Artificial intelligence

Artificial intelligence, or AI, is becoming increasingly part of our lives. It may feel like something new, but it has been in development since 1955, when John McCarthy, an American computer scientist pioneer and inventor often given the title *father of artificial intelligence*, **played a seminal role in the field and development of intelligent machines. The first artificial intelligence conference was the 1956 Dartmouth Conference held at Dartmouth College, New Hampshire, in America. At the time, McCarthy said it could take "five to 500 years" to make a breakthrough. McCarthy's Lisp computer language, created in 1958, became the standard AI programming language and is still used in many applications, such as credit card security, smart phones and voice recognition.**

Machine learning (ML), which is another term used as a sub-set of AI, uses large amounts of data of past events to help predict future outcomes. The algorithms produced from data gathering are essentially a list, set of rules and steps that lead to an outcome. In the area of health, it could be a diagnosis, a pathway or a course of treatment.

In real life, when you develop a set of symptoms, and see your doctor, they will use their knowledge and experience to assess how those symptoms match a particular condition. In ML, the AI process will use previous diagnoses of other people to match your symptoms and come to a diagnosis. In both instances the presentation will be matched against a list, whether learnt through years of study and experience of seeing patients, or imputed data based on previous real-life cases.

AI in health

It is interesting to see that, in research published in 2019 by Moorfields Eye Hospital, DeepMind Health and UCL, the AI system recommended the correct referral decision for more than 50 eye diseases, with 94% accuracy, matching world-leading eye experts.

Other areas are beginning to explore the area of AI, with funding being made available via the NHS Artificial Intelligence in Health and Care Awards. The Artificial Intelligence Award is run by the Accelerated Access Collaborative (AAC) in partnership with NHSX and the National Institute for Health Research (NIHR). It will make £140 million available over three years to accelerate the testing and evaluation of the most promising AI technologies which meet the strategic aims set out in the NHS Long Term Plan.

A recent award to researchers and clinicians at the University of Dundee and NHS Tayside sees the collaboration receiving £150,000. The team hope to develop technology capable of diagnosing skin cancer. Project leader Professor Stephen McKenna, of the university's Computing department, said,

"Success in this area will be gradual, starting with goals such as clinical decision support for the most common benign lesions. Skin disease naturally lends itself to automated image analysis. Lesions can be photographed easily and then analysed with the help of deep learning technology."

Secretary of State for Health and Social Care Matt Hancock said "The 'Deep learning for effective triaging of skin disease in the NHS' project will see researchers develop an AI system to accurately distinguish between benign lesions and cancers."
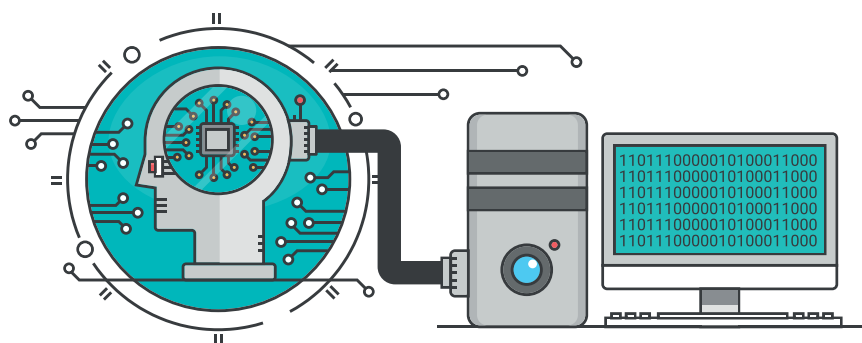
Emerging evidence in psoriatic arthritis was presented as an abstract at the American Academy of Rheumatology by rheumatologist Philip Mease and colleagues, titled *'Machine learning identifies an association between pre-existing radiographic damage and long-term clinical outcomes with secukinumab therapy in patients with psoriatic arthritis.'* The authors said, "A strong and significant association was demonstrated between disease activity and baseline radiographic damage at the individual joint level, whereas the analysis at patient level showed a weaker association. High radiographic damage at baseline was associated with a lower rate of achieving remission."

Diagnosing skin disease with algorithms

In a project funded by PAPAA, DermNet New Zealand has developed The DermDiag tool, which has been designed to help people understand their skin condition. This online tool does not offer medical advice, but provides a series of questions which leads towards a potential match to the symptoms entered within the programme.

The DermDiag tool is based on the bestselling book for doctors, *Differential Diagnosis in Dermatology* by Dr Richard Ashton. You can access the tool on the symptom checker page, found under 'LEARN' at **www.papaa.org**.
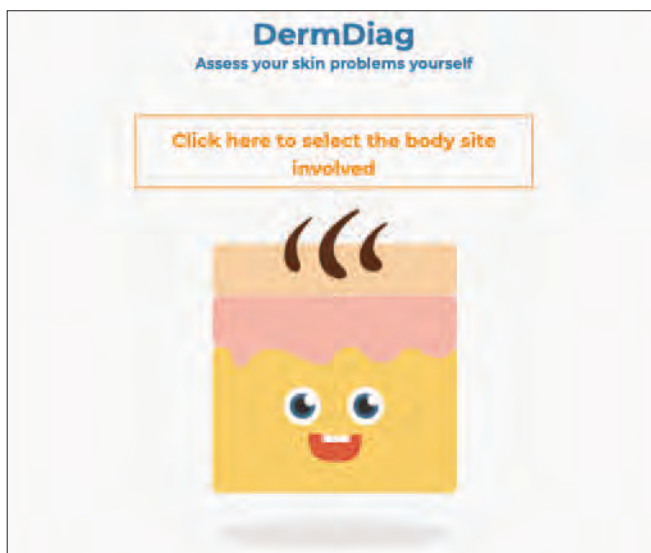
What's the future?

It is certainly an exciting time. Wearable technology that can record real-time health data, which can be uploaded to a database, offers the prospect of not only monitoring and helping to manage health, but also to help develop machine learning and artificial intelligence algorithms to aid diagnosis and predict outcomes.

Links:

https://www.papaa.org/learn-about-psoriasis-and-psoriatic-arthritis/symptom-checker/

Sources:

John McCarthy obituary, The Independent, November 2011

BBC Bitesize, November 2020

Dartmouth College https://home.dartmouth.edu (accessed November 2020)

Moorfields Eye Hospital media release, 2019

University of Dundee media release, September 2020

American Academy of Rheumatology meetings abstracts (accessed November 2020)