

Artificial Intelligence - Healthcare's Nervous System

Submitted by - Sampurna Ganguly and Tulasi Vijaya Kumar IIM Bangalore

Growth opportunities are hard to come by without significant investment, but one major opportunity is a self-running engine for growth in healthcare – Artificial Intelligence.

Artificial Intelligence is Healthcare's new Nervous System. AI applications can potentially create \$150 billion in annual savings for the United States healthcare economy by 2026¹. AI in health represents a collection of multiple technologies enabling machines to sense, comprehend, act and learn, so they can perform administrative and clinical healthcare functions. Unlike legacy technologies that are only algorithms/tools that complement a human, health AI today can truly augment human activity in taking over tasks that range from medical imaging to risk analysis to diagnosing health conditions.

Artificial Intelligence taking over tasks with human intervention

Many roles which were not possible without human intervention are now quickly getting embraced by AI and the prominent uses of AI in Healthcare industry stand as follows:

Robot Assisted Surgery – Cognitive robots can integrate the information from pre-medical records with real time operating metrics to physically guide the surgeons' instrument precision for operations of complex anatomy. Before the surgery, the patient's medical records are loaded to AI system so that the AI system can indicate the focused location of surgery². This kind of precision and accuracy can help in paced healing of patient reducing the length of stay in hospital.

Virtual Nursing Assistants and continuous patient monitoring— These virtual assistants keep a tab on patient's health condition, remotely assess patient's symptoms and deliver alerts to physicians reducing the unnecessary visits to hospital and reduce the burden of nursing assistants so that they can focus on patient treatment and recommendations to doctor.

Preliminary Diagnosis and Automated Image Diagnosis – Doctors are spending at least 17-23% of their productive time in preliminary diagnosis and image diagnosis such as CT scan, X-Ray, etc³. These images taken by medical apparatus can be, instead, analyzed by self-learning AI systems – with the precision of diagnosis improving with repeated usage of the AI systems (owing to referencing huge amounts of data from previous usages for decision making). Disruptive technologies like IBM Watson Health have become frontiers in fields like Oncology by achieving unparalleled accuracy in detection of terminal diseases like Cancer and timely advocating the doctor.

Administrative Workflow Assistance – Administrative assistants such as voice-to-text transcription can eliminate non-patient care activities such as writing chart notes, prescriptions and ordering tests, thus resulting in considerable time saving⁴, thereby increasing efficiency & productivity by increasing the number of patients treated in the same time period.

Healthcare Fraud Detection using Predictive Analytics – Fraudulent billing and medi-claims are dealt with investigation in traditional methods which is laborious and time consuming, thereby making it difficult⁵. With predictive analytics and AI in Healthcare, potentially fraudulent patterns of claims are identified and flagged for

further investigation. This reduces the amount spent by governments and insurance companies on fraudulent healthcare practices.

Dosage Error Reduction – AI machines work with precision in providing medical dosage to the patients reducing the cases of medical error and human negligence.

Clinical Trial Participant Identifier – Every new drug or medical device must pass clinical trials before it can go to market. Yet, more than 80% of trials fail to meet enrollment timelines, and nearly 50% of sites enroll one or no patients. Finding and matching patients to trials is a slow, manual process requiring extensive outreach efforts and in-depth review of medical records by trained clinical staff. Since 90% of the data contained in medical records is unstructured or free-form text ⁶(e.g. doctors' notes, pathology reports, operating notes), such reviews cannot easily be automated by current tools. Artificial Intelligence (AI), natural language processing (NLP) and data analytics applied on clinical data to match patients against clinical trial eligibility criteria is emerging.

Emerging Workplace Practices with AI in healthcare

With AI taking over some of the tasks in healthcare, the following workplace practices will become predominant:

Elimination of repetitive and non-productive tasks by indulging AI – Most of the repetitive and non-productive tasks like billing, insurance processing, patient monitoring, providing medication to patients at regular intervals, etc. will be replaced by the intelligent AI systems which can perform a plethora of activities : administering proper dosage medication by IoT connected devices, continuous updates to doctors & nurses, intervening in the treatment at early stage by processing medical records and assisting doctors in decision making – to name but a few.

Healthier and productive workplace due to reduced work burden – Healthcare workforce is burdened by over work due to lack of trained healthcare professionals in remote areas. With many of the assisting tasks being taken up reliably by the AI systems, the healthcare professionals can do what they are best at, thus improving the employee satisfaction, morale & productivity.

Deploying AI in healthcare specializations like radiology which experience scarcity of healthcare experts– Service gap is ever increasing due to scarcity of healthcare professionals, but with AI integrated in healthcare, the service gap is reduced and access to healthcare becomes possible with doctors able to attend to more cases⁷.

Utilization of AI in early intervention of disease and diagnosis – Late diagnosis of ailments make the process of treatment cumbersome for the doctors and cure difficult – thus creating a lot of mental trauma & depression in afflicted patients and their families. However, with AI processing, unorganized datasets can be analysed on a regular basis, and potential risk factors can be flagged early on in the process, such that even before a patient is aware of any malfunction in her/his system, the AI systems capture the risk potential and provide advice for handling the same. This system would also assist in delivering insights/warnings to patients in rural areas (provided their data is available in the AI system's database), who most often do not have the financial means to visit hospitals for regular check-ups⁸.

Skilling of employees and empowering them technically – Most of the minimal skilled workforce gets an opportunity to up-skill themselves in this digital era to adapt themselves to ever changing medical practices

Telepathy and fostering cooperation among healthcare professionals to promote rural practicing by doctors – Health care organizations in most cases, do not think of expanding to rural areas due to lack of infrastructure and timely availability of advice expertise to treat their patients well. Telepathy technology in AI, where a human brain can be linked with a computer can aid in analyzing data and providing diagnosis⁹. This technology gives an opportunity to doctors willing to work in rural areas, opportunities to interact for expert advice, validate their understanding and utilizing the better technology to provide accelerated and efficient healthcare solutions to the rural community.

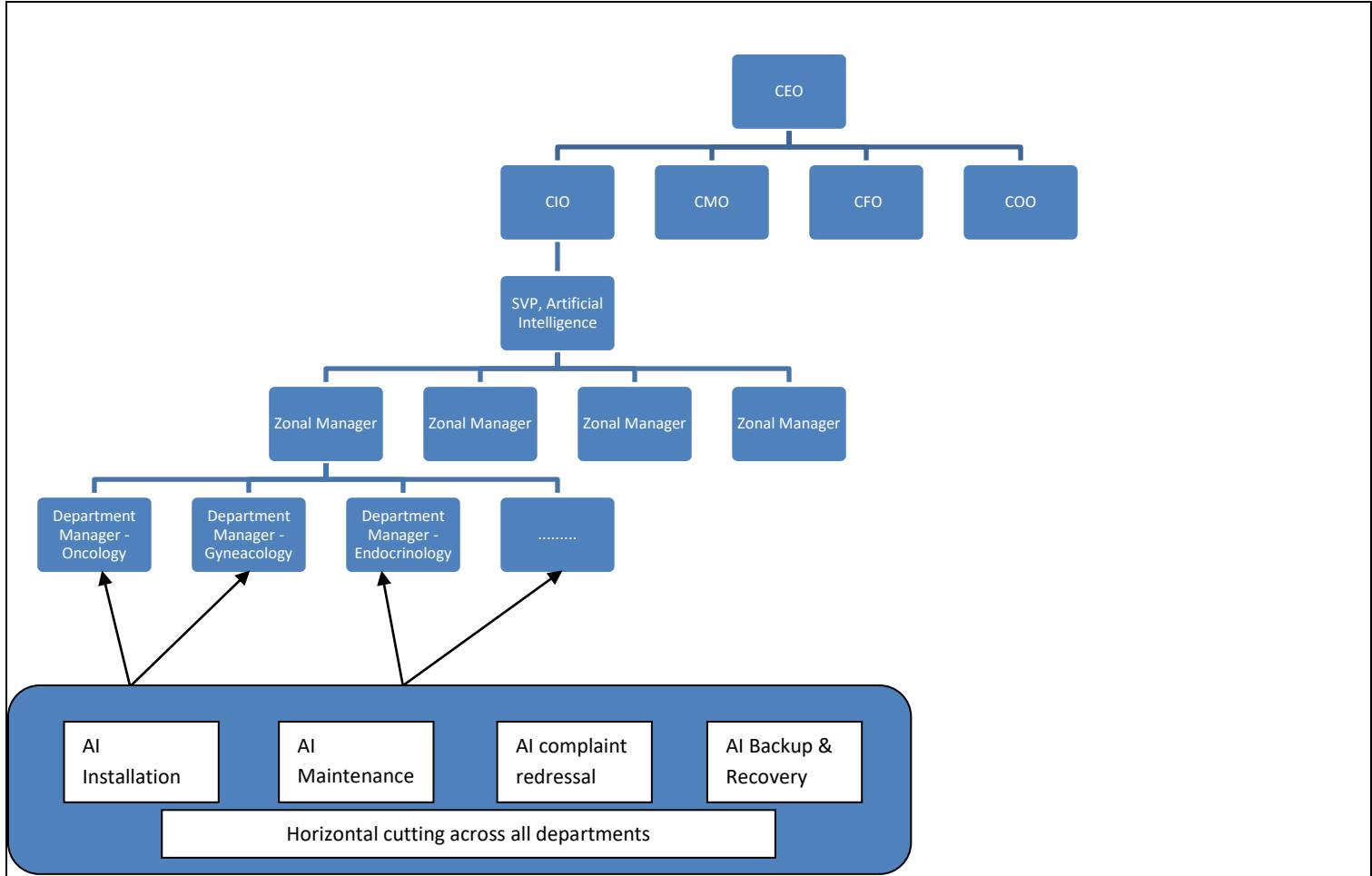
Re-skilling and Organization Redesign in Healthcare with AI

Healthcare is an industry with consistent lack of enough skilled professionals. In industries like IT, for example, AI has the potential to replace human intervention in many sectors. In healthcare however, AI can be employed as a facilitator- something that assists the workforce in this sector (doctors, nurses, medical representatives, academicians, etc), rather than taking away jobs.

It must be remembered that in the healthcare sector AI cannot replace human intervention. The final call of what treatment needs to be administered will still rest with the medical practitioners. Thus in contrast to other industries, healthcare is much less susceptible to job loss as an aftermath of the advent of AI.

However, having said that, in order to adopt AI and integrate it seamlessly in the day to day workings of a hospital, a primary health center, etc., significant training of employees is required. They need to become extremely proficient with the AI systems, in order to reap the benefits of its adoption. The employees need to be provided thorough training to educate them on the implications of proper usage and the ramifications of improper usage on the organizations, employees, patients & other stakeholders¹⁰. In most healthcare segments, employees are not well versed with technology. Training them and making them proficient in technology adoption is the first step towards re-skilling. The entire point of re-skilling is to re-allocate human resources to tasks that are less repetitive and require more human expertise¹³.

The organization redesign should contain a specialized department which handles AI training, installing, AI contingency planning etc.



Artificial Intelligence – Pain points in Healthcare

Artificial Intelligence is challenging to implement in two aspects:

Availability of datasets – Curated data that is digitally captured is required to train the AI systems. The efficiency of AI systems depends on quality of data that is fitting to the context of medical problems ¹¹. This is essential in deciding where AI is to be introduced so that the relevance and availability of digital data in healthcare is leveraged to the greatest extent. Hence, separating meaningful data from junk data and centralizing all the data in a common repository are the biggest challenges.

Accountability of AI systems in case of medical negligence and lack of governing policies – As of now AI systems are primarily used in assisting doctors in proving better healthcare solutions. So the doctor is still responsible for the medical negligence cases ¹². However, once AI takes over the critical aspects such as complex surgeries, the question of accountability in case of machine failure needs to be delved into with potential government policy interventions.

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