GLOBAL SKIN HEALTH

ARTIFICIAL INTELLIGENCE IN DERMATOLOGY: THE FUTURE IS HERE

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OBJECTIVE: Artificial intelligence (AI) works by mimicking human cognitive functions. It is bringing a paradigm shift to healthcare, powered by increasing availability of healthcare data and rapid progress of analytics techniques. We survey the current status of AI applications in dermatology and discuss its future.

PATIENTS AND METHODS: Artificial Intelligence can be applied to various types of dermatology data (structured and unstructured). Popular AI techniques include machine learning methods for structured data, such as the classical support vector machine and neural network, and the modern deep learning, as well as natural language processing for unstructured data. Major disease areas that have a great potential with the use of AI tools include skin cancers, sexually transmitted diseases and in dermatoscopy research. We will review in more details the AI applications in skin diseases, in the three major areas of early detection and diagnosis, treatment, as well as outcome prediction and prognosis evaluation using the Variational Autoencoder (VAE). VAE is a class of deep generative models which is trained by maximizing the evidence lower bound of data distribution.

RESULTS: When trained on only normal data, the resulting model can perform efficient inference and to determine if a test image is normal or not. We perform experiments on ISIC2018 Challenge Disease Classification dataset (Task 3) and compare different methods to use variational autoencoder to detect anomaly. The model can detect all diseases including early skin cancer with a satisfactory accuracy. To the best of our knowledge, this is the first applied work of deep generative models for anomaly detection in dermatology.

CONCLUSION: Across the entire healthcare field and specifically dermatology, Artificial Intelligence presents profound and promising prospects for improved efficiencies in relation to streamlined and automated care provision and services in rural areas or resource poor settings.