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Healthy Living

BETTER LIFESTYLE, GREAT LIVING

The future. Dr Rose Nakasi's AI technology is a cognitive tool that helps diagnose diseases such as malaria and tuberculosis, and soon, cervical cancer. She believes it will help free up overworked medical personnel and allow for faster, more accurate diagnoses.

Dr Nakasi using AI to transform healthcare

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Dr Nakasi using AI to transform healthcare

Dr Rose Nakasi's AI technology is a cognitive tool that helps diagnose diseases such as malaria and tuberculosis, and soon, cervical cancer. In an interview with Taaka Kupewa Wandera, she emphasises that AI is not a replacement but a support tool for medical practitioners. She believes it will help free up overworked medical personnel and allow for faster, more accurate diagnoses.

What inspired your involvement in AI?

In 2022, I graduated with a PhD in computer science with a focus on AI, which I believe has the potential to help solve some of our societal challenges. My application or technology is not the first; AI has been used in various ways for social good.

Malaria, tuberculosis and cancer are some of the most common ailments in Uganda. Malaria, for example, has led to the deaths of many people yet there are still many challenges in its management and treatment.

Before you ascertain that a person has malaria or cancer, they must go through a diagnosis to get the required treatment. If there is an error in diagnosis, then you are most likely to receive the wrong treatment and by the time the condition is detected, it would have advanced.

Misdiagnosis due to overworked technicians or lack of advanced equipment, therefore, leads to improper treatment and other problems such as drug resistance. This AI software will help provide support in the diagnosis process as well as faster and more accurate diagnoses.

This AI model works with the help of a smart phone. Smartphones can be used to capture images and then do analytics. With advancements in technology, phones can be used to understand patterns and characteristics of how diseases present themselves. So, we collaborated with medical personnel, who have taken us through the science of diagnosing these diseases and we are trying to replicate those mechanisms using AI. Also, this technology is able to do away with biases that come with subjectivity.

Trials have been carried out where both experts and the AI model have tested the same image and the AI model came up with a more accurate and consistent conclusion. However, after every diagnosis, the expert must confirm the results since at the end of the day, they are the final decision makers.

The AI model will also be able to reduce fatigue that comes from carrying out various examinations, which will in turn match the World Health Organisation (WHO) microscopy practice standard. According to the WHO standards of using a microscope, a technician is not allowed to review more than 20 patients a day. However, from what we observed at the various health centres we visited, one technician views up to 200 slides a day, which can be strenuous, leading to mistakes.

Diagnostics is a core aspect of anyone's health. If your diagnosis is correct, then you will get the right treatment. If we can control the disease from the diagnostic level, it can reduce on mortality rate of some of these diseases.

How does this AI model detect diseases?

We worked together with medical technicians who helped us characterise and map out different pathogens and their features, based on their images. These identified features served as our training examples for the AI model. Essentially, we presented the model with images highlighting the characteristics and features specific to each pathogen, enabling it to learn and distinguish between them. Once trained, the model can effectively reference its knowledge when presented with new test images, accurately identifying pathogens such as tuberculosis bacilli and malaria parasites.

When a patient visits the hospital, the technician initially follows standard procedures, including preparing a slide from a blood sample. At the examination stage, the AI tool comes into play. We have developed a 3D printable adapter that attaches a smartphone to the microscope's eyepiece.

By synchronising the focal points of both the eyepiece and the smartphone camera, the image under the microscope is directly transmitted to the smartphone. Once an image of the slide is captured, the AI model in the background analyses it to identify any parasites present. This setup lessens the need for the doctor to strain their eyes by peering through the microscope; instead, they can simply view the image on the smartphone screen and make informed decisions based on the AI model's analysis.

We are presently engaged in collaborative efforts with Mulago National Referral Hospital and Kiruddu National Referral Hospital, where they have begun implementing our AI model. We are in the process of taking this technology to other hospitals.

How will the same AI model diagnose cervical cancer?

We are in the process of expanding the application of our technology to cancer histopathology (the diagnosis and study of diseases of the tissues). The technology remains the same; the key difference lies in the dataset and images we are analysing. Most cancer samples are sent to the Uganda Cancer Institute (UCI), simply because there are no pathologists.

In cancer pathology, a crucial method involves microscopic examination. When a suspicious area is identified, a sample is extracted and subjected to staining procedures. This prepared sample is then mounted onto a slide and examined under a microscope by a pathologist. Through this process, the pathologist assesses whether the sample's characteristics indicate malignancy. It is important to note that while this is a common approach, there are various screening methods for cancer, each serving as a distinct modality.

Do you think AI will yield positive outcomes in the health sector?

I look at the impact it is able to create and not the biases that come with it. I consider AI a problem solver that can solve our present pressing needs, not just in health but in other fields as well. In health, it could make advancements in the treatment process. AI can help analyse individual patient data to recommend personalised treatment plans. Medication that works for me may not necessarily work for you. If AI is able to help us learn the characteristics of each individual, then medical personnel can prescribe more effective medication. I believe AI in the near future, will be able to automate some tasks, which in turn will free up healthcare professionals to focus on complex cases or activities.

What advice do you give women who shy away from careers in STEM?

As women, we usually have this belief that certain domains are meant for only men. I want to demystify that kind of mentality. As a woman, you have the opportunity and responsibility to contribute significantly to the advancement of your country. If we recognise our potential to engage in core scientific disciplines such as AI and make positive contributions to society, then we should pursue these opportunities without hesitation.

I encourage young girls and women in technology to embrace these fields wholeheartedly. Your technological innovation or initiative could be the solution to a pressing need.

ABOUT DR ROSE NAKASI

Dr Rose Nakasi holds a PhD of Computer Science from Makerere University. She is a lecturer of Computer Science as well as a research scientist at the Makerere Artificial Intelligence Lab, in Makerere University, Uganda. Rose is also an active member of the Data Science Africa community and a chair for the Topic Group AI based detection of Malaria (TG-Malaria) at the ITU-WHO Focus Group AI for Health (FGAI4H). Her research interests are in artificial intelligence and data science, and particularly in the use of these for developing improved automated tools and techniques for microscopy diagnosis of diseases such as malaria in low-resourced but highly endemic settings.

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