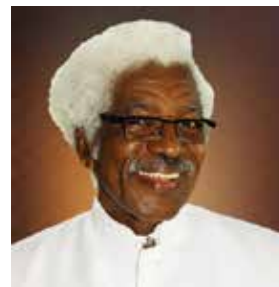# I am your **Dr**obot… Repeat after me…

Computer technology has become a serious option for tackling the shortage of medical manpower. Shima Gyoh wonders if it is feasible for robots to replace doctors

The doctor's work involves the processing of enormous amounts of clinical data, often learnt over many years and needing continuous updating as it daily increases with output from many research publications. Medical technologies and the understanding of pathologies have become deep and complex, and the volume of knowledge is encyclopaedic. The human body has many systems working in an integrated fashion, and disorder of one can adversely affect the function of the others. To reach the correct diagnosis, the expert clinician has to be familiar with a vast number of clinical conditions usually learned over many years for his or her diagnosis to become reliable.

Such huge volumes of data, taken from thousands of sources, can be installed, integrated and manipulated in computers. Computer-aided diagnosis has been with us for some time. Scans can be built into smart phones or even domestic furniture to provide clinicians with health data. Where diagnosis is attempted, machine language, operating on a set of rules, selects conditional pathways to reach conclusions. The accuracy of computer-aided diagnosis depends on the skill of the doctor in manipulating the machine, but the programme itself remains unchanged until upgraded.

The human brain works differently, through a learning process. In interacting with the environment, it makes and breaks millions of inter-connecting pathways through synapses, and retentive memory is achieved through signals repeatedly going through the relevant circuits and strengthening and stabilising the synaptic connections. Its accuracy improves with increasing use or 'experience'.

This style is being imitated in computers to produce artificial intelligence (AI) by using vastly increased connections and circuits called 'neural networks'. While it takes years for humans to accumulate a large amount of medical data from which correct diagnoses can proceed, this data can be installed in a computer within a short time. In astronomy, analysis of complex data that takes trained experts months can be accomplished by AI in a split second.[1] Some companies are perfecting diagnostic machine-learning algorithms that would enable a robot to read patients' medical records, access its own internal encyclopaedic knowledge of clinical conditions taken from textbooks, journals, and medical databases to reach an accurate diagnosis. Integration of natural language processing would enable it to converse with patients and doctors, seeking clarification where necessary and answering questions.

When it comes to making diagnosis from investigations, such as histological slides, cardiograms, radiology and other forms of scanning, the performance of AI is remarkable and often much better than that of humans. Digitised images can be fed directly into algorithms. Prognosis too will be improved. In cases where there are clear dividing lines like benign and malignant, as with recognition of lesions, algorithms are often more accurate than humans. In other cases, like sepsis or arthritis, their role is limited.

One problem with the use of diagnostic scanning with AI machines might be that they will find very early malignant changes that, left alone, the immune system might subsequently destroy, or which otherwise might not proceed to clinical disease. In the prostate, for example, radical operations might result in the unpleasant complications of urinary incontinence and impotence for carcinoma in situ that might not have spread.

With regard to the speculation that AI might finally replace radiologists and pathologists, I am convinced that they will instead become powerful instruments in the hands of experts and clinicians, enabling them to increase their output with fewer staff. This would be great, particularly for the unpopular specialties always short of staff. Clinicians will also benefit as robots might take the histories and assemble the results of investigations before presentation. Despite this, palpation of clinical disease in organs, their consistency, and the general appearance and morale of the patient will still need the human touch for the foreseeable future.

Nearly all patients need the reassurance of the doctor. Many visit their physicians for support, comfort and advice, sometimes on matters not related to physical health. We also handle hypochondriacs without upsetting their health with inappropriate prescriptions. Robots can assist in all procedures, but the legal liability remains with the patient's human doctor. The best doctor is the one who is the patient's friend and confidant, and I wonder how many people would trust a robot to that extent.

Shima Gyoh has held many posts ranging from village doctor to DG of Nigeria's Federal Ministry of Health and Chair of the Medical and Dental Council of Nigeria.

Reference
1 Neural Networks meet Space, By Manuel Gnida, Symmetry, 08/30/17, www.symmetrymagazine.org/article/neural-networks-meet-space

Shining a light on severe malaria

The Severe Malaria Observatory (SMO) is a repository of information on severe malaria. It aims to:

- Disseminate best practice, tool-kits, market information, guidelines, projects and outcomes
- Advocate continuous research and capacity building
- Support visibility and coordination of ongoing activities

To enhance its impact, the SMO needs YOU.

Join the community.
Share your knowledge.
Help save more lives.

www.severemalaria.org

Photo: Anna Wang

Severe Malaria Observatory

Experience. Evidence. Guidance.