

Artificial Intelligence Enabled, Data-Driven Diagnostic Support for Adult ADHD

A recommendation tool that provides an efficient and effective way of triaging patients

Reference: ADHD Diagnosis



New Africa, stock.adobe.com

IP Status

Patent application submitted

Seeking

Licensing, Development partner,
Commercial partner

About **University of Huddersfield**

The University of Huddersfield understand how crucial research can be in staying ahead of the competition and growing – or maintaining – your market position, and that’s why they’re committed to ensuring the highest standards of research throughout the university.

Background

Global demand for ADHD diagnostic assessments of adults has been growing rapidly because there is more awareness of this condition. In the UK, this increasingly high demand, combined with a shortage of expert clinicians and difficulties with recruitment and retention of health professionals in the NHS, is that waiting lists are very long, with an average waiting time of 2 years. Delayed diagnosis and treatment for ADHD can be harmful to people, leading to broader mental health conditions, relationship and employment problems, and substance misuse. This puts a significant economic burden on the NHS and social services.

To address these issues, University of Huddersfield researchers are proposing an AI-based solution to aid clinicians in the ADHD diagnosis process. This technology is built by incorporating expert clinician knowledge and historical clinical data routinely collected using NICE guidelines. The solution operates as a recommendation tool that provides an efficient and effective way of triaging patients.

Tech Overview

At the heart of the AI solution is a hybrid AI algorithm that uses a combination of a machine learning model and a knowledge model:

- Research prior to this project, carried out by the applicants, developed a machine learning-based model that analyses the data that the Trust holds in its computing systems – the same data a clinician would have access to – and produces a diagnosis of ADHD, along with a confidence factor (a measure of confidence). The model was trained based on data from previous cases provided by the Trust. A variety of machine learning algorithms were used, but the best performance was delivered by a decision tree algorithm.
- In addition, in a number of in-depth interviews with experienced clinicians, knowledge acquisition was used to capture medical knowledge about how the AI system should reach a decision based on the data collected for a particular case. This implicit knowledge was represented as a number of rules (which use the same case data as an input) with three possible outcomes: positive, negative or consult expert.
- Where the two models disagree, the AI system provides the outcome “consult expert.”

The technology is complete (working prototype, TRL 7) and is currently undergoing clinical evaluation in an NHS clinical setting, in the context of an NIHR-funded project. Robust results regarding clinical validity, on the basis of approx. 400 cases, are expected in summer 2021, and the final product is expected to be ready by September 2021.

Figure 1: How the technology operates

Figure 2: How AI is integrated in the diagnosis process

Benefits

This AI solution was developed with clinical involvement from day one and addresses the main bottleneck in adult ADHD diagnosis: the limited availability of senior specialist clinicians. It will shorten the waiting time for a diagnosis because a broad range of more junior health professionals will be able to complete the diagnostic assessments.

Using clinical data as input, the AI will enable the health professional to quickly differentiate between patients who require further assessment by an expert clinician and those who do not.

Additional benefits are associated financial savings, increased operational efficiency and improved quality of assessment, based on NICE guidelines whilst the patient and social benefits are multifactorial.

Applications

The prime customers of this technology are public and private healthcare providers conducting adult ADHD diagnosis, which will want to benefit from operational improvements (higher productivity and case throughput) and financial savings.

The researchers have commenced analysing the marketplace and have identified the following categories of customers:

1. UK markets: (1) NHS Trusts providing mental health care (60 in England alone) (2) Clinical Commissioning Groups (ca. 200 in England), and (3) Private Hospitals and other Practitioners wishing to provide services for ADHD.
2. Prison services, to reduce crime recidivism.
3. International markets both in public and private sector: The clinical data used to create the tool is based on instruments which are disease specific and have valid translations in other languages, hence have a commercial value. Initial target countries will be USA, Germany, Middle East and Japan.
4. Pharmaceutical and med-tech/digital companies
5. Remote health service providers – this international market, currently worth US\$11bn, is expected to grow at a CAGR of 8.76% during the period 2020 – 2027. The shift to virtual home health services has reached record levels since the onset of the COVID -19 pandemic and is expected to continue.

Opportunity

Licensees, health services public and private sector: both UK & Internationally and remote providers.

Pharma collaboration.

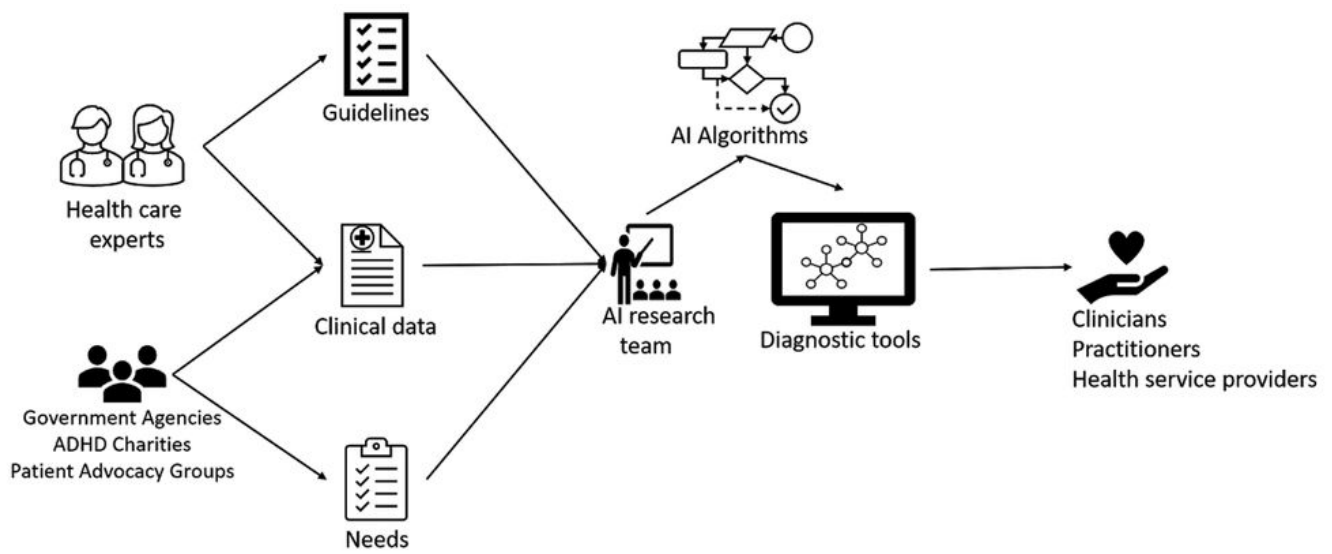
Collaboration on next generation diagnostics.

Patents

- Provisional patent application which was submitted to the UK patent office in November 2020 (application no. 2017793.7).

Appendix 1

Figure 1: How the technology operates



Appendix 2

Figure 2: How AI is integrated in the diagnosis process

