



How much Skin in the Game does Artificial Intelligence have?



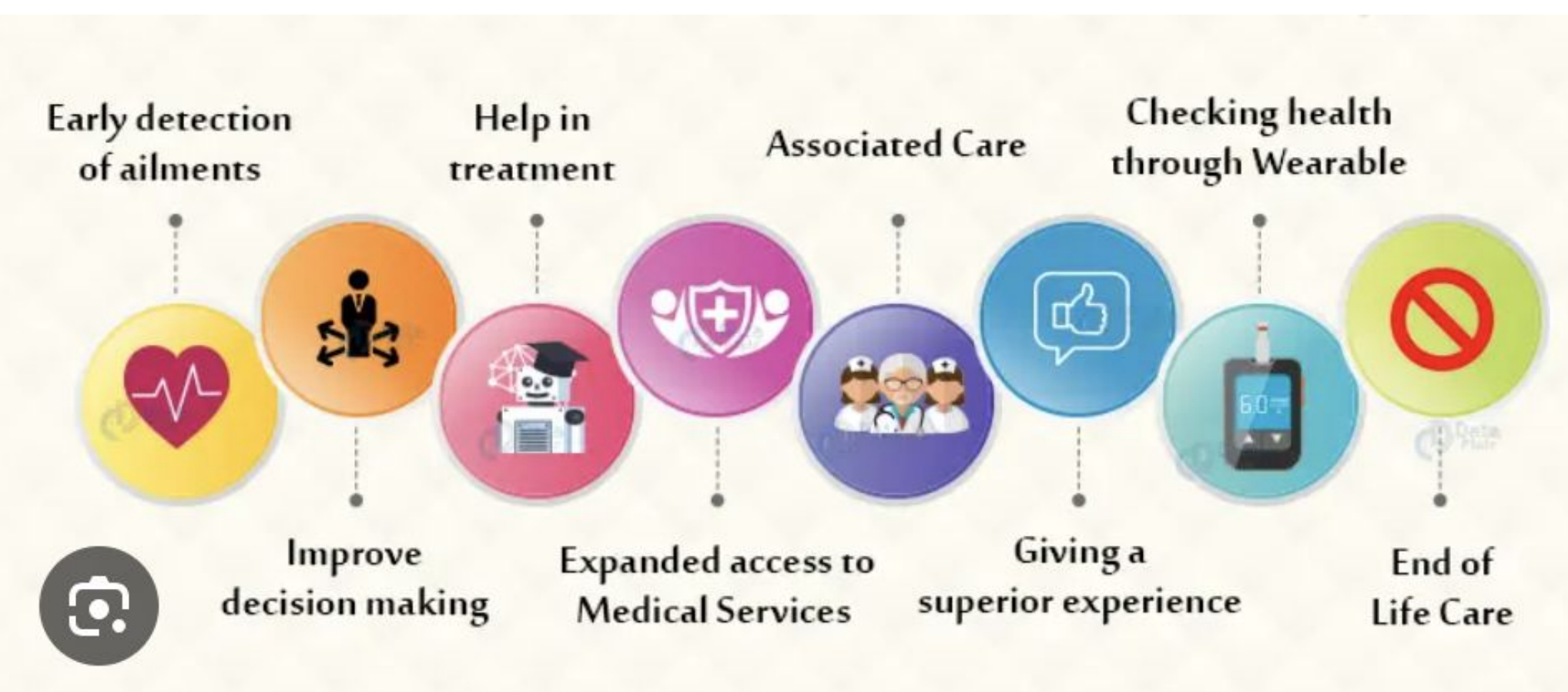
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Introduction

Artificial intelligence (AI) has made its way into a myriad of aspects of life. With its almost ubiquitous presence and seemingly infinite potential it is imperative to examine its impact in the medical field. In this paper we aim to examine the interplay between AI and the field of Dermatology.

Dermatology as a field has much potential for AI usage. With growing wait times for offices around the country and since most of the symptoms present for a patient can be seen with the eye, one may infer this would be the perfect field to integrate AI. It is easy to upload an image and get a possible diagnosis via a smartphone app in seconds. However, these AI programs may not have the capabilities to provide accurate diagnoses. We examined two specific case studies to determine possible reasons for why AI programs are not yet developed enough to be relied on.



Background

Artificial Intelligence has many potential benefits for healthcare: from providing accurate diagnosis without human error/bias to increasing accessibility to healthcare. The benefits are not only for issues plaguing basic science or treatment, but also sociological issues that put up structural roadblocks to high quality care.

Studies have shown varying efficacy for AI/computer based programs for diagnosis. One study at Drexel showed the differences in the two methods for dermatoscopy. “The meta-analysis showed that sensitivity for CAD-based dermoscopy was slightly higher than for dermoscopy (91% vs. 88%; $p=0.076$), while specificity for dermoscopy was significantly better than CAD-based dermoscopy (86% vs. 79%; $p < 0.001$). The diagnostic odds ratio for dermoscopy (51.5) and CAD-based dermoscopy (57.5) were not significantly different ($p=0.783$).” It was concluded that both tests have the same diagnostic efficacy. However, there are clear strengths and weaknesses for both methods.

Cases

Case 1

A 21-year old male developed black spots on the plantar aspect of his right foot near the great toe. A smartphone app diagnosed the uploaded picture as benign nevus initially. Later, a closer zoomed in picture of the lesion was inputted, and the app diagnosed this as wart vulgaris. The patient visited a dermatologist, and plantar warts were confirmed. The patient improved after treatment with cryotherapy and salicylic acid cream.



Figure 1: Pictures uploaded to AI Dermatology Application

Case 2

Our second patient presented with lesions in the groin skin fold that did not respond to over-the-counter cream. The smartphone app diagnosed the uploaded photograph as possible psoriasis. This was shared with a dermatologist who diagnosed the lesion as bacterial infection of the hair follicles. These improved with antibacterial cream. The patient did not consent to usage of these pictures for this presentation.

Conclusion

While it is not possible to know why the AI app provided wrong diagnoses, we can extrapolate possible reasons. Many dermatological issues cannot easily be diagnosed with an image alone. It is important to account for texture, shape, color, whether the affected area of the skin is raised, whether the growth has evolved, and more. When a patient takes a picture of their condition, many of these aspects other than color and shape cannot be determined by an image alone.

Additionally, lighting and distance are factors that may prevent an AI app from accurately providing a diagnosis.

While AI has shown significant potential in other medical fields, it is still a long way from being able to input the appropriate three dimensional, and tactile information needed to provide accurate diagnoses for patients. More work needs to be done by uploading images, as well as adding various other aspects of diagnosis into machine learning algorithms before a reliable AI app can be used. For the time being, it is still best to wait for an appointment and get an accurate diagnosis from a Dermatologist. However, with its immense potential, AI research and case studies like this can help to improve sensitivity and specificity of these programs.