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REVIEW OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE AND RESEARCH

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ABSTRACT

AI is used or assessed for a range of healthcare and research purposes, including detection of disease, management of chronic conditions, delivery of health services, and drug discovery. AI has shown the capacity to help and address important health challenges, but is limited up to certain extent by the quality of available health data. The use of AI raises authentical issues, including: the potential of AI has not been accepted by people for the accurate decision and supporting decision making. It is difficult to explain the output of AI systems. Inherent unfairness in the data used to train AI systems ensuring the protection of potential of sensitive data by securing public trust in the development and using the AI technologies affects on people's sense of dignity and social isolation in care, situations affects on the role and skill-requirements of healthcare professionals, and the potential for AI to be used for hostile purposes.

Keywords: *AI, discovery, ethical issues, erroneous decision, health data.*

I. INTRODUCTION

Definition of artificial intelligence:
The term broadly refers to computing technologies that resemble processes associated with human intelligence, such as reasoning, learning and adaptation, sensory understanding, and interaction.1 currently, most applications of AI are narrow, and they are only able to carry out specific tasks or solve pre-defined problems. It is an important feature of contemporary. AI technologies are able to make sense of varied and unstructured principle issues, kinds of data, such as natural language, text and images. Machine-learning has been the most successful type of AI in recent years, and is the underlying approach of many of the applications currently in use. 2 Rather than following pre-programmed instructions, machine learning allows systems to discover patterns and derive its own rules when it is presented with data and new experiences.3

II. APPLICATIONS OF AI

Application of AI is the process of developing a new technique as an initiate standard of care and uses the robust practice of peer-reviewed R&D, and can provide safeguards against the misleading or poorly-validated use of AI algorithms.4 The use of AI diagnosis the replacements for establishing steps on medical standard of care. It will far and more approve the use of such diagnosis to provide supporting information that aids in decisions.5

AI has the potential to be used in planning and resource allocation in health and social care services. For example, the IBM Watson Care Manager system is being carried out by Harrow Council with the aim of improving its efficiency. It matches individuals with a care provider that meets their needs, within their allocated care budget.6 It also designs individual care plans, and claims to offer insights for more effective use of care management resources.7 AI is also being used with the aim of improving patient experiences. Alder Hey Children's Hospital in Liverpool is working with IBM Watson to create a 'cognitive hospital', which will include an app to facilitate interactions with patients. The app aims to identify patient's anxieties before a visit, and provide information on demand, and equip doctors with information to help them to deliver appropriate treatments.8

III. MEDICAL EXPLORATION

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AI can be used to analyse and identify patterns in large and complex datasets faster and more precisely than before. 9 It can be used to search the scientific literature for relevant studies, and to combine different kinds of data; for example, to aid drug discovery.10 The Institute of Cancer Research's can SAR database combines genetic and clinical data from patients with information from scientific uses. AI predicts new targets for cancer drugs.11 Researchers have developed in AI 'robot scientist' called Eve which is designed to make the process of drug discovery faster and more economical.12 AI systems used in healthcare should have been valuable for medical research by helping it to match suitable patients for clinical studies.13

Scientific care:
AI has the potential to aid the diagnosis of disease and is currently being trialled for this purpose in some of the UK hospitals.14 Using AI to analyse clinical data, research publications, and professional guidelines can also help to inform decisions about treatment.15

Possible uses of AI in clinical care include: Medical imaging – medical scans have been systematically collected and stored for some time and are readily available to train AI.16 AI has shown promising results in detecting conditions such as pneumonia, breast and skin cancers, and eye diseases.17

- Echocardiography – the Ultromics system, trialled at John Radcliffe Hospital in Oxford, uses AI to analyse echocardiography scans that detect patterns of heartbeats and diagnose coronary heart disease.18
- Screening for neurological conditions – AI tools are being developed to analyze speech patterns to predict psychotic episodes and identify and monitor symptoms of neurological conditions such as Parkinson's disease.19
- Surgery – robotic tools controlled by AI have been used in research to carry out specific tasks in keyhole surgery, such as tying knots to close wounds.20

Patient – consumer facing applications:
Several apps that use AI to offer personalized health assessments and home care advice are currently in the market.21 The app ADA Health Companion uses AI to operate a chat-bot, which combines information about symptoms from the user with other information to offer possible diagnoses.22 A similar app developed by Babylon Health, is currently being trialed by a group of NHS surgeries in London.23 Information tools or chat-bots driven by AI are being used to help with the management of chronic medical conditions.24 For example, the Arthritis Virtual Assistant developed by IBM for Arthritis Research UK is learning through interactions with patients to provide personalized information and advice in concerning medicines, diet, and exercise.25 Government-fund and commercial initiatives are exploring ways in which AI could be used to power robotic systems and apps to support people living at home with conditions such as early stage dementia, and prevent hospital admissions.26

Commnuity health:
AI has the potential to be used to aid early detection of infectious disease outbreaks and sources of epidemics, such as water Contamination.27 Humans have attributes that AI systems might not be able to authentically possess, such as compassion.28 Clinical practice often involves complex judgments and abilities that AI currently is unable to replicate, such as contextual knowledge and the ability to read social cues.29 Claims that AI will be able to display autonomy have been questioned on grounds that this is a property which is essential to human being and by definition it cannot be held by a machine.30

IV. PRINCIPLE ON SOCIAL ISSUES:

Many principle and social issues raised by AI are overlapped with those raised by data uses.31 The dependence on technologies are more broad. And issue arises with the use of beneficial technologies and 'telehealth'.32

Reliability and safety:
Reliability and safety are key issues where AI is used to control equipment, deliver treatment, or make decisions in healthcare.33 AI could make errors and, if an error is difficult to detect or has knock-on effects, this could have serious implications.34 For example, in a 2015 clinical trial, an AI app was used to predict which patients were

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likely to develop complications following pneumonia, and therefore should be hospitalized. 35 This app imperfectly instructed doctors to send home patients with asthma due to its inability to take contextual information into account.36

Transparency and accountability:
It can be difficult or impossible to determine the underlying logic that generates the outputs produced by AI.37 Some AI is proprietary and deliberately kept secret, but some are simply too complex for a human to understand.38 Machine learning technologies can be particularly opaque because of the way they continuously tweak their own parameters and rules.39 This creates problems for validating the outputs of AI systems, and identifying errors or biases in the data.40

Effects on patients:
AI health apps have the potential to empower people to evaluate their own symptoms and care for themselves when possible.41 AI systems that aim to support people with chronic health conditions or disabilities could increase people's sense of dignity, independence, and quality of life; and enable people who may otherwise have been admitted to care institutions to stay at home for longer duration. 42 nevertheless, concerns have been raised about a loss of human contact and increased social isolation.43 AI systems might have been contradictory on individual autonomy: for example, if they restrict choices based on calculations about risk or what is in the best interests of the user.44 If AI systems are used to make a diagnosis or devise a treatment plan, but the healthcare professional is unable to explain how these were arrived at, this might be seen as restricting the patient's right to make free, informed decisions about their health.45 Applications that aim to imitate a human companion or care raise the possibility that the user will be unable to judge whether they are communicating with a real person or with technology. This could be experienced as a form of deception or fraud.46

Assurance:
At a practical level, both patients and healthcare professionals will need to be able to assure AI systems.47 If they are to be implemented successfully in healthcare clinical trials of IBM's Watson Oncology, a tool used in cancer diagnosis, was reportedly halted in some clinics as doctors outside the US did not have confidence in its recommendations, and felt that the model reflected an American-specific approach to cancer treatment.48

V. DATA PRIVACY AND SECURITY

AI application in healthcare makes use of data that is considered to be sensitive and private. 49 These are subject to legal controls. 66 However, other kinds of data that are not obviously about health status, such as social media activity and internet search history, could be used to reveal information about the health status of the user and those around them.50 The Nuffield Council on Bioethics has suggested that initiatives using data that raise privacy concerns should go beyond compliance with the law to take account of people's expectations about how their data will be used.51 AI could be used to detect cyber-attacks and protect healthcare computer systems.52 However, there is the potential for AI systems to be hacked to gain access to sensitive data, or spammed with fake or biased data in ways that might not easily be detectable.53

The future of AI
In the future, it is likely that AI systems will become more advanced and attains the ability to carry out a wider range of tasks without human control or input.54 If this comes about, some have suggested that AI systems will need to learn to 'be ethical' and to make ethical decisions. 55 This is the subject of much philosophical debate, Nuffield raising questions about whether and how ethical values or principles can ever be coded or learnt by a machine; who, if anyone, should decide on these values; and whether duties that apply to humans can or should apply to machines, or whether new ethical principles might be needed.56

VI. CONCLUSION

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AI technologies are being used or trialed for a range of purposes in the field of healthcare and research,57 including detection of disease, management of chronic conditions, delivery of health services, and drug discovery.58 AI technologies have the potential to help, address important health challenges, but might be limited by the quality of available health data, and by the inability of AI to possess some human characteristics, such as compassion.59

The use of AI raises a number of ethical and social issues, many of which overlap with issues raised by the use of data and healthcare technologies more broadly.60 A key challenge for future governance of AI technologies will be ensuring that AI is developed and used in a way that is transparent and compatible with the public interest, while stimulating and driving innovation in the sector.61.

REFERENCES

1. See, for example, Engineering and Physical Sciences Research Council, Artificial intelligence technologies.
2. *US National Science and Technology Council (2016) Preparing for the future of artificial intelligence.*
3. *Royal Society (2017) Machine learning: the power and promise of computers that learn by example.*
4. *The development of AI systems usually involves 'training' them with data. For an overview of different training models, see Nesta (2015) Machines that learn in the wild: machine learning capabilities, limitations and implications.*
5. *House of Lords Select Committee on Artificial Intelligence (2018) AI in the UK: ready, willing and able?.*
6. *Department for Business, Energy & Industrial Strategy (2017) Policy paper: industrial strategy: the grand challenges; Gov.uk (26 April 2018) Tech sector backs AI industry with multi-million investment.*
7. *CBInsights (2017) AI, healthcare & the future of drug pricing: Investment activity, market breakdown, AI in clinical trials.*
8. *Gov.uk (22 November 2017) Autumn budget 2017: 25 things you need to know.*
9. *Nuffield Foundation (28 March 2018) The Nuffield Foundation announces new £5 million Ada Lovelace Institute.*
10. *See: https://www.partnershiponai.org/.*
11. *IEEE (2018) The IEEE Global Initiative on ethics of autonomous and intelligent systems.*
12. *UNICRI (2017) UNICRI centre for artificial intelligence and robotics.*
13. *Future of Life Institute (2017) Asilomar AI principles.*
14. *Reform (2018) Thinking on its own: AI in the NHS.*
15. *Future Advocacy (2018) Ethical, social, and political challenges of artificial intelligence in health.*
16. *Nesta (2018) Confronting Dr Robot: creating a people-powered future for AI in health.*
17. *European Group on Ethics in Science and New Technologies (2018) Artificial intelligence, robotics, and 'autonomous' systems.*
18. *Science and Technology Committee (Commons) (2018) Algorithms in decision-making inquiry.*
19. *Harrow Council (2016) IBM and harrow council to bring watson care manager to individuals in the UK.*
20. *Alder Hey Children's NHS Foundation Trust (2017) Welcome to Alder Hey – the UK's first cognitive hospital.*
21. *See, for example, Leung MKK, et al. (2016) Machine Learning in Genomic Medicine: A Review of Computational Problems and Data Sets Proc IEEE 104: 176-97; Science Magazine (7 July 2017) The AI revolution in science.*
22. *O'Mara-Eves A, et al. (2015) Using text mining for study Identification in systematic reviews: a systematic review of current approaches Syst Rev 4: 5.*
23. *The Conversation (11 November 2013) Artificial intelligence uses biggest disease database to fight cancer.*
24. *Williams K, et al. (2015) Cheaper faster drug development validated By the repositioning of drugs against neglected tropical diseases J R Soc Interface 12: 20141289.*
25. *Alder Hey Children's NHS Foundation Trust (2016) Alder Hey children's hospital set to become UK's first 'cognitive' hospital.*
26. *Dilsizian SE and Siegel EL (2013) Artificial intelligence in medicine And cardiac imaging Curr Cardiol Rep 16: 441; Future Advocacy (2018) Ethical, social, and political challenges of artificial intelligence in health.*

[NC-Rase 18] ISSN 2348 – 8034
DOI: 10.5281/zenodo.1483985 Impact Factor- 5.070

27. *Written evidence from Royal College of Radiologists (AIC0146) to the House of Lords Select Committee on Artificial Intelligence; Hainc N, et al. (2017) The bright, artificial intelligence-augmented future of neuroimaging reading Front Neurol 8: 489.*
28. *Wang D, et al. (2016) Deep learning for identifying metastatic breast cancer arXiv preprint arXiv:160605718; Esteva A, et al. (2017) Dermatologist-level classification of skin cancer with deep neural networks Nature 542: 115; Rajpurkar P, et al. (2017) CheXNet: Radiologist-level pneumonia detection on chest x-rays with deep learning arXiv preprint arXiv:171105225; Moorfields Eye Hospital (2018) DeepMind Health Q&A.*
29. *See http://www.ultromics.com/technology/.*
30. *Bedi G, et al. (2015) Automated analysis of free speech predicts psychosis onset in high-risk youths, NPJ Schitzophrenia, 1: 15030; IBM Research (5 January 2017) IBM 5 in 5: with AI, our words will be a window into our mental health.*
31. *Kassahun Y, et al. (2016) Surgical robotics beyond enhanced dexterity instrumentation Int J Comp Ass Rad 11: 553-68.*
32. *Medical News Bulletin (20 January 2017) Artificial intelligence app Ada: your personal health companion; see also: https://ada.com/.*
33. *See: https://www.gpathand.nhs.uk/our-nhs-service.*
34. *IBM press release (13 Mar 2017) Arthritis research UK introduces*
35. *IBM watson-powered 'virtual assistant' to provide information and advice to people with arthritis.*
36. *See, for example, https://chiron.org.uk/; University of Portsmouth press release (11 September 2014) Meet Rita, she'll be taking care of you. However, some question the suggestion that assistive technologies could relieve pressures on women in particular, see: Parks JA (2010) Lifting the burden of women's care work: should robots replace the "human touch"? Hypatia 25: 100-20.*
37. *Shafner L, et al. (2017) Evaluating the use of an artificial intelligence (AI) platform on mobile devices to measure and support tuberculosis medication adherence.*
38. *Moore SF, et al. (2018) Harnessing the power of intelligent machines To enhance primary care Bri J Gen Pract 68: 6-7.*
39. *Jacobsmeyer B (2012) Focus: tracking down an epidemic's source Physics 5: 89; Doshi R, et al. (2017) Tuberculosis control, and the where and why of artificial intelligence ERJ Open Res 3.*