in medicine and treatment through artificial intelligence and machine learning has supported the healthcare professionals

in successful treatment (Schmidt-Erfurth, 2018).

Supervised learning, where the data requirement towards the end result or outcome is available has also been a great help in healthcare. Robots are of great help in the field of medicine for matters related to easy as well as complex jobs, especially as surgical robots (Davenport&Glaser, 2002). Neural network models or deep learning have also been used in healthcare, especially in detection of cancer lesions through radiology (Fakoor et al., 2013; Vial et al., 2018). The use of artificial intelligence and machine learning has revolutionized the healthcare system. Surgeries, clinical trials, pain management, drug discovery as well as research has been supported by artificial intelligence. Moreover, training and other administrative applications in healthcare has also been facilitated by the healthcare (Berg, 2018; Commins, 2010).

LIMITATIONS OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE

Artificial intelligence has a vast and endless potential in healthcare system. However, there are some limitations in the use of artificial intelligence in healthcare, especially ethics and relationship between patient and doctor (Aronson& Rehm, 2015). Privacy is of main concern for any organization, and the data is extremely confidential in healthcare. Protection of such data from hackers needs to be ensured as cases of data breach have often been reported.

There is need to have strict rules, regulations and legislations regarding the cyberattacks. Moreover, the response or output of machines is not based on “how and why” factors and thereby sometimes unreliable decisions based on the data input is given. Moreover, emotions or affect domain is still a weakness of machine learning. Despite all these shortcomings, artificial intelligence has been doing remarkably good in case of patient care and administrative processes.

CHALLENGES TO INTERTWINE ARTIFICIAL INTELLIGENCE AND AFFECT

Though machine learning has made the lives easier as the work gets accurately and easily done with higher efficiency, but there are some ethical concerns related to artificial intelligence. There is a fear of job loss with the advent of machine learning. Data privacy and information security has also been an issue considering cyber attacks and hacking. Though there is extreme research and efforts in the field of artificial intelligence but the accountability to unethical means through machine learning has still not been

considered due to lack of significant legislations in the field.

Humans have been efficient workers, but under some emotional turmoil of fear or anger, their work capacity and performance get negatively impacted. Humans need counseling and support of mental health experts in such demanding situations. Machines when equipped with emotional content might also give inappropriate responses under such emotional stress. Such concerns regarding combining artificial and emotional intelligence needs attention while programming the machines with emotional content.

CONCLUSION

Artificial intelligence or machine learning has supported the organizations, especially healthcare with an extraordinary support in quick accomplishment of tasks with higher accuracy and acceptability. Technologies equipped with artificial intelligence help in analyzing the data which is vast and complex in nature (Gillies, Kinahan & Hricak, 2016). Radiology and pathology are two important areas where machine learning has been a tremendous support. The concept of affect and artificial intelligence needs more research and the success of which can be a support for the healthcare in well being and compassionate care of the patients. It is through the artificial intelligence that doctors have been able to invest emotionally with the patients with more empathy when the technical matters could easily be accomplished through machines. Moreover, diagnostic mistakes can also be removed which are there due to errors (Dilsizian & Siegel, 2014; Graber, Franlin & Gordon, 2005; Patel, et al., 2009). Artificial intelligence would surely bring more success and achievements in healthcare.

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