Artificial intelligence in healthcare

Introduction

Assume that you have been appointed to a task force of 5 or 6 computing professionals within your organization. You have been asked to examine the current issue outlined in the article below. Your team has not been asked to make specific recommendations to solve the problem. Rather, you have been asked to make recommendations that will help the Government decide what next steps they should take.

Prompts

1. What is/are the problem/problems here? Is there an underlying fundamental problem?
2. Who are the major stakeholders and what are their perspectives?
3. What are the major ethical, legal, and security aspects associated with the problem?
4. What are the intended and unintended consequences of existing computing solutions? Consider the consequences on individuals, organizations and society within local and global contexts.
5. What recommendations do you propose that may lead to potential solutions?

Namita Pradhan, 24, sits in front of a computer in the city of Bhubaneswar in India, a city known for its ancient temples. Cows and dogs roam the streets outside and vendors shout out what they're selling while Namita watches colonoscopy videos. She looks for pre-cancerous polyps. When she spots one, she draws a digital circle around it. Glenda Hernandez, in New Orleans, USA, spends her days listening to audio recordings of people coughing. Her job is to differentiate between good coughs and bad ones. Namita, Glenda and thousands of others around the world are involved in training artificial intelligence (AI) systems that can do the work of a doctor.

AI systems can diagnose skin cancer like dermatologists, seizures like neurologists and ulcers like gastroenterologists. They can predict which patients will get diarrhea as a side effect of a drug, the length of time a patient will be in ICU after an operation and whose cancer is incurable. AI can cut down treatment costs by 50% and improve medical outcomes by 30 to 40%. In the US, AI is estimated to generate savings of $150 billion annually for the health industry. The UAE spends $1200 per capita on healthcare, which accounts for a quarter of all healthcare expenditure in the GCC. The UAE government has set itself the target of 2071 as the year where all public and private hospitals will be equipped with AI technology. 62% of UAE residents were found to be in favor of replacing doctors with AI.

Before an AI system learns how to identify medical conditions on its own, someone has to label the data supplied to it, which is what Namita and Glenda do. Neither they nor other data entry workers, however, have any medical qualifications or specialist knowledge. Training for the job involved several online video calls with a non-practicing doctor located in the US. Medical experts question the reliability of non-experts in labeling data that will be fed into a machine and used to make real-life health decisions.

In addition to labeled images, data comes from medical journals, patient health records, lab results, radiology and pathology reports, doctor's notes, clinical care guidelines and the Internet. Machines analyze these data and identify patterns and rules using algorithms that computer programmers create. Algorithms generate new algorithms based on inferences from data, enabling machines to learn from experience, adjust to new inputs and perform human-like tasks. In this way, neural networks are created. AI companies keep quiet about where these data are obtained from and who they are supplied too. Privacy activists point out that large amounts of personal information is being stored and shared without patient consent. As the Internet expands and is meshed more and more into daily life, companies have easier access to sensitive information without patients' knowledge.

Doctors and healthcare administrators believe that AI can bring ubiquity to medical care – patients can be diagnosed and treated at any time and in any place. AI can eradicate barriers that have traditionally hindered access to medical care such as cost, geographical distance and language. The World Health Organization reports that a Google-based AI system has enabled India to make strides in detecting diabetic retinopathy, the leading cause of blindness among working-age adults in the world. Diabetic retinopathy is widespread in the Middle East too. Six of the 10 countries with the highest rates of diabetic blindness are in the Middle East. The prevalence of retinopathy among diabetic patients ranges from 19% in the UAE to 55% in Yemen and 64% in Jordan. Another benefit of AI systems is that they can compensate for doctor fatigue, oversight and lack of experience. In one study AI software was found to be more than 90% accurate in diagnosing asthma while trained doctors were accurate 80 to 84% of the time. For such levels of accuracy, though, an AI system needs access to clear, unobstructed images. A blurry X-ray or a cataract in a patient's eye prevents the AI from recognizing the disease.

While AI shows promise in the detection and diagnosis of illnesses, this does not guarantee that the decisions it makes are fair and ethical. Doctors and other medical experts are concerned that AI risks perpetuating health disparities that already exist. Medicine has excluded women and minorities in research despite knowing that they exhibit different symptoms and have risk factors different to mainstream groups. Moreover, AI technology used for facial recognition purposes has been found to misidentify people with darker skin tones. This is because the data used to train AI algorithms do not always represent the diversity of races in a society. When algorithms fail to recognise racial diversity, this can have dire consequences in the detection and treatment of illnesses that disproportionately affect non-white communities. Health related AI data need to reflect a wider range of racial backgrounds, but also social and economic status. Otherwise, algorithms will merely reflect the pre-existing biases of society when faced with situations that involve ethical and social complexity. For example, if poor patients' health conditions are found not to improve after chemotherapy, machine learning algorithms might recommend against such treatment for all lower socio-economic groups. In this way, AI can make discrimination invisible and automated

American Academy of Ophthalmology. (2016). Diabetic Retinopathy – Middle East. Retrieved from https://www.aao.org/topic-detail/diabetic-retinopathy-middle-east

Barber, G. (2019, Sept. 2). A Molecule Designed by AI Exhibits 'Druglike' Qualities. *WIRED*. Retrieved from https://www.wired.com/story/molecule-designed-ai-exhibits-druglike-qualities/

HIMSS TV. (2019, Aug 8). UAE 2013 AI strategy: enabling population health management. Retrieved from https://himsstv.brightcovegallery.com/detail/videos/himss-uae-ehealth-week-2019/video/6015709175001/uae-2031-ai-strategy:-enabling-population-health-management?autoStart=true

Internet Society. (2017). *Artificial Intelligence and Machine Learning. Policy Paper*. Retrieved from https://www.internetsociety.org/resources/doc/2017/artificial-intelligence-and-machine-learning-policy-paper/

Metz, C. (2019, Aug.16). A.I. Is Learning From Humans. Many Humans. *The New York Times*. Retrieved from https://www.nytimes.com/2019/08/16/technology/ai-humans.html

Metz, C. (2019, March 10). India Fights Diabetic Blindness With Help From A.I. *The New York Times*. Retrieved from https://www.nytimes.com/2019/03/10/technology/artificial-intelligence-eye-hospital-india.html

OECD. (2019). Artificial Intelligence in Society. Paris: OECD Publishing. Retrieved from https://read.oecd-ilibrary.org/science-and-technology/artificial-intelligence-in-society_eedfee77-en#page3

ValuStrat. (2018). How can AI transform the healthcare sector in UAE? Retrieved from https://valustrat.com/can-ai-transform-healthcare-sector-uae