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Editorial

Artificial Intelligence and Medicine

Let me start this editorial with a quiz. Name a living being with minimalized size as compared to the towering elephant or a sky-scraping giraffe or name an animal which is not worthy of even carrying even a fraction of the load bearing ability of an ant but yet the undeniable ruler of the world. The answer might bamboozle some of you for a fraction of a second.....well the answer is HUMAN BEING. Still this species of life is the SUPREMO of all creatures. He is the CREATOR, THE SUSTAINOR AND EVEN THE DESTROYER like the trinity Hindu gods BRAHMA, BISHNU AND MAHESWARA. But how? Only because he has at his disposal a supremely functional grey matter called INTELLIGENCE which he uses with deftness and dexterity to overcome all hurdles of existence and make life as easy as a cake walk for all of his kith and kins. But Life, at all his nooks and corners, has in store for us lots of new challenges and surprises lying in ambush. These, we need to confront with all gumptions. Thus man has been in constant perusal to go beyond his frontiers of achievements and sought new means to be victorious. We are now in the age of Machine Intelligence or Artificial Intelligence (which henceforth in this article will be called by its acronym AI) which has increased the capacity of human decision making manifolds and within a bat of an eyelid.

Now What is AI ?

Isaac Asimov, the revered author of science fiction conceived of an idea of AI and machine learning and introduced it into his fiction way back in 1940.¹ Thereafter that the wing of fantasy slowly began to be analyzed in terms of its practical feasibility and during the mid half of the previous century AI was founded as an academic discipline.

Going by the terminology, the term artificial intelligence (AI) refers to human-alike intelligence demonstrated by a computer, robot, or other machine. In popular terms, artificial intelligence is the ability of a computer or machine to ape the capabilities of the human mind—learning from examples and experience, recognizing objects, understanding and responding to language, making decisions, solving problems—and combining these and other capabilities to perform functions a human might perform, such as greeting a hotel guest or driving a car.

All of the above functions using AI are definitely laudable but the use of AI in medical science to me should attract the maximum kudos as it makes the difference between life and death by early detection of diseases ensures healing before the nemesis. But how are these two distinctly different fields of study correlate and work in harmony? Let us discuss in detail. Medical artificial intelligence (medical AI)

primarily deploys computer techniques to aid clinical diagnoses and suggest treatments. AI has the capacity of detecting meaningful correlation in a dataset and is widely used in oodles of clinical situations to diagnose, treat, and predict the results. The application of AI has tremendous potentials in the following fields²:

- (i) Artificial Intelligence Techniques in Medicine
- (ii) Data Mining and Knowledge Discovery in Medicine
- (iii) Medical Expert Systems
- (iv) Machine Learning-Based Medical Systems
- (v) Medical Signal and Image Processing Techniques

Avila-Garcia et al.³ exhibited the use of a neural network-based multiscale Gaussian matching filter for detection and segmentation on coronary angiogram X-ray images and in the process quickened and perfected the results of image classification.

Cui et al.⁴ exhibited a cascaded neural network composed of a Tumor Localization Network to localize the brain tumor from slices of MRI images and an Intra-Tumor Classification Network to label tumor regions. With advanced technologies being applied it has the potential to generate better and more perfect results. This is a boon for the doctors and the suffering patients.

Fu et al.⁵ demonstrated results of using a Convolutional Neural Network (CNN) to recognize strabismus. Trained by and from the data collected by an eye-movement tracker, and after analyzing a large number of GaDe images, their CNN could recognize successfully strabismus.

Chan et al.⁶ trained a support vector machine to perfectly detect common pneumothorax using the local binary patterns derived from a multiscale intensity texture analysis on the chest X-ray images.

Chen et al.⁷ introduced a clinical decision support system to augur fractures in hip bones and vertebrates engendered by medications for treatments of chronic respiratory diseases. The system uses integrated genetic algorithm and support vector machine trained by balanced datasets acquired from random and cluster-based undersampling methods, parallelly tested with imbalanced datasets.

Yap et al.⁸ demonstrated the use of state-of-the-art computer vision object detection algorithm on Breast Ultrasound (BUS) lesion

localisation to improve the lesion detection by the use of IoU (equivalent to Dice Coefficient Index, which is commonly used in lesion segmentation) as it is more reliable when compared to the detected point.

As rightly said by one, in near future a patient might be visiting a computer before visiting a doctor for detection of diseases. Now let us zero in on a sensitive issue. To err is human and doctors being human can make mistakes or misdiagnose diseases which can be fatal to their patients. In fact, this problem is so severe that "medical mistakes are now estimated to kill up to 440,000 people in U.S. hospitals each year, making preventable errors the third leading cause of death in America behind heart disease and cancer."⁹ Currently, doctors are not given incentives to consult with each other. Patients too burn a hole in their pocket to get a second opinion. One AI application, created by the Human Diagnosis Project (Human Dx), aspires to solve the problem. The app has an interface where physicians can raise a clinical question, their working diagnosis and even upload images and test results of the case they are acting upon. Using the app, the physician can request help from specific colleagues or the wider network of doctors who are empanelled to the Human Dx community. Within a few days, the app's AI consolidates all the responses received into a single report. In this way the app can act with dexterity without the hazards of setting up a formal, expensive, external consultation.

What can be more relevant than the use of AI during the COVID19 pandemic? AI has the potential to improve the planning, treatment and reported outcomes of the COVID-19 patient, being an evidence-based medical tool. AI can easily track the spread of the virus, identifies the high-risk patients, and is effective in controlling this infection in real-time. It can also forecast mortality risk by analyzing the previous data of the patients. AI does this by population screening, medical help, notification, and suggestions about the control of infection.

This article can attain a stupendously huge length if I go on discussing about the advantages of the use of AI in health care sector. To cut it short, let me come back to the note with which I started this article. Man is the greatest creation of nature and He has provided man with the best place (our earth) to live and prosper on. But how can man show his gratitude to Nature? An idiom effectively gives the answer – "WHAT YOU ARE IS A GIFT OF

NATURE BUT WHAT YOU BE IS A GIFT TO NATURE". Intelligence actually is the device which has been gifted by nature to humanity to help him supersede others and infringe into the hitherto unbounded territories of achievements. After honing up his intelligence on the anvil of practical challenges of living on this hostile world man has unleashed his acquired skill to step into the next frontier that is AI OR MACHINE LEARNING. Let us all hope that this application will make the world we live in if not the heaven but close to utopia.

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