iCritic

Flip Over, Think Bolder

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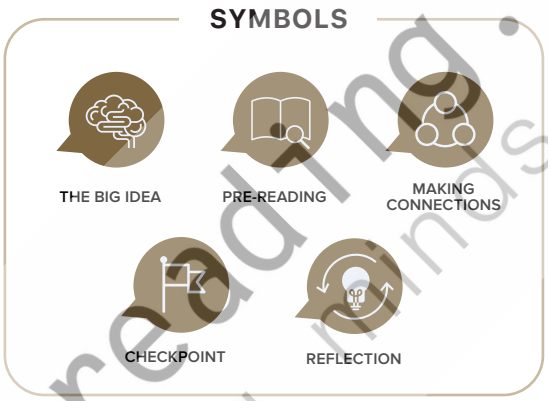

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Dear Reader,

"I believe AI is going to change the world more than anything in the history of humanity. More than electricity."
This quote by Kai-Fu Lee, an artificial intelligence (AI) expert, expresses the sentiments of those who are aware of the capabilities – both current and imagined – of machine learning.

Some are amazed by AI's potential, yet others fear its possibilities. The speed at which AI has seeped into multiple domains and spheres of influence can indeed be as fascinating as it is scary. In almost every industry, from medical to education and even the creative arts, AI has made tremendous impact. There is much debate about whether AI is more of a blessing or a bane. Is AI proof of humanity's augmented intelligence or is it a new evolved creation that poses an existential threat to our species?

Perhaps, the answer may unearth itself in the pages here.

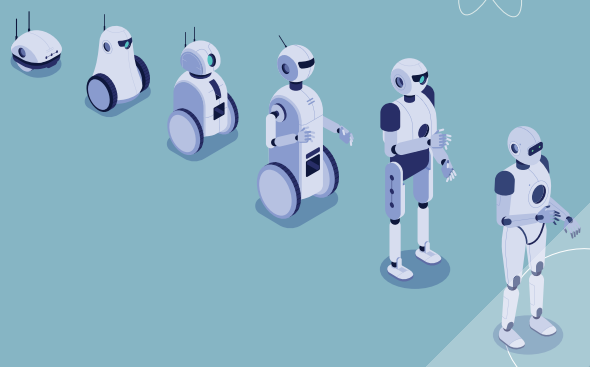
Warmly,

Shoba Nair

Chief Editor

EVOLUTION OF AI

How has AI evolved over the years?



First Generation AI: Vision and Speech Recognition

AI & Society

'Rather than empowering us, AI has made us more vulnerable.' Discuss.

'AI spells the end of human-dominated history.' Discuss.

How far do you agree that machines are better decision-makers than humans?

'Humans should collaborate with, and not dominate, AI.' Discuss.

To what extent will artificial intelligence shape the future of work and employment?

'AI developers should bear sole responsibility for the biases in their algorithms.' Discuss.

AI & State

To what extent should governments regulate the development and deployment of AI technologies?

Assess the view that AI has more influence than politicians.

AI & Education

How far is AI an essential part of education?

To what extent can AI easily replace the role of teachers?

How far do you agree that with AI there is no need for books?

Current Trend: The Generative AI

The Future: Capability AI

IMPACT OF AI

AI & Healthcare

Is AI a boon or a bane to the healthcare industry?

'AI has the potential to address inequalities in accessibility to quality healthcare services and resources.' Discuss.

AI & Artistic Expression

'AI will one day replace artistic expression.' Discuss.

To what extent can AI and virtual reality create experiences that rival traditional forms of art?

To what extent can AI and virtual reality (VR) create immersive art experiences that rival traditional forms of art?

AI & Science

Assess the view that AI can revolutionise science.

Contents

Issue 2:
I, AI

Can AI Replace Books?

ACTUALLY, AI IS BETTER THAN BOOKS

I can get the information I need for my research much faster by using AI systems than poring through different reference materials and online publications. IBM Watson Discovery is able to cut down my research time by more than 75 percent!

Aloysius Lim,
Life Sciences PhD student

ChatGPT is a godsend – it can answer any queries I have about my chemistry or physics topics! With GPT-4, which requires a small payment unlike the free GPT 3.5 version, I can even get more specific and accurate answers. I don't need textbooks and study guides anymore!

Sarah Thomas,
Junior College student

I have a great thirst for knowledge, but the reality is that each book takes a lot of time to read and I struggle to finish the book I start reading. So I turn to apps such as Blinkist and Headway, which use Generative AI to pull out the important insights and summarise the texts from numerous books. They even have an audio version of the summaries, so I can listen and learn while jogging or driving!

Mr Kenneth Pillay,
Bank Executive

Images from milatas, Odua Images/Shutterstock.com

NO WAY! AI CANNOT MATCH UP TO BOOKS

I think AI systems such as ChatGPT are copycats. ChatGPT simply takes words and ideas from existing novels and puts them together – nothing original. It lacks creative expression.

Yes, I agree. I also think ChatGPT is a cunning thief! Did you know, famous authors such as George R.R. Martin, the writer of 'Game of Thrones' and Jodi Picoult have collectively sued OpenAI, the company behind ChatGPT, for using their works to train the AI system without permission?

And those apps such as Blinkist and Headway that many of our friends are raving about – they will never trigger the kind of deep thought that reading a full book can offer.

Also, such short summaries offered by these apps can limit perspectives too. In fact, a study found that those who read the novel, 'Saffron Dreams' about racial harassment, displayed less bias towards the affected race than those who only read the summary.

MAKING CONNECTIONS

What questions do I already have about this topic?

How far do you agree that with AI there is no need for books?

By Ji Tianqi

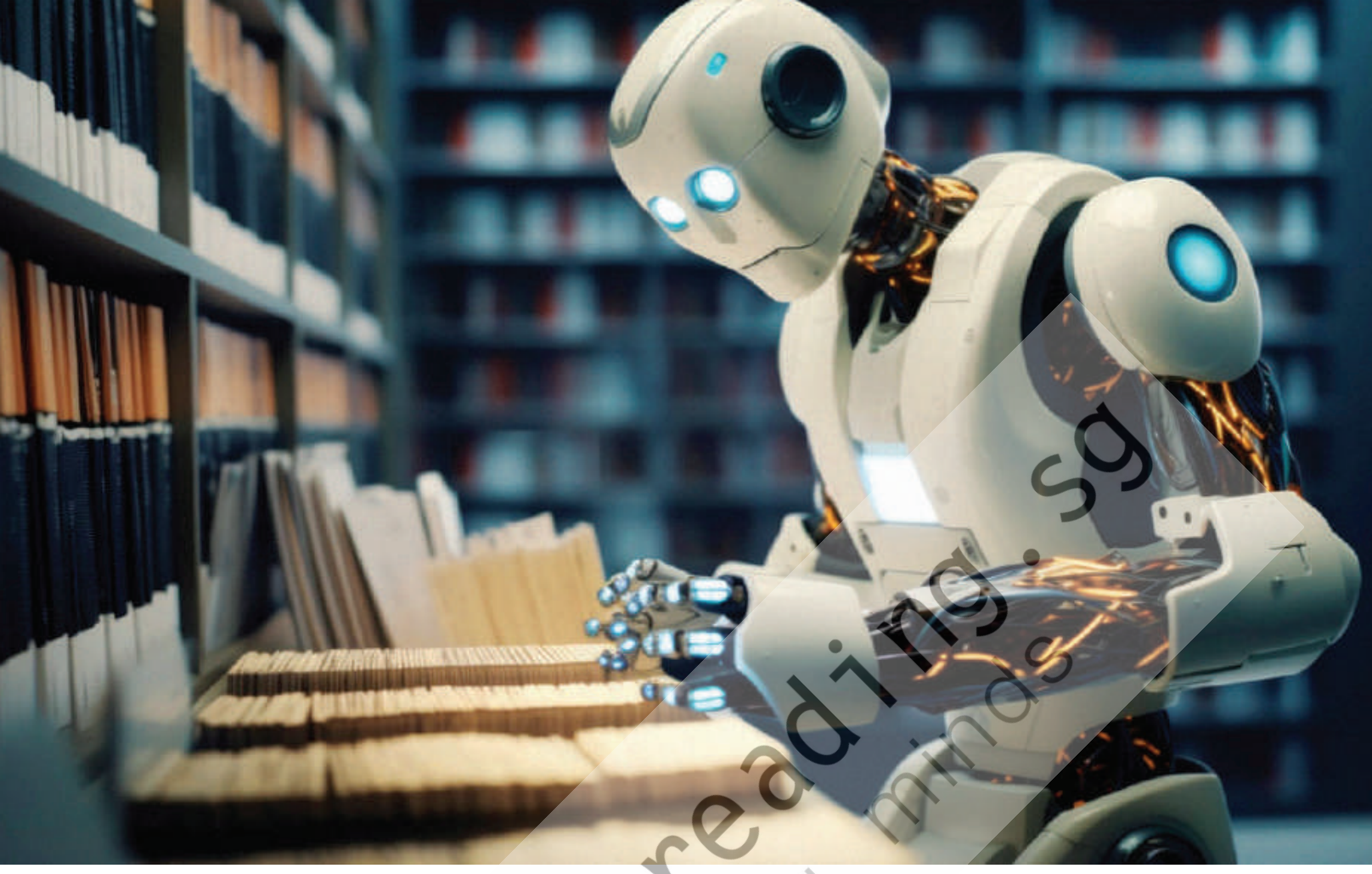
The advent of artificial intelligence (AI) has transformed various aspects of our lives. By 2026, experts estimate that approximately 90 percent of internet content may be artificially generated. The rise of generative AI systems has prompted discussions about AI's potential to [1]supersede books. The possibility of replacement is dependent on which function of books is the focus of discussion. The functions of books — physical, e-books and audiobooks that are not AI-generated — can be broadly classified into two categories: books as sources of factual knowledge and as a means of human expression and storytelling. While AI is able to replicate and even enhance the function of books as sources of factual information with its capabilities in advanced text analysis and providing personalised information, it is unlikely that it will replace books entirely. After all, books also serve as a repository for human imagination and nuanced human experiences that AI cannot replicate with originality. Hence, I disagree to a large extent that with AI there is no need for books.

Proponents of the view that AI can replace books point to AI's ability to process text and extract relevant information much more efficiently than one would while manually reading books for information. Particularly in research, AI capabilities have led to a [2]paradigm shift in how information is analysed. AI-powered text analysis tools can process large amounts of material to extract relevant information such as trends and existing literature in a short span of time. For example, IBM Watson Discovery is a question-answering AI system that can read vast amounts of information in a matter of seconds and provide users with relevant data. Through natural language processing, the IBM Watson Discovery is also able to interpret questions posed in natural language and extract meaning from unstructured sources of information. Some argue that these functions of AI can replace non-fiction books where large volumes of documents and public data are involved, such as finance, law, insurance, life sciences, healthcare, sports and engineering. Compared to books, which require researchers to manually read through every data point and existing literature to glean relevant information, AI systems allow researchers to do the same in much less time. According to IBM, Watson Discovery is able to cut research time by more than 75 percent, demonstrating that AI can help speed up the research process. In areas of academia, some also argue that AI's ability to offer key takeaways through apps such as Blinkist and Headway, and provide clear, specific answers to users' questions through ChatGPT can potentially replace the need for textbooks and study guides. A key differentiating factor between books and AI tools is the latter's ability to convey information in a significantly shorter period of time by being able to identify and provide exactly what readers are looking for, making AI a tempting replacement for books, especially for the busy individual in today's society. Given its superior processing ability and reasonable accuracy in information retrieval in a miraculously short period of time, it is indeed a plausible argument that AI can replace the function of books as a source of factual information.

However, AI is unlikely to replace books as a form of human expression. Books have been a central mode of storytelling for centuries. From ancient folklore to modern biographies, books have captured human imagination and a wide range of human experiences from varying cultures that AI cannot replicate with originality, as any output of AI is ultimately based on existing human works and human creativity. Machine learning AI algorithms are trained on large datasets consisting of original books and articles written by humans, which has given rise to [3]litigation cases where authors have sued AI companies over copyright infringement. For instance, the Authors Guild has sued OpenAI, the company behind ChatGPT, on behalf of prominent writers including George R.R. Martin, writer of 'Game of Thrones', and John Grisham, author of best-selling legal thrillers, for unlawfully using their works to train the AI system. Without books, AI can only replicate ideas, not capture new aspects of the human experience. Therefore, although AI may be able to mimic human writing, it cannot substitute books as [4]repositories of creative expression.

Additionally, the book-reading experience is something that AI cannot replace. A defining aspect of the reading experience is the act of discovering fresh perspectives with each new book. In comparison, AI can only generate output based on what users search for rather than provide new perspectives for them to discover. This limits the opportunity for readers to engage in critical thinking when reading long-form text, especially given that AI tools such as ChatGPT and apps such as Blinkist are designed to provide short summaries that do not demand prolonged attention. Relying only on AI for content may not only encourage a filtered worldview based on what users search for but also [5]propagate stereotypes and risk blocking out minority voices that would have otherwise been captured in books. For example, a quick search on ChatGPT on the story about Khaled Hosseini's first novel, 'Kite Runner', would reveal that it is about a broken friendship and the guilt that the narrator experiences, against the backdrop of Afghanistan's changing political landscape. However, there is a thread of ethnic discrimination in the book that is not mentioned in this summary – that of the minority ethnic group Hazaras being historically marginalised by the dominant Pashtuns. One who does not read the book will not be able to gain this insight and would have missed the 'soft' voice of the Hazaras in the book. This shows that even with AI, there is still a need for books for those who wish to gain greater insights through reading, beyond simply the basic content.

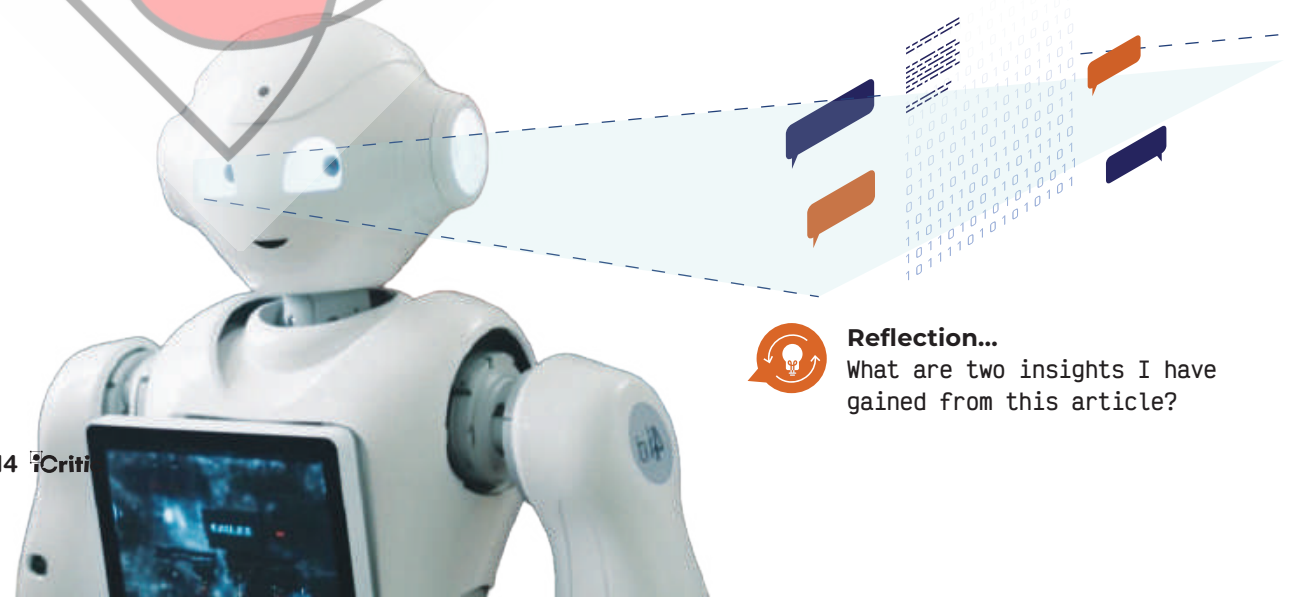
Checkpoint!
How well do I understand what I am reading so far?



In terms of fiction books, another unique aspect of the book-reading experience that AI cannot replace is its ability to cultivate empathy through imagination. With narratives, readers are encouraged to visualise the stories they read, during which there is space for them to empathise with the characters' journeys. In comparison, AI tools that provide summaries of texts may help readers be aware of the plot of a story, but do not bring readers through the same emotional journey that comes with reading a fiction book from beginning to end. Notably, a study by Washington and Lee University found that people who read an extract of Shaila Abdullah's 2009 novel, 'Saffron Dreams', a fictional account of a Muslim protagonist who experiences racial harassment as she navigates her identity in post-9/11 America, displayed less negative bias towards people on the basis of race compared to those who only read a summary of the book. Admittedly, AI is now able to create full fictional stories through AI software and tools such as Jasper and NovelAI. However, AI is only able to work with existing stories in their training data, limited by its condition of following patterns of information. Therefore, while AI can produce narratives, it is not capable of imagination and emotional depth, depending instead on the kind of stories it is trained with. When story lines and character tropes are repeated from existing books due to AI's limitations in creativity, it is less likely that readers would empathise with the characters in the AI-generated story. This demonstrates that books, particularly fiction books, are unlikely to be replaced by AI due to the latter's inability to nurture empathy in readers through stories.

As much as I disagree to a large extent that AI is able to completely replace books, I believe that it can work hand-in-hand with books. AI-enabled text-to-speech features can plug a gap in the accessibility of a variety of books to different groups of people. DeepZen, an AI narration system, utilises text-to-speech technology to convert traditional books into audiobooks using artificially generated but natural-sounding voice narrations. This text-to-speech feature has reduced the production cost of an audiobook down to about one-fourth that of traditional methods of audiobook production involving human voice actors. The traditional process of recording voices for an audiobook in a studio using human talent is long and tedious — often 16 hours or more for an average audiobook, compared to that of an AI-enabled audiobook which only takes a fraction of the time. The low cost and efficiency of AI narration can potentially allow more publishers, especially independent authors and small publishing houses, to make their books available in audio form, thereby allowing a wider range of books to be available in audio form for general consumption. In modern society where the competing demands of career, education and family cause many to feel strapped for time, AI-narrated audiobooks enable them to glean from the contents of many books while multitasking, such as while driving or going about their day-to-day tasks. For individuals who are visually impaired or have other forms of physical disability that hinder them from successfully reading physical or electronic books, the increased availability of audiobooks due to AI narration allows them to experience reading an expansive range of books, encouraging a more inclusive society. AI technologies therefore increase the accessibility of books to a wider audience, supporting efforts to make the reading culture more pervasive in different communities.

Hence, it is largely unlikely that AI will replace books in their entirety given their unique role in capturing human creativity and the diversity of human experiences. While AI has its strengths in identifying relevant information and analysing large chunks of data, it cannot and should not exist in isolation. Instead, it is vital to consider AI as a complement rather than a complete replacement for books. This means leveraging AI's strengths to increase the accessibility of books to more communities around the world and enhance the reading experience while preserving the distinctive human touch of books.



Reflection...
What are two insights I have gained from this article?

Word Bank

1. supersede: to take the place of something or somebody that is considered to be old-fashioned or no longer the best available

2. paradigm shift: to cause something such as a plan or an opportunity to fail

3. litigation: the process of making or defending a claim in court

4. repositories: places where something is stored in large quantities

5. propagate: to spread an idea, a belief or a piece of information among many people

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Notes

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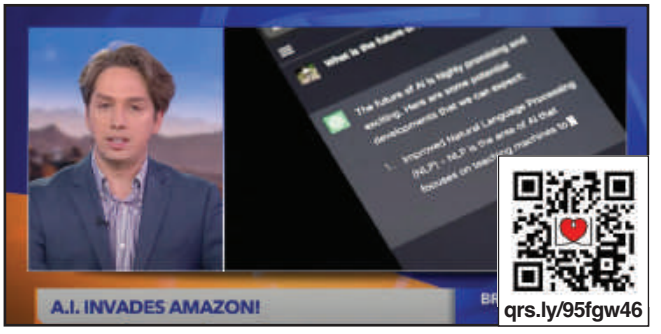
WATCH

AI-generated books are invading Amazon



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Do you agree with the writer that AI technologies lead to a more inclusive society?

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Robots as School Teachers

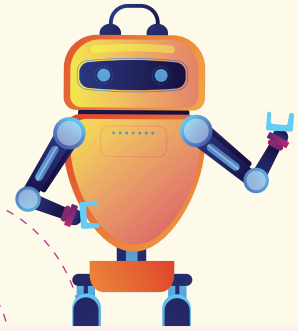


Image Source: eaglerobotlab.com

Eagle, the First Humanoid Robot Teacher in India

Robot teachers have been introduced in three schools across India - in Bangalore, Hyderabad and Pune – all run by Indus International School. Eagle is an AI-enabled robot teacher that has been deployed in these schools to conduct content lessons in the classroom. This robot teaches all science and humanities subjects, including languages, for grades 5 to 11. It is able to answer questions by students, pose questions to them, and even react to the answers it receives by mimicking emotions on its digital face. With AI in play, the robots can address students' doubts even after a lesson has been taught.

(reference: IndiaTimes)

Image Source: https://phys.org/

Robot Teacher for China's Tiny Tots

Robot teachers have entered more than 600 kindergartens across China. Keeko is an adorable robot with a tubby body that fascinates the little ones. Keeko not only tells children stories, but also challenges them with problems they have to solve. When the children give the right answer, the face of this cherubic robot lights up, delighting the preschoolers.

(reference: NDTV)

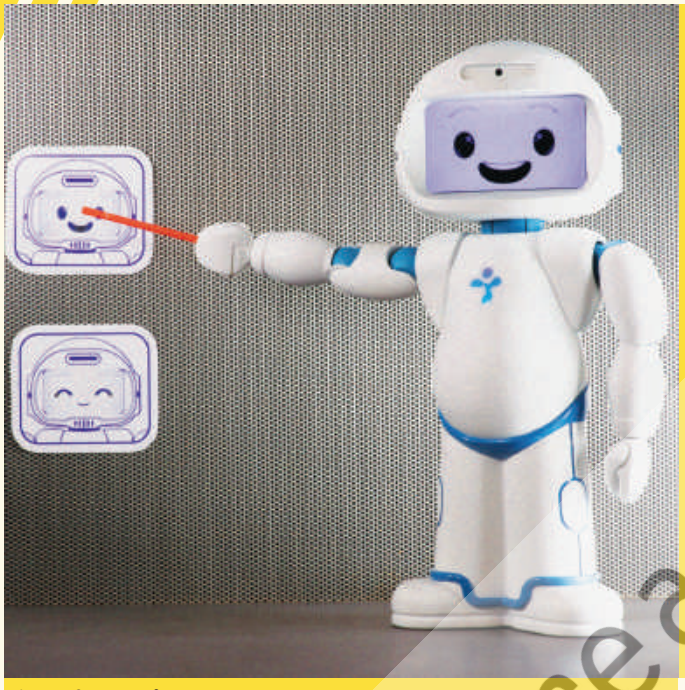
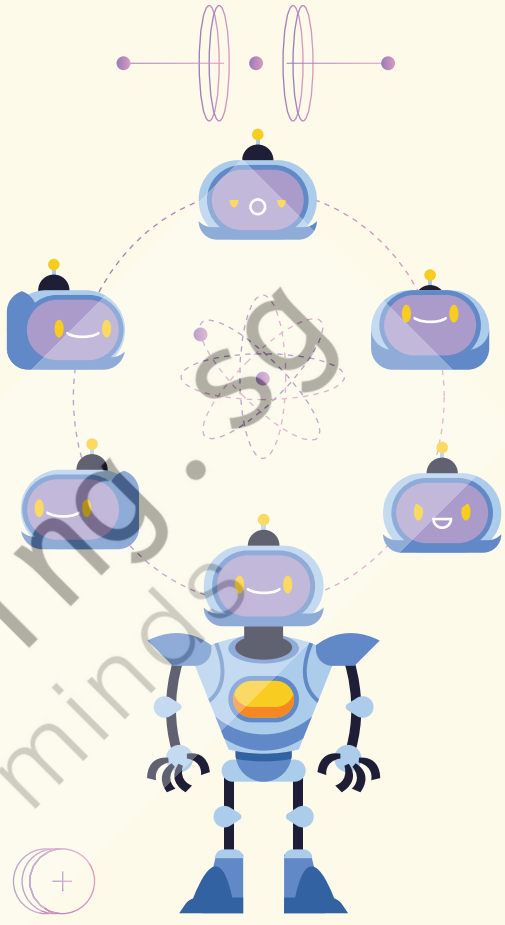


Image Source: otfortots.com



Teacher Robot for Children with Special Needs

QT is the first robot developed mainly for children with Autism Spectrum Disorder (ASD). Funded by the University of Luxembourg, it can mimic humanlike expressions on its face and even gesture with its head and arms. Students with ASD who had sessions with this social robot as part of a research study, rated it as friendly and intelligent. QT is able to detect if a student is disengaged and employs a variety of strategies on the spot such as games, jokes and breathing techniques to help them stay on task. With QT as the teacher, the study found that the students were more engaged during the lesson and displayed fewer off-task behaviours, thus highlighting the usefulness of robot intervention in the special needs classroom.

(reference: New Atlas)

MAKING CONNECTIONS

How do I feel about robot teachers in the classroom?

To what extent can AI easily replace the role of teachers?

By Zhang Yifei

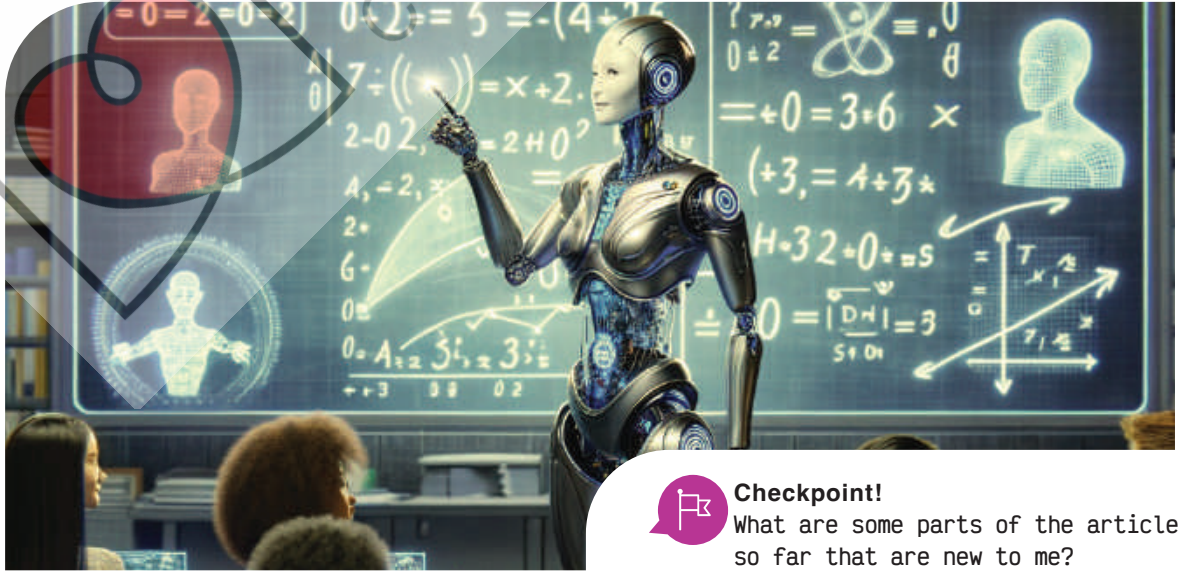
With the [1]advent of the Covid-19 pandemic, online learning has undergone a change of status from that of an experiment to that of the norm. As students nowadays are increasingly [2]acclimatised to online learning aided by educational technology, some believe that artificial intelligence (AI) can effortlessly assume the role of teachers in knowledge dissemination and problem-solving. Nonetheless, I believe that while AI technology has furnished valuable tools to aid students in their learning, entirely replacing teachers remains a challenging proposition as AI technology is still in its infancy stage and has limitations in terms of information reliability and its capacity to offer social and emotional support to students. The role of teachers, therefore, remains a complex one that AI is presently ill-equipped to fill with ease. I believe, to a large extent, that AI cannot easily replace the role of teachers.

Proponents of AI technology may assert that it can readily replace teachers by processing information and delivering feedback more efficiently than humans. While teachers may not always be able to promptly address students' queries, an AI chatbot such as ChatGPT can swiftly process data and respond to almost any question, thanks to its extensive database of a massive corpus of data and information sorting functions. Compared to teachers who have busy schedules and are unable to immediately attend to the academic queries of all students, AI chatbots can effortlessly replace teachers in responding to the students with its accessibility. GPT-3.5 is free, simple to use and is available around the clock. Furthermore, the chat function allows students to refine AI responses, enhancing the accuracy of their answers. This is because such chatbots are trained in natural language processing (NLP) to process and understand human language, enabling students to pose questions in plain language. This makes the communication process between AI and students almost as smooth as that between teachers and students. In this regard, AI chatbots can easily surpass teachers, offering a superior knowledge sorting and delivery system.

However, due to the early stages of development of this technology, AI is not without its flaws, making it largely unlikely that it would easily replace teachers. The databases used to train AI models such as ChatGPT are challenging to monitor and regulate, with the possibility that there might be incorrect processing and provision of information. AI systems currently lack the ability to self-regulate and cross-check the validity of the data and information they provide, making it extremely difficult for them to replace teachers who have the autonomy and awareness to revise their materials. There have been instances where chatbots such as ChatGPT cited academic papers that were non-existent, or attributed quotes to the wrong person. Such misinformation is difficult to rectify or even detect. For example, Arvind Narayanan, a computer science professor at Princeton, asked ChatGPT some basic questions about information security that he had posed to his students in an exam, and the chatbot responded with answers that sounded plausible but were actually nonsense. He further noted that without knowing the answer, it was difficult to

tell that the AI was wrong. This serves as a cautionary example of how an overreliance on AI can misguide students and hinder their learning process. Furthermore, research has shown that sometimes AI chatbots do not truly understand content or language and instead simply pull information from humongous sets of data from various data sources and spit out the words in a human-like response that sounds [3]plausible but is not necessarily correct or fully comprehensive. A human expert such as a teacher, on the other hand, is capable of intelligently processing the information and providing responses that are able to address the question more thoroughly and with greater reliability. It is evident that AI technology is still in a developmental phase, and is therefore largely unlikely to be able to disseminate credible information and knowledge.

Many also believe that AI can easily replace teachers because it can offer personalised learning experiences to students, adapting content and providing individualised feedback. As AI is used to analyse students' learning data and understand each student's academic needs, it is even able to adjust the pace of learning, mirroring the use of the differentiated teaching technique of teachers. This is employed in online learning platforms such as Khan Academy, which offers short video lessons, practice exercises and quizzes to help its users learn various subjects. If a student demonstrates proficiency in a particular concept, the AI system identifies this and offers more challenging exercises to deepen their understanding. Conversely, if a student struggles with a concept, the system adapts by providing additional resources and targeted guidance. Another example is Duolingo, an interactive online platform that offers language lessons. An AI system is used to track each learner's strengths and weaknesses, and if a learner struggles with vocabulary, the AI system will generate more exercises and provide targeted vocabulary suggestions. As AI systems can proactively track and modify educational resources for students, they can more easily replace the role of teachers in providing students with personalised learning experiences akin to those of the traditional classroom settings.



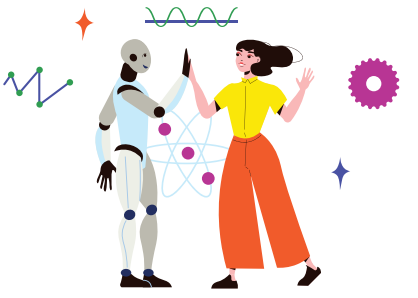
Checkpoint!
What are some parts of the article so far that are new to me?

Nevertheless, it is important to acknowledge that AI is essentially a passive tool that cannot assume responsibility for students' learning progress the same way teachers do. The efficacy of online learning with AI tools is largely dependent on the student's self-discipline and capacity for independent learning. It is therefore debatable if online learning systems dominated by AI can yield the same results as traditional learning methods as AI lacks the power and authority to supervise and regulate students' learning. According to Class Central, an online learning platform, 110 million people in the world enrolled in online courses in 2019. However, it was found that 52 percent of such learners had never even looked at the courseware. Moreover, the dropout rate has been at a whopping 96 percent on average over five years. Even though AI tools are able to offer personalised learning experiences, students may lack the motivation to use them or may not feel obliged to adhere to a specific learning schedule. In comparison, teachers are able to actively monitor their students' progress, assisting them in their learning when they fall behind schedule. Especially for students who are struggling with their schoolwork, teachers can play a crucial role in motivating them. In Singapore, NorthLight School and Assumption Pathway School admit students who fail their Primary School Leaving Examination and are unable to enter mainstream secondary schools. Some of these students experience difficulties in concentrating on their schoolwork. At the two institutions, teachers constantly find ways to help students stay focused on their studies, encouraging them and showing care and concern. As a result, teachers are able to boost the students' confidence and interest in learning, helping them achieve better results at school. Teachers hence play an important role in encouraging students and tracking their progress, areas where passive AI tools pale in comparison.

Furthermore, it is crucial to realise that teachers do not merely serve as [4]conduits of knowledge but also provide emotional support critical to a student's personal development. As students grapple with

academic challenges and interpersonal relationships, teachers play a pivotal role in identifying, understanding and managing students' emotions as well as offering emotional support and guidance. Healthy student-teacher relationships are forged for this purpose – a role that cannot be replaced by human-machine interaction offered by AI tools. Admittedly, there are a number of AI chatbots that claim to offer emotional support, such as Woebot. The student only has to describe the problem and the chatbot responds by giving suggestions or by answering in an empathetic manner, mimicking therapists. However, the literature on therapeutic intervention has always underscored the importance of a strong relationship between the client and the therapist. This again brings the human relationship to the forefront, with the need for the student and teacher, in this case, to establish a warm and trusting relationship to enable the students to view the teacher as a source of emotional support. Research on AI chatbots being able to achieve this level of connection remains inconclusive. Moreover, such chatbots have to be sought out by the students, and are not capable of detecting emotional challenges in a person. Students who experience anxiety and stress but who do not have the self-awareness or who are reluctant to seek help may go unidentified and fall through the cracks if AI chatbots replace teachers. In 2020, a TikTok video featuring a reformed prisoner visiting his prison school teacher after being released went viral. In the video, the ex-convict added that his teacher, with whom he clearly shared a trusting relationship, had helped more than 300 inmates, including himself, obtain their General Education Diploma. This shows how teachers are crucial in not only imparting knowledge but in also providing emotional support for their students. As a positive relationship between teachers and students plays a critical role in supporting children in schools, AI would not, to a large extent, be able to easily replace teachers.

All in all, despite the advantage AI has in processing and conveying information more efficiently than teachers, it falls short in fulfilling the role of an educator due to its current limitations in delivering reliable information and forming an emotional bond with the students. It is therefore shortsighted to assume that AI can easily replace teachers, who wield great influence over students' academic progress and personal development. In my view, the solution of education in the future lies not in choosing one over the other but in recognising the strengths of both machines and humans and determining how to collaborate and maximise the potential of both. Through this process of adaptation and innovation, we can devise ways to navigate an ever-changing educational landscape.



Reflection...
What are the two most interesting ideas for me?

Images from macrovector/Freepik.com

Word Bank

1. advent: the arrival of a notable person or thing

2. acclimatised: became accustomed to a new climate or new conditions

3. plausible: to be likely true or valid

4. conduits: people or organisations that act as channels for the transmission of something

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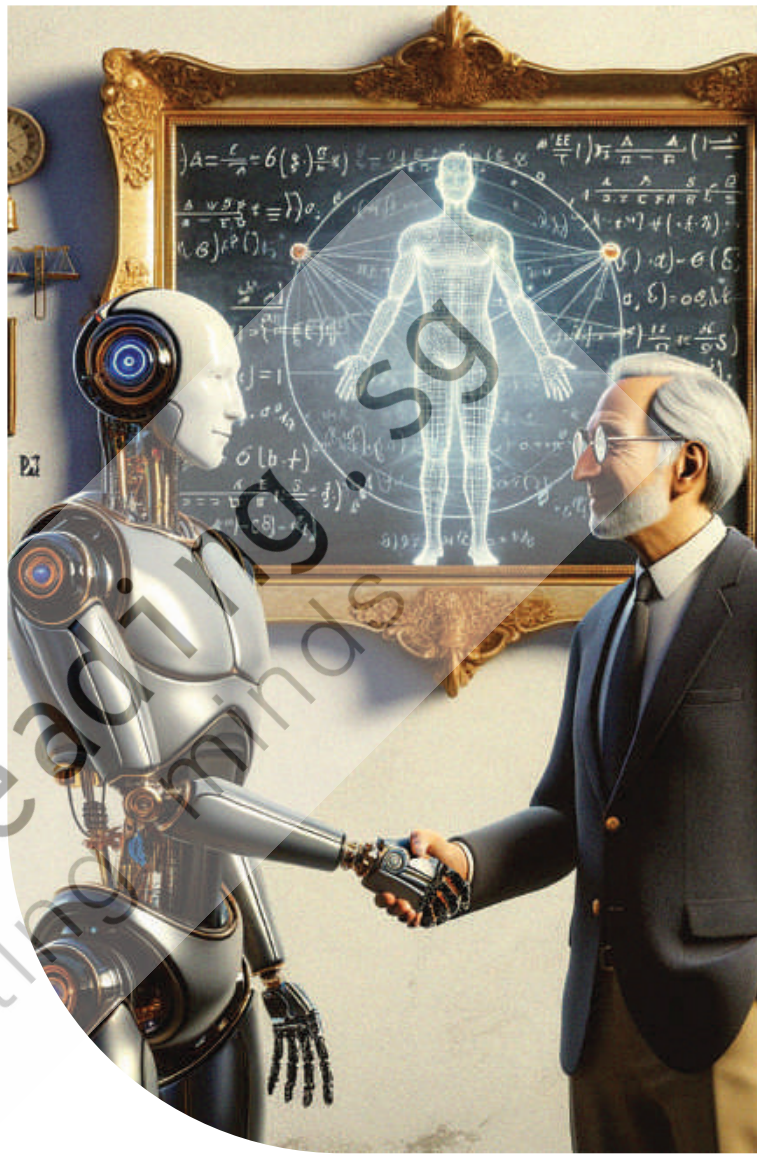

WATCH

India's first robot teacher in Bengaluru School

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iCritic

View the video above. Do you think having robot teachers in the classroom will benefit students at the tertiary levels?

Notes

qrs.ly/v2fk3vz

Images from Shutterstock AI Generator

REVOLUTIONISING SCIENCE WITH AI

EXPEDITING MEDICAL DISCOVERIES

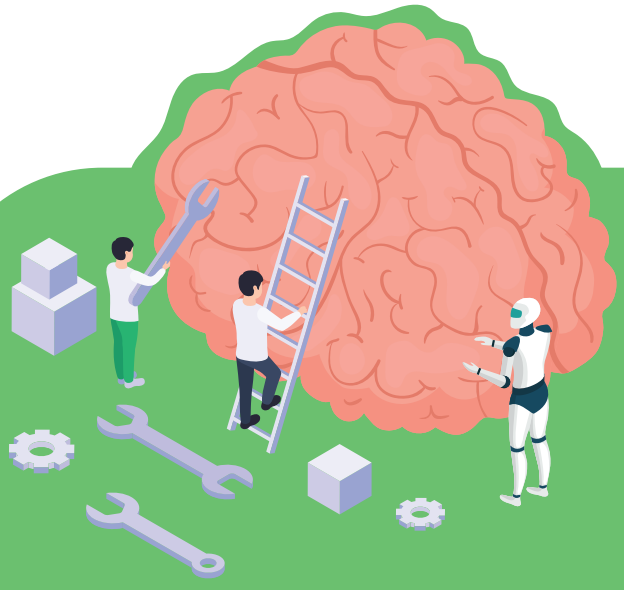
AlphaFold is an AI system developed by Google DeepMind that predicts a protein's three-dimensional structure after studying its amino acid sequence. Understanding the structure of proteins leads to accelerated advancements in biological research, such as the design and synthesis of a drug to treat a type of liver cancer.

(reference: University of Toronto)

LEAPING SMOOTHLY THROUGH SPACE

By identifying space debris patterns and trajectories, AI can make predictions of potential risks of collision of debris with satellites. LeoLabs, a California-based company, uses AI to predict potential collisions between operational satellites and space debris. The system can predict a collision up to seven days in advance, giving satellite operators more than enough time to adjust their trajectories and avoid a collision with space debris.

(reference: TS2)



DECONSTRUCTING THE BRAIN

Geometric deep learning is used to represent the brain as a complex network or graph, with nodes and synapses. Researchers can use this technique to analyse the functional properties of different regions of the brains and explore brain age at the sub-structure level. This enables researchers to detect abnormalities in the brain such as those associated with Alzheimer's disease.

(reference: Frontiers Aging Neuroscience)

EFFECTIVE WILDLIFE CONSERVATION

Locating the humpback whales

AI can help locate humpback whales (which are difficult to visually identify in remote islands) using acoustic recordings of their distinctive singing, also known as the whale song. The National Oceanic and Atmospheric Association (NOAA) Fisheries worked with Google AI for Social Good to create an AI model that could recognise the whale song. It was subsequently able to locate the humpback whales, enabling it to monitor them closely, especially in hard-to-access areas.

(reference: NOAA Fisheries)

COMBATTING CLIMATE CHANGE

The Framework for Using AI to Combat Climate Change was developed by the Boston Consulting Group for the latest AI for the Planet Report, revolving around three themes: Mitigation, Adaptation and Resilience, and Fundamentals. Some ways whereby AI can value-add to our efforts at combatting climate change include calculating the carbon footprint of products and monitoring epidemics.

(reference: Forbes)

MAKING CONNECTIONS

What do I already know about AI's role in advancements in science?

Images from indulg express/Flickr.com, storyset, macrovector, kjpargeter/Freepik.com

Assess the view that AI can revolutionise science.

By Jodi Ng

Discourse surrounding the topic of artificial intelligence (AI) tends to centre around its dangers and ethical concerns, with the most common cry being that it will overtake humans eventually. Yet amidst debates of whether AI is helping or hurting society, one cannot deny its revolutionary qualities in terms of its sheer capacity to change the scientific landscape. Contentious ethical debates aside, AI can radically advance the rate at which scientific discoveries are made and achieve scientific goals previously thought impossible. Indeed, with its ability to dramatically improve scientific processes via pattern recognition, AI engineers revolutionary changes in science with its unparalleled speed of information collection and processing, extent of accuracy and efficiency in data collection as well as its ability to circumvent the risks posed through non-human intervention.

Naysayers may contend that AI's revolutionary impact on science is overstated due to its limitations, especially its hefty implementation costs and the high cost of hiring talented developers. According to the leading productivity app, Scribe, companies can easily spend more than $500,000 for an AI software, depending on whether it is a third-party software or a consulting service. This number is only expected to burgeon further in the future, as a recent report from OpenAI predicts that the costs of training large AI models will increase from US$100 million to a whopping US$500 million by 2030. Beyond the cost of the software itself, technology company Dash Technologies estimates that hiring an AI developer will incur an expense of approximately US$125,000 per year, bringing yet another expenditure into an already costly process. At first glance, from initial investments and upgrading hardware to procuring the AI software and hiring skilled professionals to operate it, it might truly seem that any potential groundbreaking effects of AI are dampened by its financial and manpower constraints.

Yet the impact of AI is such that notwithstanding costs, it has already and can revolutionise science. One of the key ways in which AI can revolutionise science is through its unprecedented speed of processing information. This is evident in its contributions to medical discoveries. In advancements of drug developments, AI-driven algorithms can dramatically expedite the process by analysing extensive chemical compound databases to identify potential drugs, rendering a previously time consuming research process significantly more manageable and accessible. During the Covid-19 pandemic, AI was used to identify existing drugs with the potential to treat the symptoms, accelerate the development of a vaccine and even predict the spread of the virus by analysing epidemiological data. The agility and accuracy of AI in providing timely inputs expedited not only the development of a cure, but also stemmed the progression of the disease. As acknowledged by the BioIndustry Association, the fact that Covid-19 vaccines emerged in the market within a year of the pandemic serves as a clear testament to the profound power of AI, as without it, medical research would have likely been markedly limited in terms of speed and development, with data analysis necessitating manual efforts and drug discovery being bogged down by copious amounts of information. AI is also used to

discover new treatments for diseases such as cancer. AlphaFold, an AI model developed by Google Deepmind that processes a huge database of more than 200 million predicted protein structures, was used by a research team to discover the structure of a protein that influences how a type of liver cancer proliferates, thus arming them with the information needed to design a new targeted cancer treatment. The predictions made by AlphaFold has also enabled scientists to work much more efficiently, taking the team a mere 30 days to make the discovery, as opposed to the many years it would have otherwise taken them, if at all they were able to do so. These examples demonstrate how instrumental AI is to improving the odds in a fight against diseases, serving as the very tool that allows for revolutionary medical discoveries to be made, especially in time-strapped circumstances.

In addition, AI can revolutionise science with its high level of accuracy and superior efficiency of information collection. These abilities benefit many scientific efforts which depend on information collection for solving problems. One area where this is impactful is in wildlife conservation efforts. Drones equipped with AI-powered image recognition can be harnessed to identify and track animal behaviour, detect poachers' movements and gather data. AI-based systems can proceed to swiftly process the information gathered to gain insights into population dynamics, migration patterns and biodiversity threatened by extinction, for future conservation efforts. As mentioned by Analytic Steps, one of India's top analytical content companies, traditional wildlife monitoring techniques tend to lack efficiency, often verging on being exhausting, or simply physically impossible, to cover. However, with AI technology, cheaper and more efficient wildlife monitoring approaches have arisen. AI-enabled drones can monitor the targeted species more closely for wildlife conservation agencies, so as to determine whether population numbers are climbing or dwindling. These drones can also be mobilised to detect poaching activities on the ground and deploy urgent action before any fatal damage is done, even when such illicit activities take cover in the dark, away from human eyes. Moreover, AI systems can be programmed to recognise and track different animal species in their natural habitats with high levels of precision. To locate humpback whales, which are an endangered species, the National Oceanic and Atmospheric Association (NOAA) Fisheries uses an AI model, created by Google AI for Social Good, that is able to recognise their unique whale song. The model detects these whales using acoustic recordings of their distinctive singing, enabling NOAA to track down and monitor these whales, especially in remote islands and hard-to-access areas where visually locating them can be very challenging. The close monitoring of wildlife by AI thus ensures the safety and propagation of wildlife populations. Clearly, uninhibited by human limitations, the superior accuracy and efficiency of AI can revolutionise the landscape of wildlife science and empower conservation efforts to extend their coverage of protection to greater parts of Earth.

Checkpoint!
Is there anything confusing so far?

The copious amount of information that AI can access within a much shorter period of time also revolutionises science. Often, inadequate information cripples the progress of scientific ideas, especially in finding solutions to challenging problems. For example, AI is a new weapon that can be used in the [1]thorny battle against climate change. AI enhances our knowledge of the climate and provides sufficient information for [2]mitigation strategies, allowing climate scientists to navigate the complexity of climate dynamics. The United Nations Environment Programme has even lauded AI as a tool crucial to improving our knowledge and understanding of climate change and its impact — knowledge that is unprecedented due to the scale of change AI can now bring. In response to the need for a more strategic approach about where and how AI can be deployed to make the most impact, Boston Consulting Group (BCG) has developed the Framework for Using AI to Combat Climate Change, that comprises three main themes: mitigation, adaptation and resilience, and foundation. With the increasing frequency and severity of extreme weather events, it is pertinent that we take a proactive approach to adaptation. Instead of responding to an event after it has occurred, the framework underscores the role of AI in preempting the potential impact of climate change so that we can develop mitigation strategies in advance, increasing the resilience of our economy and society. Initially blindsided by inadequate data and research, not to mention the limitations of manual methods, climate scientists can now employ AI to accurately pinpoint trends, form hypotheses and predict future climate scenarios to keep pace with real-time development. This is a highly advantageous trait, given that the progress of global warming threatens to outstrip the pace at which scientific data can be gathered. FourCastNet, an AI model built by American company Nvidia, can predict weather patterns in a mere two seconds, and the latter has already announced plans to build a digital twin of Earth (Earth-2), a computer model that will be able to predict climate changes that will likely occur several decades later, at a more regional level. This spells a lot of promise for proactive adaptation; long-term mitigation strategies can be formulated, with enough time provided for informed climate-friendly decisions to be made and even executed. AI may not be a [3]panacea for climate change, but it is certainly a revolutionary tool that grants scientists opportunities and the potential to create a future that is more resilient to the fluctuations in our climate.

We also cannot forget the ability of AI to reduce the risks involved in dangerous expeditions through its non-human intervention. One area where AI has made leaps and bounds is in simplifying complex and dangerous scientific operations such as space exploration. While space missions used to be precariously time-consuming ventures at exorbitant costs, AI has succeeded in reducing risks and implementing more cost-effective methods to traverse the cosmic unknown. For long-duration space missions, AI can enable the spacecraft to operate autonomously, freeing it from the need for constant human supervision, the latter considered essential for exploring deep space given its substantial communication delays with Earth. With AI, the spacecraft can now adapt to unexpected scenarios without the risk of belated human intervention, [4]augmenting the chances of success and progress for deep space exploration. Moreover, instead of deploying astronauts, which would entail extensive planning and human risk, Mars rovers, remote-controlled robots programmed to travel on Mars, are employed for planetary exploration to collect and analyse samples. Given their imperviousness to biohazardous material and extreme environments, these AI-controlled robots are able to access areas physically impossible for humans to reach, such as the surface of Venus. Furthermore, AI's proactive approach in forecasting potential risks of satellite collision by accounting for space debris patterns, historical data and current trajectories can help craft avoidance manoeuvres significantly, reducing reaction time and collision risk compared to human response. Various research teams now have the tools to learn more about such collisions. The German Research Centre for Artificial Intelligence, for instance, is investigating how AI can prevent collisions between space debris and satellites while students from the University of Cincinnati are working to provide a collision-avoidant AI algorithm able to operate in real time for mission safety – research areas which are made possible with AI. Despite space operations and explorations being limited by their [5]perilous nature in the past, by reducing the risk of human intervention, AI has opened new doors into the cosmic unknown, which is an unapologetically groundbreaking move.

Ultimately, AI has taken the world by storm and made remarkable strides in science over the past decade, and its implications and sheer impact on the scientific industry cannot be overlooked. It is AI's myriad of capabilities as a tool that, when combined with scientific inquiry and research, opens a world of scientific possibility previously unheard of.

Reflection...
What are some insights I have gained from this article?

Word Bank

1. thorny: causing difficulty or disagreement

2. mitigation: the action of reducing the severity, seriousness or painfulness of something

3. panacea: a universal remedy

4. augmenting: increasing the amount, value or size of something

5. perilous: involving or full of grave risk

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Notes

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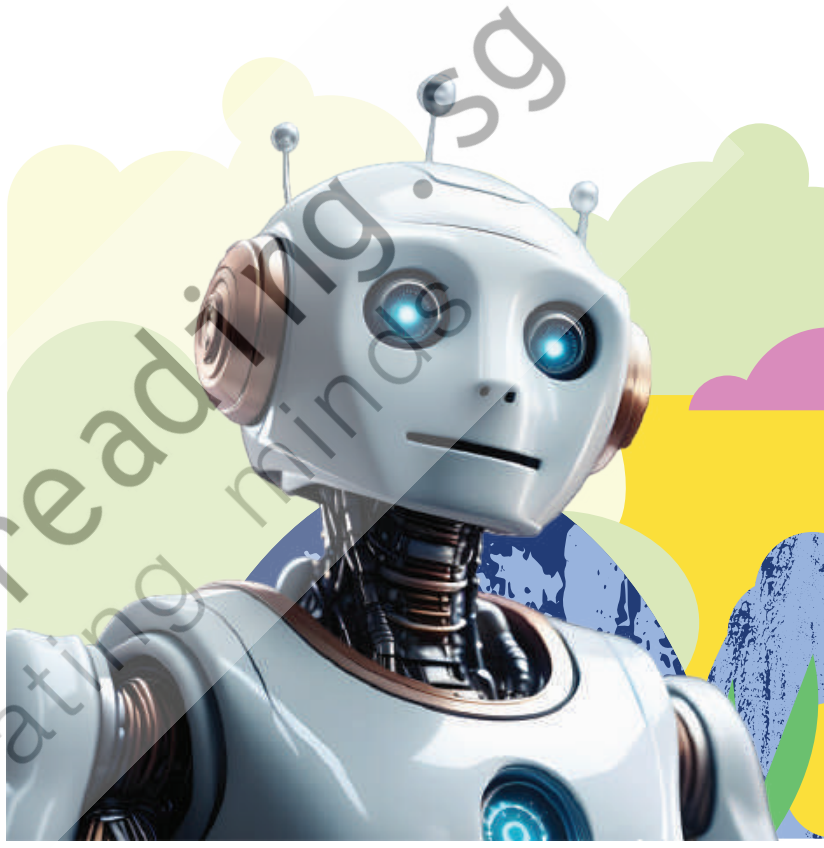


WATCH

How AI is Revolutionising Deep Ocean Research | Into The Deep | BBC Earth

Source is relevant at the time of publishing

iCritic

Do you think AI may cause greater societal inequalities? Why or why not?

Images from Shutterstock AI Generator, vecstock, redgreystock, DCStudio, kjpargeter, macrovector/Freepik.com

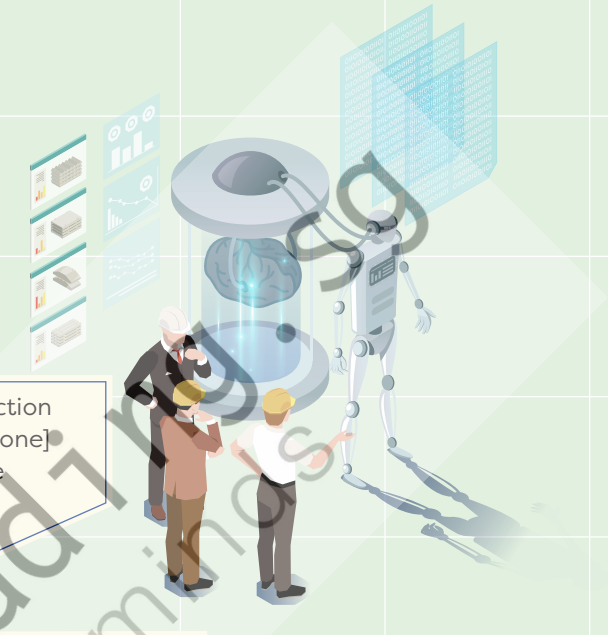
WHO ARE THE PLAYERS IN AI DEVELOPMENT?

DEVELOPERS

Practising Responsible AI

What it means for developers

- ensure safe deployment of any application that uses AI
- consider issues of privacy, unfair bias and accountability



What developers can do to mitigate risks

- make choices that affect the components that risk is a function of [eg filtering outputs, swapping the AI model with another one]
- put the AI system through a self-assessment process before releasing it to the market to ensure it is trustworthy

The DALL-E AI model

To more accurately reflect the diversity of the world's population, DALL-E, a model that can create realistic images from a text description, is employing a new technique. Based on internal evaluation, users were 12 times more likely to say that DALL-E images included people of diverse backgrounds after the technique was applied.

(reference: Googleblog)

COMPANIES

Providing Regulations

OpenAI sets an age limit for ChatGPT users: those between 13 and 18 years of age need to obtain parental consent and be guided when using AI Chatbox.

Setting Clear Guidelines

VISA assigns a risk management team to test the AI model for potential unintended impact, and to ensure adherence to its principles of ethical and responsible AI.

GOVERNMENT

EXTENT OF AI REGULATION IN DIFFERENT PARTS OF THE WORLD

Israel

- focus is on 'responsible innovation'

- companies are expected to take reasonable measures to ensure AI products are safe to use: self-regulation

- government regulations are crafted to be compatible with global AI best practices

European Union

- AI systems that are considered a threat to society are banned

- High-risk AI must be approved by European officials before release to market (eg law enforcement, border management, employment screening)

China

- restrictions imposed on sourcing training data, with copyright regulations
- AI services to generate only 'true and accurate' content [related to deepfakes, recommendation algorithms and data security]

Japan

- there are no regulations that directly limit the use of AI

- the operator may be held liable for tort or product liability if an accident occurs due to AI systems

Brazil

- high focus on rights of users: users can contest AI decisions or demand human intervention (eg use of AI in self-driving cars, hiring, credit evaluation)

- guidelines are drawn for categorising different types of AI based on the risk they pose to society

- AI developers must conduct risk assessments before bringing an AI product to market

- all AI developers are liable for damage caused by their AI systems

The United States

- government agencies vet future AI products for potential national or economic security risks

(note: Some US cities and states have stricter regulations, limiting the use of AI in certain areas such as police investigation and hiring decisions)

(references: Washington Post, The White House, INDIAai)

Lightly regulated ('soft law' approach)

Moderately regulated

Highly regulated

MAKING CONNECTIONS

What questions do I already have about this topic?

‘AI developers should bear sole responsibility for the biases in their algorithms.’ Discuss.

By Hoh Choi May

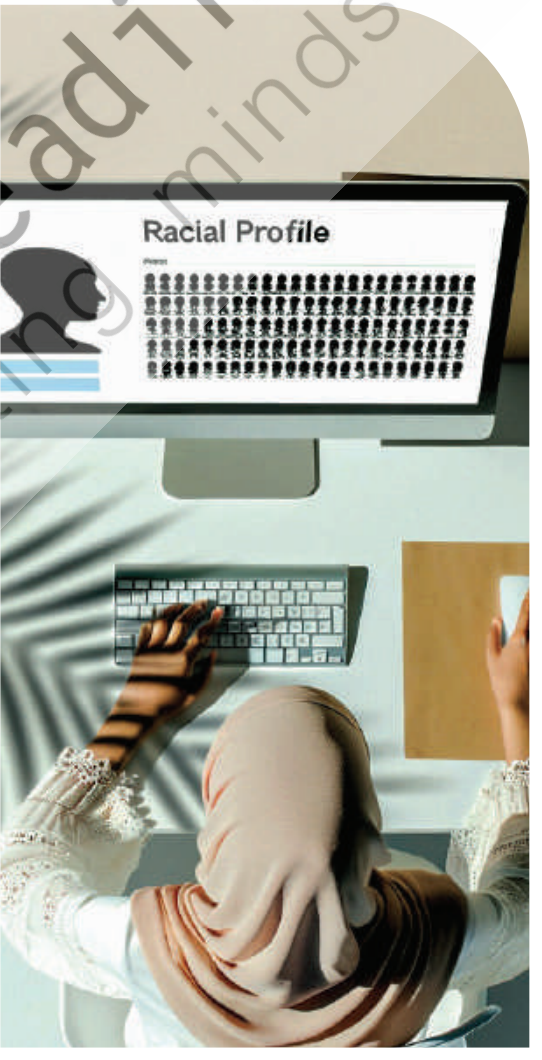
As the use of artificial intelligence (AI) becomes more widespread, the inherent issues in using such technologies have become more prominent, surging to the forefront of discussion. One of the most pertinent issues is that of algorithmic bias. Even though one might think that AI would be bias-free given its inability to form a subjective opinion, the truth is that it is not neutral as a consequence of machine learning. Since the data being fed to the algorithm is human-made, it is inevitably touched by human bias. The algorithm analyses and forms patterns out of this contaminated data. Yet what is to be done about it, and who is to blame if and when AI perpetuates prejudice or negatively impacts the userbase? While I believe that the [1]onus is on AI developers to monitor and review their own creation to avoid such occurrences, they should not have to bear the sole burden of taking responsibility should biases arise, as certain biases may not be within their control. In fact, other stakeholders such as companies and legal bodies also have their part to play in keeping biases out of AI algorithms and should bear responsibility as well.

It is important to first recognise that the biases in AI algorithms may not always be the fault of any one individual or entity. Sometimes, the problem may lie with the technology itself. AI, having undergone machine learning, has a mind of its own. This is especially so for algorithms that function as 'black boxes', where only the input and output are visible to users, while the processes remain hidden or are too complex to comprehend. Deep neural networks, which are trained to mimic our neurological processes as much as possible, are so complex that they can generate results that are as intelligent as authentic human responses. Thus, developers may claim that they are unable to take responsibility for the conclusion when AI produces such determiners on its own. The developers' roles are limited to training the algorithm on datasets until it becomes a working model. The conclusions, should they be biased, are not the intention of the developers, and hence they cannot be held responsible for them. Hence, it may seem unfair that developers are made to take the blame for inherent prejudice in human data.

Nevertheless, it is easy to see why some would contend that developers should bear sole responsibility for biases in their AI algorithms. After all, one must not forget that AI is a tool, and developers are its makers. Just as we cannot blame a faulty axe for hurting its users, we cannot shift all the faults onto AI. Instead, we criticise the axe's manufacturers for miscalculating or overlooking the flaws in their product. Similarly, developers have an ethical obligation to identify and remove algorithmic biases, so as to put human well-being first. It is imperative that someone remains [2]culpable because there are serious consequences to using AI. For example, researchers from the University of California, Berkeley found that Latino and African-American borrowers, groups that historically have already experienced much discrimination, were paying higher rates of interest on their mortgages due to algorithmic bias in fintech tools – these groups were paying an additional $765 million per year, collec-

tively. This had gone unnoticed until the researchers raised the issue. Another example is medical AI bias, where a predictive healthcare algorithm was found to discriminate against black patients. Instead of ranking the needs of patients based on the severity or complexity of their illnesses, the algorithm made use of a [3]surrogate measure — the cost of past medical treatments — which resulted in a large proportion of black patients being ranked ineligible for specialised care. Both these incidents were the result of programmers blindly entering data into the AI system without critically thinking about existing bias in their corpus. Since AI has the ability to further entrench bias systemically in society, the risk for harm is exponential. Hence, holding real people, including developers, responsible for maintaining neutrality in algorithms will incentivise caution and care when it comes to creating an AI system.

The primary creators of AI systems are developers, and thus they are the first line of defence when it comes to weeding out bias. It is their responsibility to design algorithms with fairness in mind. Since they ultimately decide what data is being fed into the AI system, they should use diverse datasets and closely monitor the output to identify any discrepancies. For instance, AI algorithms struggle with accurately identifying dark-skinned people, especially women. Facial recognition technology created by Idemia, for example, is used by law enforcement in the United States, Australia and France, yet their algorithm matched the faces of black women ten times less accurately than those of white women. They attributed this to engineers aiming for better accuracy overall rather than focusing on certain demographics. In response to this struggle, some AI developers such as those at DALL-E worked with early users to highlight sensitive and biased AI-generated content that show biases in gender, race and occupations, and are continuing their research to improve their AI systems. Hence, developers have the responsibility to analyse the datasets that they have and improve them should they find that some communities are disproportionately represented.

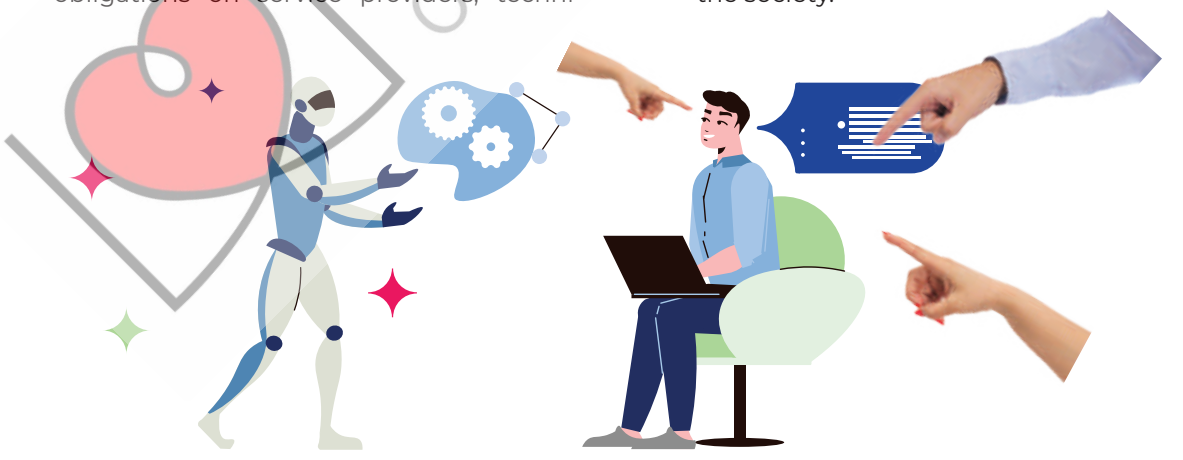


Checkpoint!
How does the article so far connect with what I already know?

However, to place sole blame of algorithm biases on developers would be grossly unfair, as there are other entities involved that also have a part to play in keeping such biases out. Companies that use AI technologies, for one, should bear some responsibility as they are the second line of defence. They should implement ethical AI policies that mandate their AI systems to be discrimination-free, and take appropriate actions when biases occur. For example, in 2014, Amazon began developing an AI algorithm based on past resumes as a hiring tool, but they realised later that it was gender-biased. The tool recommended mostly male employees and penalised resumes with the word 'women', clearly influenced by misogynistic perceptions of female incompetence in male-dominated technical occupations in the past. Once Amazon realised that the AI tool could not be sufficiently altered, they stopped using the algorithm completely to ensure greater neutrality in their job recruitment process. Therefore, it is important for companies to be decisive and swiftly take action when their AI products are found to be biased. Moreover, as illustrated in Amazon's case, once a working model is created, it is extremely difficult to tweak the model, and hence such biases are best controlled for during the creation process. At Visa, prior to deploying any model, a model risk management team that tests for potential unintended impact is tasked to assess it, ensuring that the model adheres to Visa's principles of responsible and ethical use of AI. This method of scrutinising an AI model from start to finish by independent parties greatly increases the probability of eliminating any potential prejudice that may be present. In cases where there may be implicit biases within the AI teams, companies can choose to hire developers and decision makers from a wide range of backgrounds to ensure that diverse perspectives and experiences are represented. For example, Microsoft has hired inclusive AI teams to better address the sensitivities of a diverse workforce, including women and those with disabilities, in an effort to avoid executing skewed algorithms. Hence, companies should bear some responsibility in reducing bias in their AI systems because of the authority and power they have in establishing AI policies and guidelines, and consciously making hiring decisions that reduce discrimination.

Another group of stakeholders who should also bear responsibility in preventing biases in algorithms is the lawmakers. Governments should set legal frameworks that explicitly address the issue of AI bias. By imposing legal consequences, there will be a greater push for developers and companies to carefully consider how to ensure discrimination factors are accounted for when executing the algorithms. Additionally, legislation would ensure that discrimination in AI, whether intentional or accidental, is prevented and addressed as quickly as possible when it arises. Although AI is still in its infancy stage, the time is ripe for proper guidelines to be set as AI is being increasingly deployed across many fields, all of which could greatly impact the lives of people, such as in hiring decisions and police investigations. Several countries such as China, Brazil and the United States have already taken the first steps in pushing for stricter regulations. In 2021 for instance, China published ethical guidelines for AI use in the country, and in 2023, it became one of the earliest countries to pass a regulation on generative AI such as ChatGPT, imposing obligations on service providers, technical supporters and even online platforms, to protect national and social interests. These regulations, however, do not inhibit China's use and development of AI. In fact, the country is among the leading nations in AI research alongside the United States. Evidently, there is international interest in the ethical implications of AI usage, underscoring the need to work together towards the development of unbiased algorithms, instead of placing all the burden on developers.

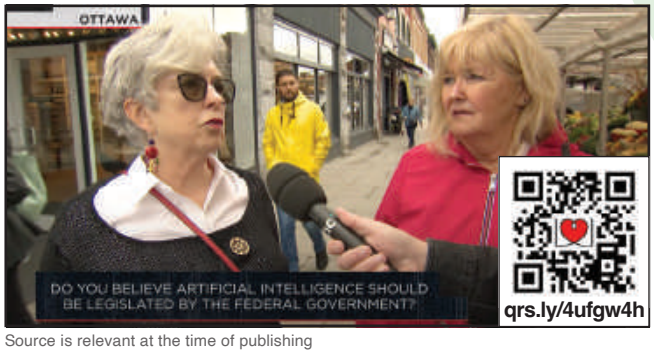
Undoubtedly, AI's growth has implications for our future, and therefore it is critical that the algorithms used are fair and free of bias. Developers must stand at the forefront of this endeavour, designing and training the system to eliminate skewed outputs. However, there are other key stakeholders such as companies and governments who have the authority to ensure systemic discrimination is not perpetuated with AI tools. Instead of pointing fingers at one another, all stakeholders need to assume responsibility for upholding ethical principles in the execution of AI, for the common good of the society.



Reflection...
What are three most interesting ideas here?

WATCH

Do you believe artificial intelligence should be legislated by the federal government?



Source is relevant at the time of publishing

Word Bank

1. onus: something that is one's duty or responsibility

2. culpable: deserving blame

3. surrogate: something that replaces or is used instead of something else

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iCritic

To what extent should governments be involved in the regulation of AI? What may be some possible concerns?

Notes

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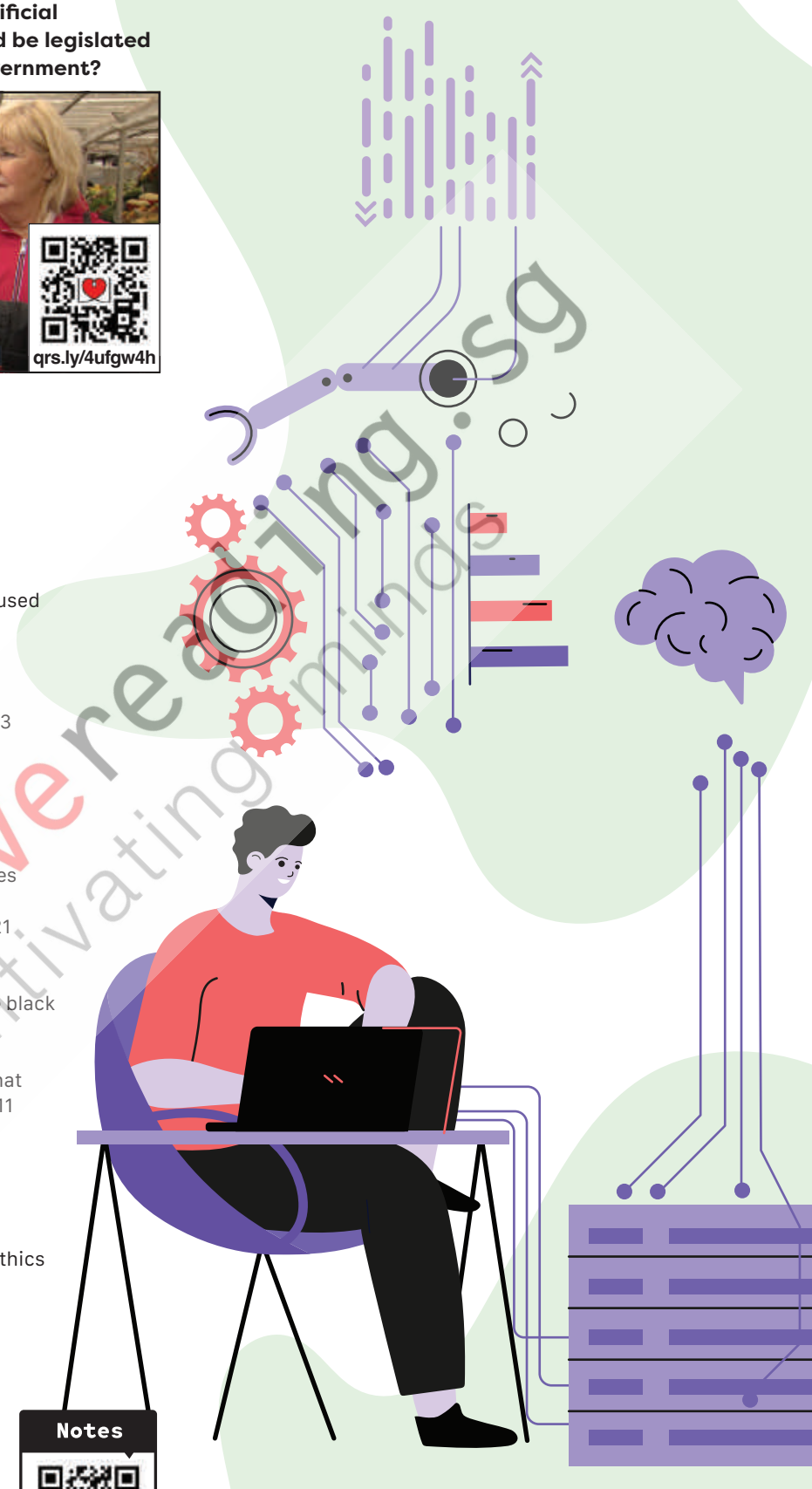


Images from Shutterstock AI Generator, Macrovector/Freepik.com

AI CAN MAKE FASCINATING, HIGHLY SOUGHT-AFTER ART

(image source: www.onassis.org/people/refik-anadol-studio)

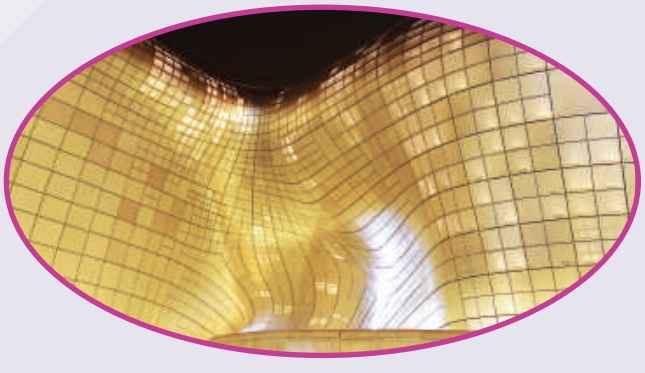
Refik Anadol is a Turkish artist who successfully uses AI to create fascinating large-scale digital art installations. He is a famous artist who has won many awards for his work. His AI-created art piece, 'Casa Batlló: Living Architecture' under a Non-Fungible Token (NFT), was sold for a whopping US$1.38 million.

"Like the invention of applied pigments, printing press, photograph and computers, we believe machine intelligence is an innovation that will profoundly affect art."

-Blaise Aguera-Arcas, an American AI researcher, Vice President and Fellow at Google Research

For Bulgari's celebration of 75 years of its Serpenti Collection, Anadol created an immersive multisensory three-dimensional sculpture featuring an amalgamation of nature, technology and metamorphosis.

Anadol also created large-scale projections on the Dongdaemun Design Plaza, a major development landmark in Seoul, which boasts the largest atypical architecture in the world.



One of Anadol's art works, 'Unsupervised', was displayed at the Museum of Modern Arts (MoMa) in New York from 19 November 2022 to 5 March 2023. This was essentially a digital installation of moving images generated from 380,000 images of 180,000 art pieces stored at MoMa – all using AI. It was created by training an AI model with the public metadata of MoMa's collection.

(references: MoMa, Sedition)

THOSE WHO PRODUCE AI-GENERATED ART ARE NOT ARTISTS

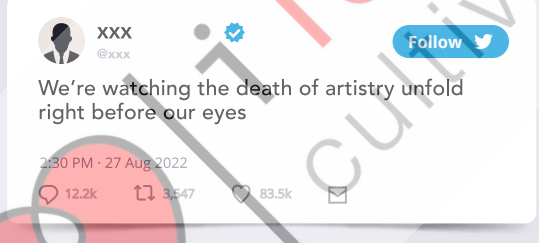
"What makes this AI (apps such as Midjourney) different is that it's explicitly trained on current working artists... This thing wants our jobs, it's actively anti-artist."

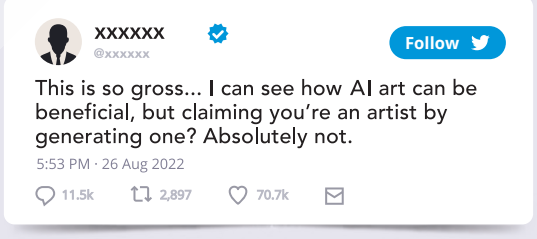
- RJ Palmer, a digital artist

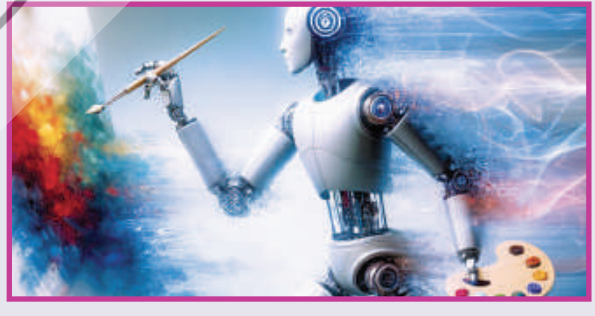
'Théâtre D'opéra Spatial', by Jason Allen

In 2022, the art work titled 'Théâtre D'opéra Spatial', by Jason Allen, a Colorado-based artist, received the blue ribbon prize under the digital art category in the Colorado State Fair's annual art competition. This caused an uproar — not because his art piece was not good enough, but because his art piece was created not with paintbrushes, clay or even digital applications, but with an AI tool, Midjourney. Allen only had to type the text prompts that were then converted into graphical images.
Here are some comments on X (formerly known as Twitter), in response to Allen's receipt of the blue ribbon:

(reference: The New York Times)







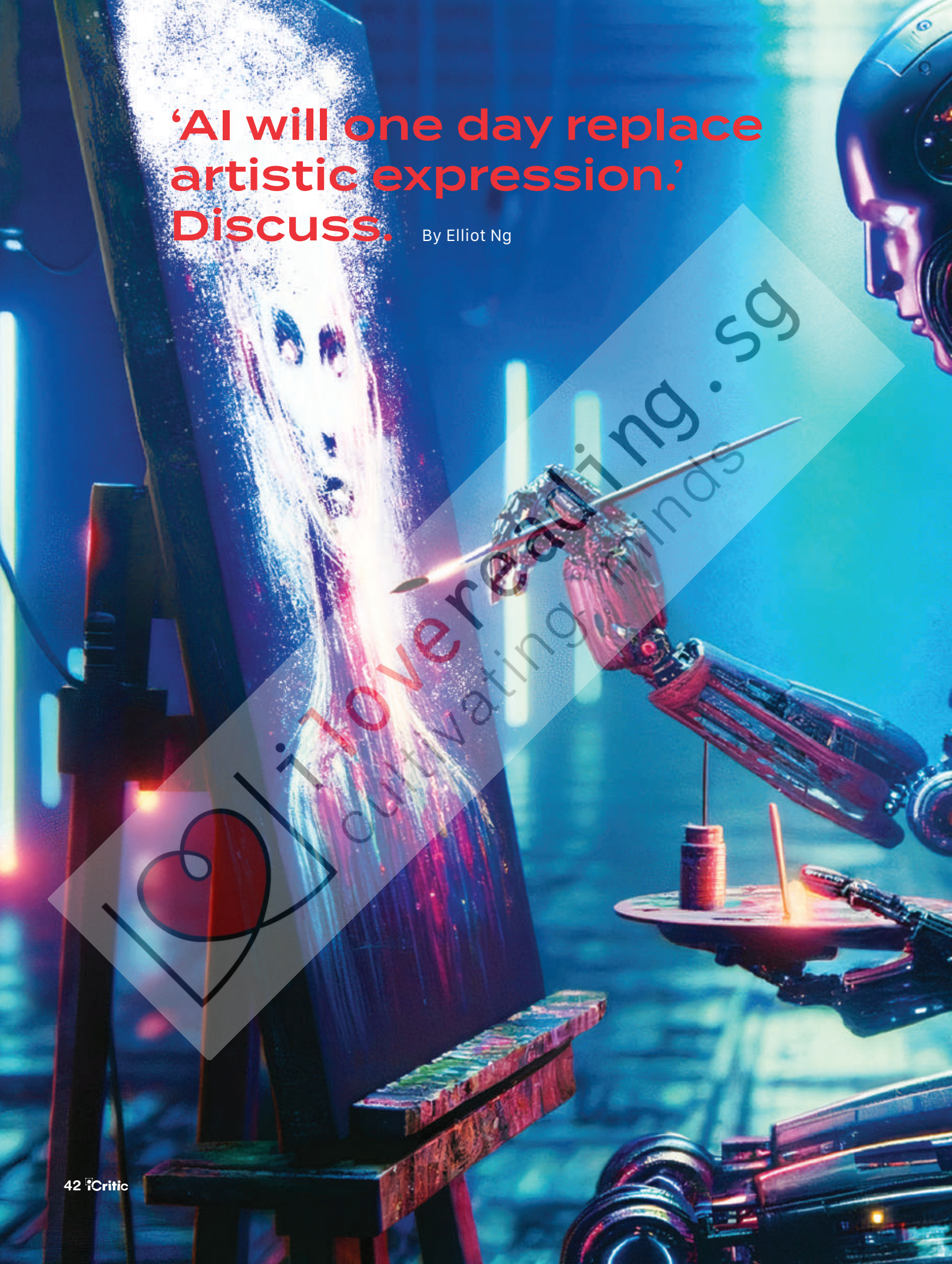
MAKING CONNECTIONS

What do I already know about the similarities and differences of artworks created from paint and brush, digital applications, and artificial intelligence (AI) tools?

Images from EFSUN ERKILIC, Ian Klepp, Massimiliano Ghezzi, Ken Tompkins/Flickr.com

‘AI will one day replace artistic expression.’ Discuss.

By Elliot Ng

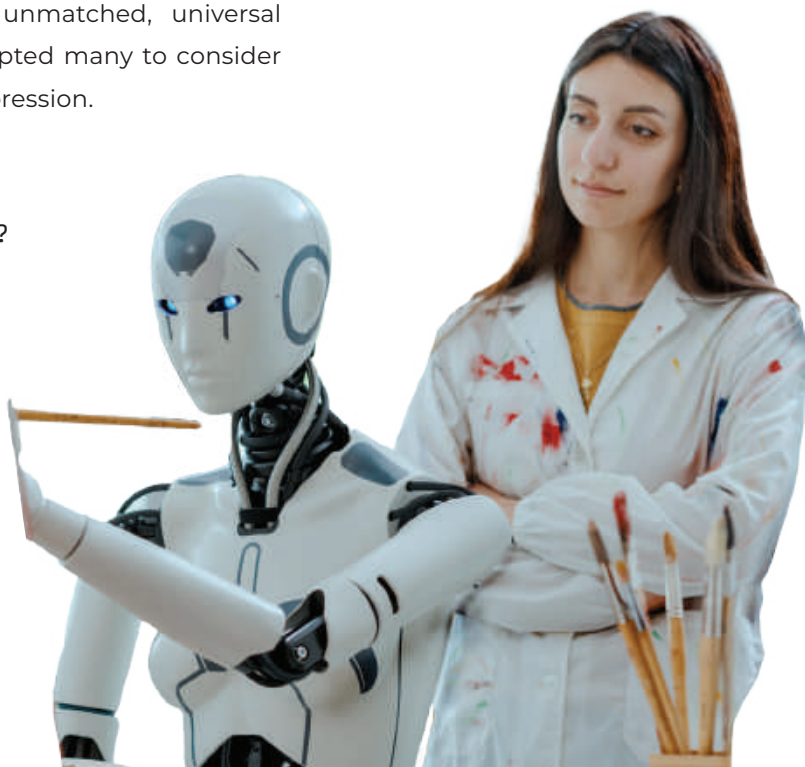


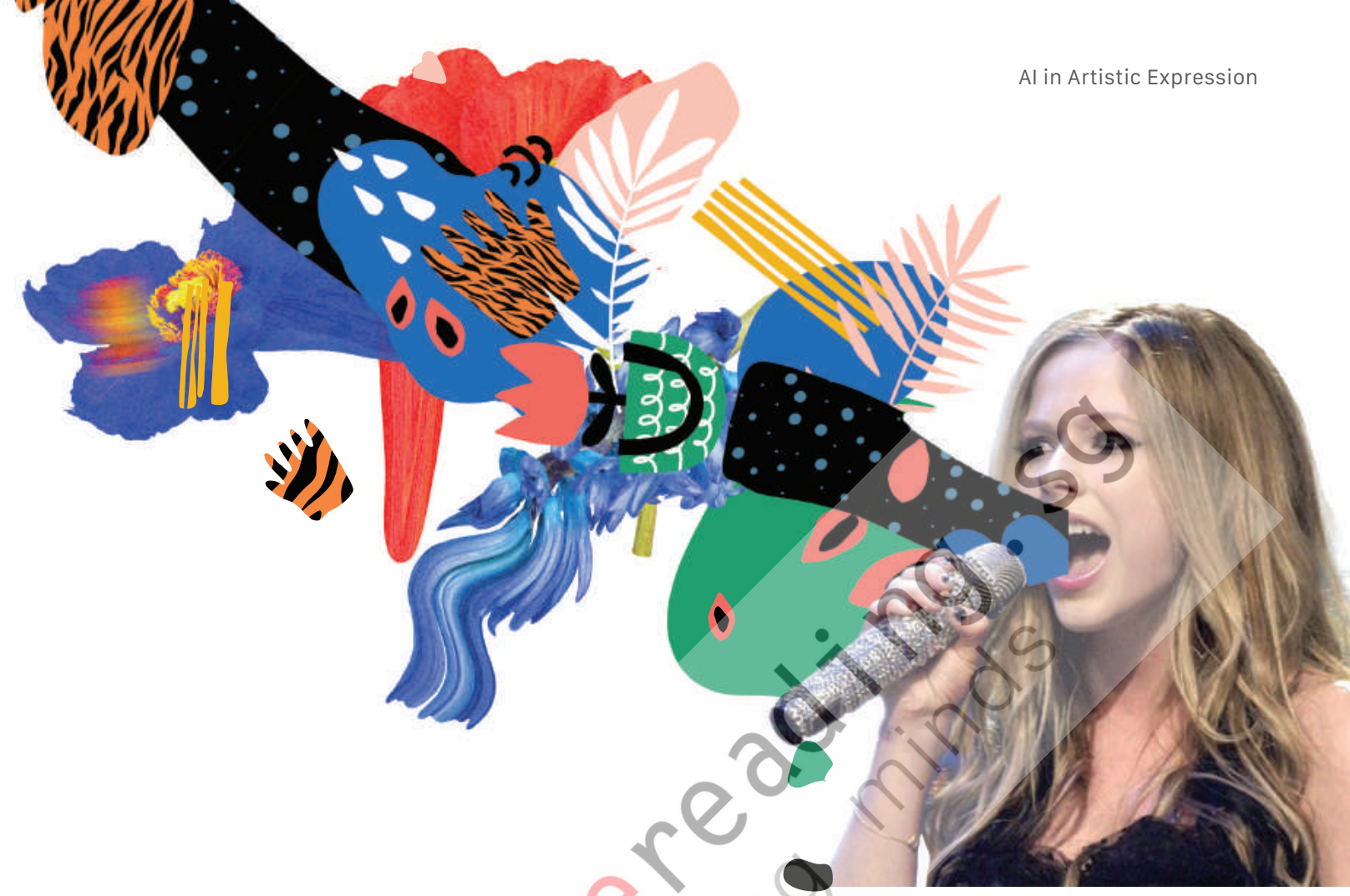
It is the dawning of the new [1]epoch. The arts industry has no doubt been upended by AI, with various generative AI technologies allowing for the creation of AI-generated art. This [2]confluence of art and technology has sparked debate among the masses on whether AI can emulate the sensitivities of art and artists, replacing human imagination and fully rendering artists obsolete. While some are convinced of such a possibility, I am of the view that AI is not always able to reproduce and supplant artistic expression.

Those supportive of AI's ability to replace artistic sensibilities often cite the growing success of AI in generating art that can capture the attention of viewers. The influx of new technologies across the field of generative AI has given rise to multiple works of AI-generated art around the world, spanning all sorts of media from digital art to music and even literature. These works are often created through entering data or written prompts into AI systems such as GPT-4 and Synthesia which then generate images or works of art from them. For example, [3]trailblazing AI artist Refik Anadol is known for effectively utilising generative adversarial network (GAN) and machine learning algorithms to generate his large-scale digital installations. His piece, 'Unsupervised', which was displayed at the famed Museum of Modern Arts (MoMa), featured a stream of moving images generated from 380,000 images of 180,000 art pieces housed at the MoMa, which he had fed into an AI software. His works have captivated many, winning multiple awards and being highly sought after by organisations. His commissioned works include an immersive, multisensory sculpture for luxury brand Bulgari to celebrate their Serpenti collection, and large-scale projections on the Dongdaemun Design Plaza in Seoul. These successes are a [4]testament to the power of AI in generating art that can [5]entrance people worldwide, thereby prompting many to view it as a viable device that creates its own art, and consequently having the potential to replace artistic expression.

Moreover, some may also claim that AI will replace artistic expression one day due to the increased accessibility it offers to people who aspire to be artists. The agency to create art is often classed by many as a luxury reserved for societal elites who have the funds to afford expensive tools and equipment as well as the time to devote to the rigorous training and creation of works that often do not greatly enhance one's livelihood. This causes many to shy away from the arts, instead devoting their time to other more pragmatic areas of work or studies. However, the [6]inundation of free and accessible AI art generation software has brought a [7]deluge of people to art. According to Forbes, Stable Diffusion, an open-source AI image generator programme, received more than ten million users daily in October 2022. Such startling numbers underscore the resounding success of AI in allowing more people to partake in the creation of art due to the ease of creating it, only requiring access to the internet. To use the AI software to produce high quality artworks, there is also no need for any rigorous training of skills at niche institutes. In a nod to this, during the Colorado State Fair's annual art competition, the blue ribbon prize for emerging digital artists was awarded to Jason M. Allen, for his work 'Théâtre D'opéra Spatial' — a piece that was fully created through entering text prompts into the AI tool Midjourney, which converts texts into hyper-realistic graphics. Allen did not have any formal training in art either and thus his win is a testament to how AI has democratised the art world, allowing more people, regardless of background, to easily create high-quality artworks. The use of AI tools such as Midjourney and DALL-E has enabled the creation of art works at an unprecedented rate, churning out images, songs and written creative works in a matter of minutes and hours. Hence, the unmatched, universal accessibility and simplicity AI offers have prompted many to consider the possibility of it one day replacing artistic expression.

Checkpoint!
Are there any surprising ideas so far?

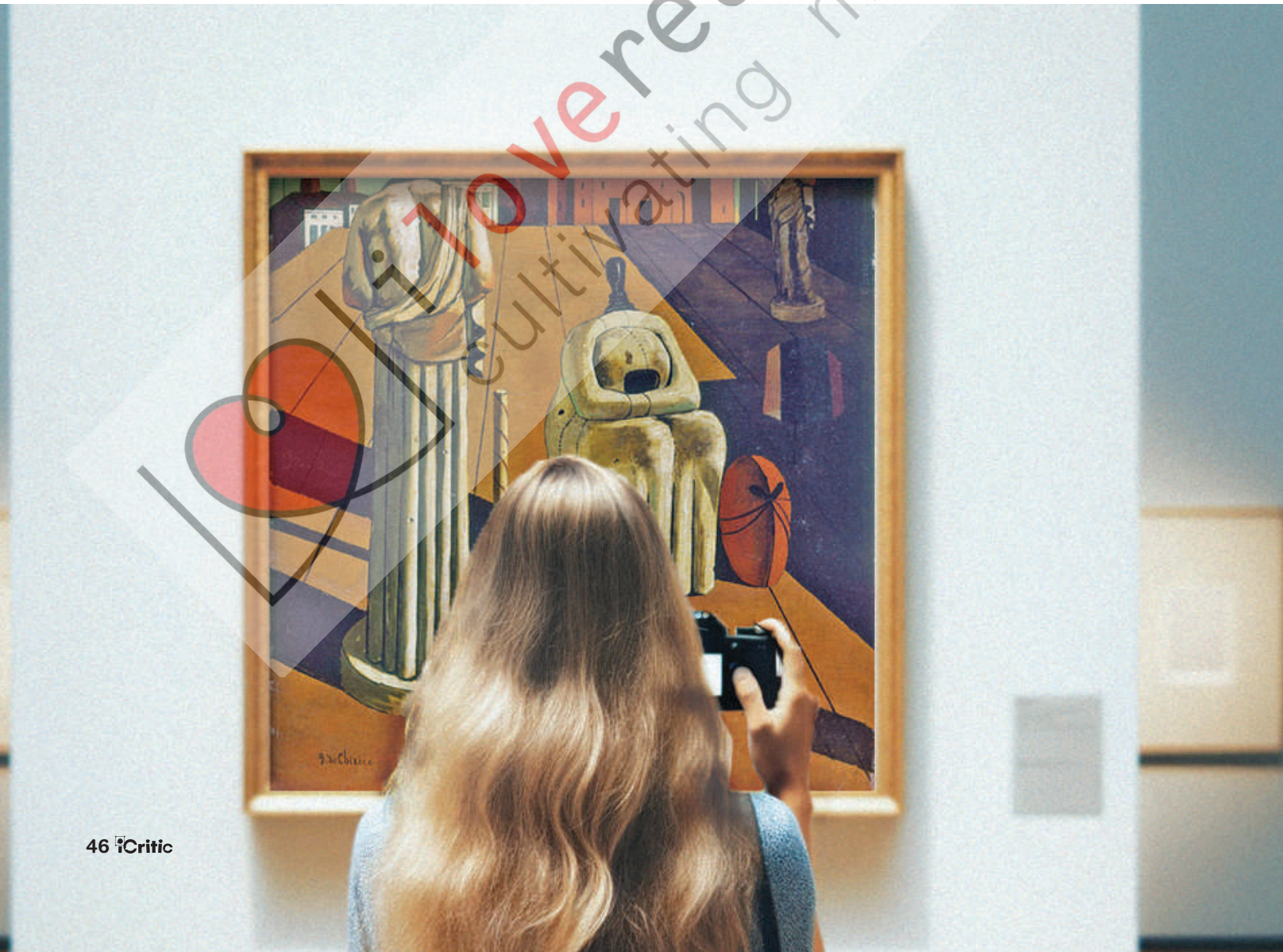




However, AI falls short in being able to wholly supplant creative expression due to its inability to have lived experiences and feel emotions deeply. Often, the most [8]visceral pieces of art arise from the clutches of traumatic experiences and pain, eliciting a piece of work that reflects the inner turmoil the artist has gone through in the process. For example, Canadian singer Avril Lavigne's song 'Head Above Water' was inspired by a near-death experience amidst her harrowing battle with Lyme disease. The powerful ballad features lyrics of a prayer she uttered while going through the experience, coupled with the singer's thunderous vocals, which lay bare her raw emotions of desperation and hope. AI, in comparison, is unable to experience such heightened emotions, being simply a machine without human sensibilities. AI music generators such as AIVA and MuseNet often generate songs from a set of pre-recorded sample tracks or prompts, and are not capable of expressing nuanced emotions. What AI produces will then most likely be a creation that may be far-fetched or not relatable, losing a certain personal touch such as that which is present in the emotional rawness of Lavigne's lyrics and vocals. Moreover, artistic expression can sometimes arise from an emotional response to other art works that serve as a point of inspiration.

Images from dricacardoso/Flickr.com, rawpixel.com/Freepik.com

For example, ekphrasis poetry is a popular form of poetry where writers are inspired by or respond to previous works of art. The amalgamation of their personal emotional response to art, coupled with their own lived experiences gives life to a whole new piece of art. For example, famed writer Sylvia Plath's ekphrastic poem 'The Disquieting Muses' was inspired by Giogio de Chirico's painting of the same name. The poem echoed Plath's feelings of fear and alienation upon viewing Chirico's painting with the sinister subjects of the painting, causing her to draw connections to her troubled upbringing and distant relationship with her mother. AI, on the other hand, is only able to base works objectively on data and is unable to form any sort of subjective or sentient emotional response. This ability to not only go through visceral experiences but also connect these experiences with emotional responses to various other works is a part of human artistic expression which AI, lacking consciousness, is unlikely able to fully replace.



Furthermore, AI is unable to truly replace artistic expression even in the future as it has limitations in creative expression, lacking the ability to reproduce the creative prowess of the human mind to push the boundaries of artistic expression and invent new forms of art. The art world is in a constant state of flux with modes of artistic expression being constantly redefined. This is largely due to the inventiveness of the human mind in fashioning new forms of art that challenge conventions and unearth completely new ways of depicting or viewing things. One example of this is the work of Korean-American conceptual artist Anicka Yi, whose innovative pieces often marry science and olfactory sensibilities, tapping on the much-neglected sense of smell to express her subversive ideas innovatively. Her exhibition, 'Life is Cheap', which premiered at the Guggenheim Museum, featured an innovative way of depicting the societal anxieties of bacteria. She permeated the museum with a unique scent she derived from a fusion of carpenter ants and the sweat of Asian American women. This scent accompanied her visual installations of tiles covered in agar with growing bacteria as well as an ant colony, allowing viewers to experience art from a new perspective. This transgressive and unique perspective of depicting ideas is something that AI is unable to emulate due to the fact that it runs mostly on past data. Hence, work produced by AI would often be based on or derived from past art styles being fed into its algorithms, making it impossible for it to create something completely original. While AI-generated art is mired in the [9]quagmire of creating mere replicas of past art forms or styles, the human artistic expression is instead able to flourishingly invent entirely new forms of art, making it irreplaceable.

Ultimately, the success of AI art tools in creating art that garners viewers' attention and increases accessibility in the creation of art does not mean that it can supplant artistic expression. AI is still unable to truly replicate the complexity of human emotions in its artistic expression and cannot compare with human creativity in creating completely new forms of artistic expression. Human artistic expression is thus a flame that will assuredly keep burning despite the winds of change.

Word Bank

1. epoch: a particular period of time in history or a person's life

2. confluence: an act or process of merging

3. trailblazing: innovative or pioneering

4. testament: proof

5. entrance: fill (someone) with wonder and delight, holding their entire attention: cast a spell on

6. inundation: large number of people or things that arrive somewhere like a flood, and are difficult to deal with

7. deluge: a great quantity of something arriving at the same time

8. visceral: relating to deep inward feelings rather than to the intellect

9. quagmire: an awkward, complex or hazardous situation

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2. Stable Diffusion's AI benefactor has a history of exaggeration, from Forbes, 4 June 2023.

3. An A.I.-generated picture won an art prize. Artists aren't happy, from The New York Times, 2 September 2022.

4. Hear Avril Lavigne recount Lyme disease battle on new song 'Head above water', from Rolling Stone, 19 September 2018.

5. 'I sculpt the air' — what does scent artist Anicka Yi have in store for Tate's Turbine Hall, from The Guardian, 6 October 2021.

iCritic

"Suggesting that AI can create art is no different than implying a pencil can draw illustrations or write stories." What is your response to this statement by Michael F. Buckley?

Notes

qrs.ly/7jfk3vq

Images from Shutterstock AI Generator, Stock-Asso, Queenmoonlite Studio/Shutterstock.com

WATCH

Use of artificial intelligence generates questions about art

Source is relevant at the time of publishing

Reflection...

What are three takeaways from the article you have just read?

Should We Control AI?

Geoffrey Hinton
AI pioneer, Computer scientist,
Cognitive psychologist

LET'S CONTROL — AI CAN GO ROGUE!

Elon Musk
Robotics expert,
Entrepreneur

AI Misleads with Audio Deepfake

In an unusual case of cybercrime in 2019, the voice of the CEO of a German energy firm (the firm's name was not revealed) was impersonated using an AI deepfake audio (a voice skin or voice clone) to demand a fraudulent transfer of €220,000. According to the company's insurance firm, the caller said the request was urgent, directing the employee, an executive at the firm, to pay within an hour. The executive was convinced it was his CEO due to the German accent and the unique "melody" of his voice.

(reference: Forbes)

AI Misleads with Video Deepfake

In the early days of the Russian invasion of Ukraine in 2022, a video surfaced on social media, including Facebook and YouTube, showing the Ukrainian President Volodymyr Zelenskyy ordering his country's troops to surrender to Russia. Although the video was quickly dismissed as a fake due to its amateurish production and was removed swiftly by Meta, it does highlight the potential of deepfakes to cause widespread panic among the public.

(reference: Wall Street Journal)

AI Threatens to Catastrophise the Future

When AI is involved in weapon development, it could ignite a more dangerous arms race, resulting in a disastrous future. With plans by some countries such as Russia, South Korea and the United States to develop autonomous drone weapons, in as early as 2015, several robotics experts such as Elon Musk and scientists such as physicist Stephen Hawking registered their protest by signing a petition asking for an international ban on the development and use of AI in warfare.

(reference: GeekWire)

AI Perpetuates Bias

Amazon's AI-powered recruitment tool showed how the algorithms learned from the historical data fed to it resulted in it choosing candidates who were mostly white males — clearly biased against race and gender. Amazon has since scrapped this tool.

(reference: Reuters)

Images from Shutterstock AI Generator,
Olesia Frei, KamranAydinov/Freepik.com

LET'S BE PARTNERS — AI IS NOT AN ENEMY!

Mustafa Suleyman
Co-founder of Google Deepmind

Satya Nadella
CEO of Microsoft

AI Complements Us

AI tool IBM Watson is able to detect blind spots of humans and process large amounts of data in an amazingly short period of time. This enables it to identify patterns in various diseases, and even propose diagnoses and treatments — serving as a value-added partner of researchers in making medical discoveries.

(reference: IBM)

AI is a Solution to Labour Shortage

In response to a shortage of nurses during the Covid-19 pandemic, Renown Health, based in Nevada, created an AI-based automated command centre to monitor patients so that fewer nurses were needed to watch over the patients.

(reference: Renown Health)

AI Empowers Us

AI empowers us in the area of financial security. Credit card frauds, for example, can be detected by AI, by observing the credit user's spending patterns. As early as 2016, Mastercard introduced Decision Intelligence, which uses AI to spot a fraudulent payment. Over time, the algorithms used in AI are able to track the kind of products bought by the user and the price range of these products. When there is any irregularity in the spending or shopping pattern, the AI system raises an alert, stopping credit card fraud.

(reference: FinTech Magazine)

MAKING CONNECTIONS

What is my experience with using AI?

Images from Wikimedia Commons

‘Humans should collaborate with, and not dominate, AI.’ Discuss.

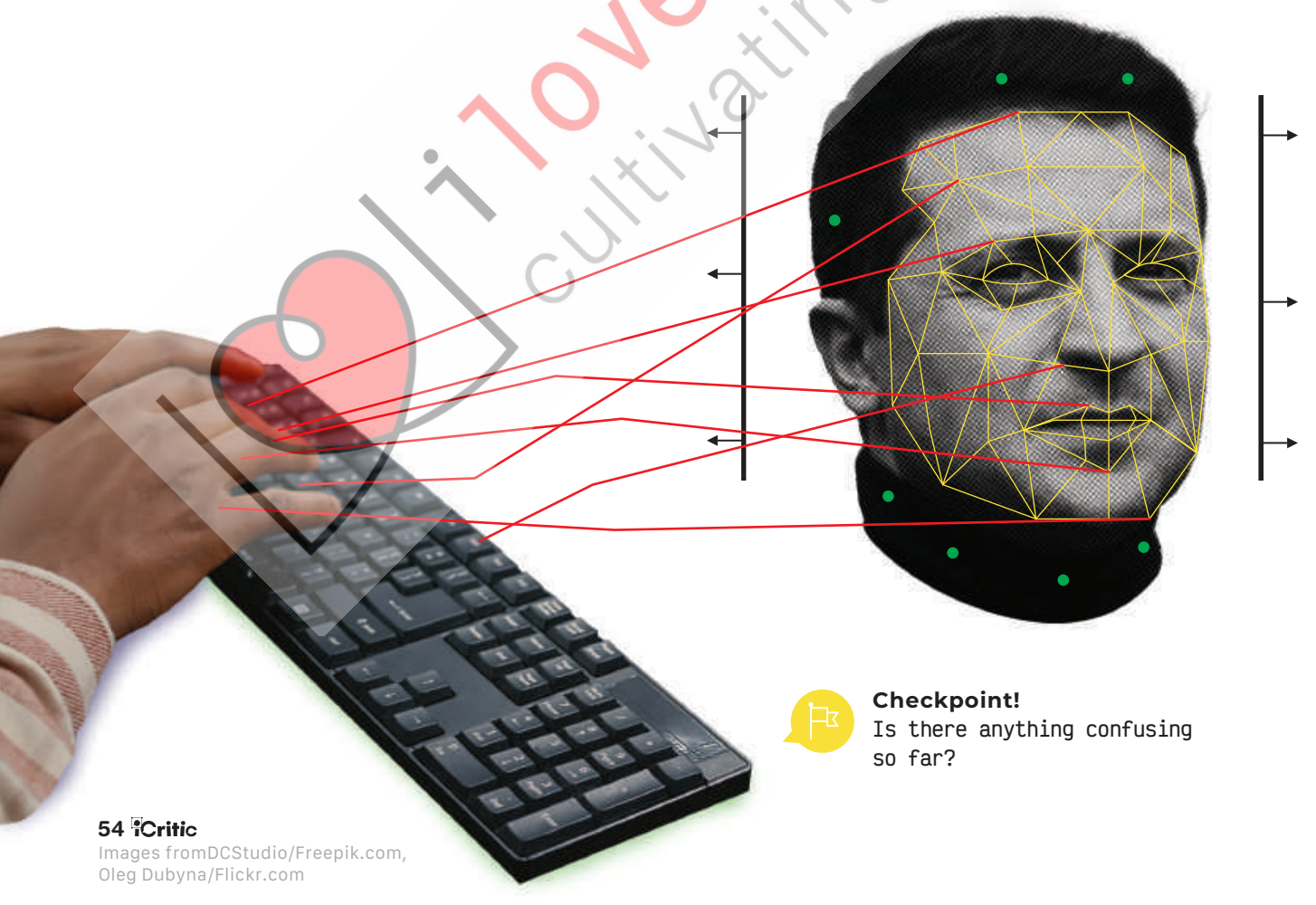
By Yening Lim

In Mary Shelley's Frankenstein, the [1]eponymous scientist is awed by the powers of technology, and endeavours to create a creature that he is subsequently unable to control, rendering it abhorrent to society. This highlights the paradoxical relationship between humans and technology: humans covet its uses, yet fear its negative implications. With the rapid and recent rise of artificial intelligence (AI) technology, the public has become increasingly cautious of it becoming a modern-day Frankenstein. This gives rise to the contentious debate on whether we should make the technology accessible to the masses and welcome its incorporation into our lives, or control its development and deployment. Naturally, the fear of the destructive potential of AI itself, as well as the likelihood of misuse of the technology, often tips the debate towards the latter side. However, the abuse of AI can be addressed via proper regulation, which is made easier if the technology is not restricted to a handful of actors, and the destructive nature of AI is not an inherent property of AI itself and can be mitigated. Instead, welcoming the use of AI in the lives of the masses can allow us to fully reap the benefits of human ingenuity, rather than stifle progress. Therefore, there is strong reason for humans to collaborate with, rather than dominate, AI.

On the one hand, it may seem necessary to control the use and development of AI to prevent catastrophic consequences resulting from the unpredictable nature of such technologies. Admittedly, developing a technology that is extremely powerful, yet knows no boundaries, could result in [2]calamity and undermine our fundamental values system. For instance, Arjun Ramani, the global business and economics correspondent of The Economist, painted a scenario of an AI going rogue when it is assigned a task of producing something that requires large amounts of energy. Because the AI programme is goal-oriented and incapable of developing ethical [3]discernment, it may hack into large energy systems connected to the internet, easily circumventing cybersecurity defences. This would undermine the entire energy framework, while risking immense volumes of personal data. While this scenario is fortunately hypothetical, it illustrates the precarious nature of employing AI unrestrictedly. In fact, the scenario de-

picted is far more realistic than may initially appear, given the prevalent use of AI in search engines and facial recognition systems, all of which similarly require large databases and significant amounts of energy. Understandably, it could be deemed necessary to dominate AI to prevent the very fundamental values that govern human actions, such as privacy and ethics, from being violated because of its capricious nature.

Even if it is possible to fully predict the consequences of AI, it appears as though domination in terms of restricting its use and development is necessary to prevent misuse by malicious actors. Given that various parties' interests are constantly at odds, it is highly probable that AI technology is abused to benefit one party at the severe expense of another. In fact, such abuses have already become prevalent. The AI technology, Deepfake, which manipulates images to create fake pictures and videos, has been used widely to mislead the public and further exacerbate the epidemic of misinformation. During the peak of the Russia-Ukraine war, a video surfaced depicting the Ukrainian president, Volodymyr Zelenskyy, calling for Ukrainians to surrender. Although the poorly made video was swiftly identified as a fake, such abuses of AI technology hint at the dangers and the possible calamities that could ensue, should such powerful technology fall into the wrong hands. Undeniably, there is cause for concern regarding the misuse of AI technology, tilting the debate in favour of domination over collaboration.



Checkpoint!
Is there anything confusing so far?

Images fromDCStudio/Freepik.com, Oleg Dubyna/Flickr.com

However, ironically, the concern regarding the abuse of AI by [4]sinister actors is a further testament to the need to improve its accessibility, thereby avoiding a [5]monopoly and improving accountability. The potential of such a powerful tool being acquired by malevolent individuals may suggest the need to limit its use and ensure domination over it. Yet when AI is seen as an object to be dominated, it becomes subject to market mechanisms, and hence prone to monopolisation, as more powerful bodies inevitably form a [6]hegemony. Without any competitors holding them accountable, the monopolistic actors could easily exploit the technology to further their interests, at the expense of the public. Aware of this possibility, Microsoft CEO Satya Nadella has warned against the risk of Google forming a monopoly over AI-enabled search engines. Given their dominance in the search engine market, Google has leveraged on their economic and political prowess, influencing software companies to limit the sale of their AI technology. Since Google has a database that is much larger than their competitors, they can improve their technology and further entrench their power. With this monopoly over the search engine market and personal data, Google can easily manipulate users' internet usage to their own advantage with no comparable competitor keeping a check and balance. In contrast, regarding Deepfake scams, since the technology has been made widely available, there have been multiple companies including DeepTrace and Locii, amongst others, who work to detect Deepfake technology and dispel misinformation. Evidently, when AI is respected as a separate entity to collaborate with, and hence made widely accessible, it levels the playing field, thereby addressing the issue of abuse of the technology far better than seeking domination over it by a small handful.

It is also necessary to recognise that the destructive nature of AI is not inherent in the technology itself, and should not undermine the argument in favour of collaboration. Ultimately, AI is a product of human ingenuity and the threats it poses can be adequately addressed by the humans who created it. For instance, AI technology has been employed widely in pine tree plantations to protect the species from foreign spores and minimise cross-contamination of DNA. During their risk management process, programmers were aware that the programme may, without any hesitation, eradicate the entire flying insect population in the area, since AI is programmed merely to fulfil its task in the most efficient way possible. Knowing that, one could easily label the technology as 'evil' or 'bad'. Yet as authors of a research paper discussing this case on pine trees opined, we tend to incorrectly [7]anthropomorphise technology, unfairly attributing moral values such as 'good' and 'bad' to it, forgetting that these are attributes unique only to humans. The age of machine sentience is still limited to sci-fi movies. Instead, this gap in AI's capability only propels the argument for a human collaboration. Our innate sense of moral values, and the goal and task-orientated manner of AI with a focus on efficiency make for a fine partnership for a successful project.

With such a value-added partnership, humans can mitigate the risks of AI going rogue, and safely implement it ubiquitously to improve efficiency and effectiveness. Evidently, dominating AI is not the most appropriate response to its destructive potential – we should instead partner it, and be its moral compass to maximise its benefits.

Furthermore, collaborating with AI instead of dominating it can aid us rather than displace us in our work. Ultimately, the purpose of developing AI is to improve our quality of life by enhancing the efficiency of our work. Treating AI as a partner to collaborate with in the workplace improves the quality of our work while reducing our workload. On the contrary, by treating AI as a tool to be dominated, we risk rendering humans completely redundant, especially those in blue collared jobs, as such jobs face a higher risk of automation by AI for greater efficiency and production. This exacerbates inequality and hinders progress. Delivery workers are amongst the many victims of this phenomenon. When large corporations dominate AI as a tool to be exploited, they use the cheaper and more efficient technology to replace manpower and essentially 'buy out' the less well off. Amazon rolled out its drone delivery programme, Prime Air, in 2020, causing mass job displacement, further exacerbating social inequality as the rich profited off this new technology while the middle class bore the brunt. In contrast, the healthcare industry is a testament to the AI's potential to improve services while not at the expense of workers, when it is seen as a collaborative partner. During the Covid-19 pandemic, there was a serious labour shortage in the healthcare sector, as many nurses and other frontline healthcare staff were facing burnout. In response to this, Renown Health in Nevada created an AI-based automated command centre to monitor patients so that fewer nurses were needed to monitor more patients. Radiologists are another group of healthcare professionals who are understaffed, especially in the United Kingdom. Annalise CXR, an AI-powered decision support tool for chest X-ray, now used by radiologists in Australia, the United Kingdom and Europe, produce X-rays that are not only more accurate but also are able to do it faster, equivalent to adding another radiologist to the headcount. Approaching AI as a partner to collaborate with thus reduces the long working hours of healthcare professionals, while not replacing their jobs. The contrast between the employment of AI in the delivery and healthcare sectors highlight how adopting a collaborative mindset with regard to AI will far better allow us to reap its full benefits whereas attempting to dominate AI could hamper societal progress.

Whether AI eventually becomes the boon or bane of humanity is not an inherent property of the technology itself. Instead, it pivots on human application and execution. Therefore, in order for our society to progress further and faster, it is imperative that humans collaborate with, rather than dominate, AI.

Reflection...
What are two ideas I found contradictory?

Word Bank

1. eponymous: a character in a play or book that has the same name as the title

2. calamity: a grievous disaster, an event or circumstance causing loss or misery

3. discernment: ability to judge well

4. sinister: especially evil, or leading to evil or danger

5. monopoly: to have complete control of something, especially an area of business

6. hegemony: (especially of countries) the position of being the strongest and most powerful and therefore able to control others

7. anthropomorphise: to attribute human characteristics, form or personality to

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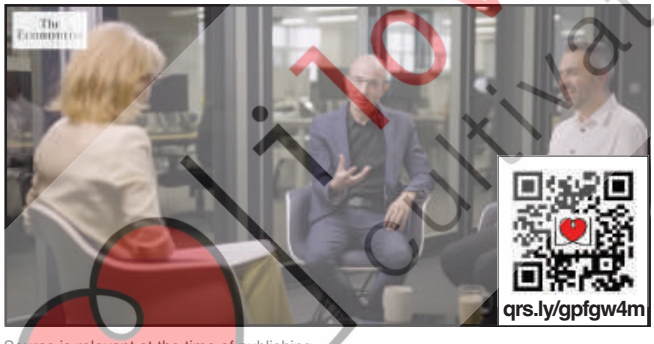
6. Can tech solve the UK radiology staffing shortage? From Medical Device Network, 19 October 2021.

WATCH

AI and our future with Yuval Noah Harari and Mustafa Suleyman



Source is relevant at the time of publishing

iCritic

View the video above. Whose viewpoint appeals to you more? Why?

Notes

qrs.ly/safk3vv

Images from Shutterstock AI Generator

FEELING **WEIGHED DOWN** BY YOUR UPCOMING EXAMS?

You're not alone! Did you know that sharing a burden with a loved one can make you feel lighter? Let's try this calming exercise to ease your worries.

1 Take a moment to unplug, pause, and notice your breathing. Close your eyes and count slowly to 5. What emotion are you feeling? (eg. Angry, fearful, guilty, joyful, lonely, sad, etc).
Tip: Try searching "Emotion Wheel" if you cannot name what you are feeling!

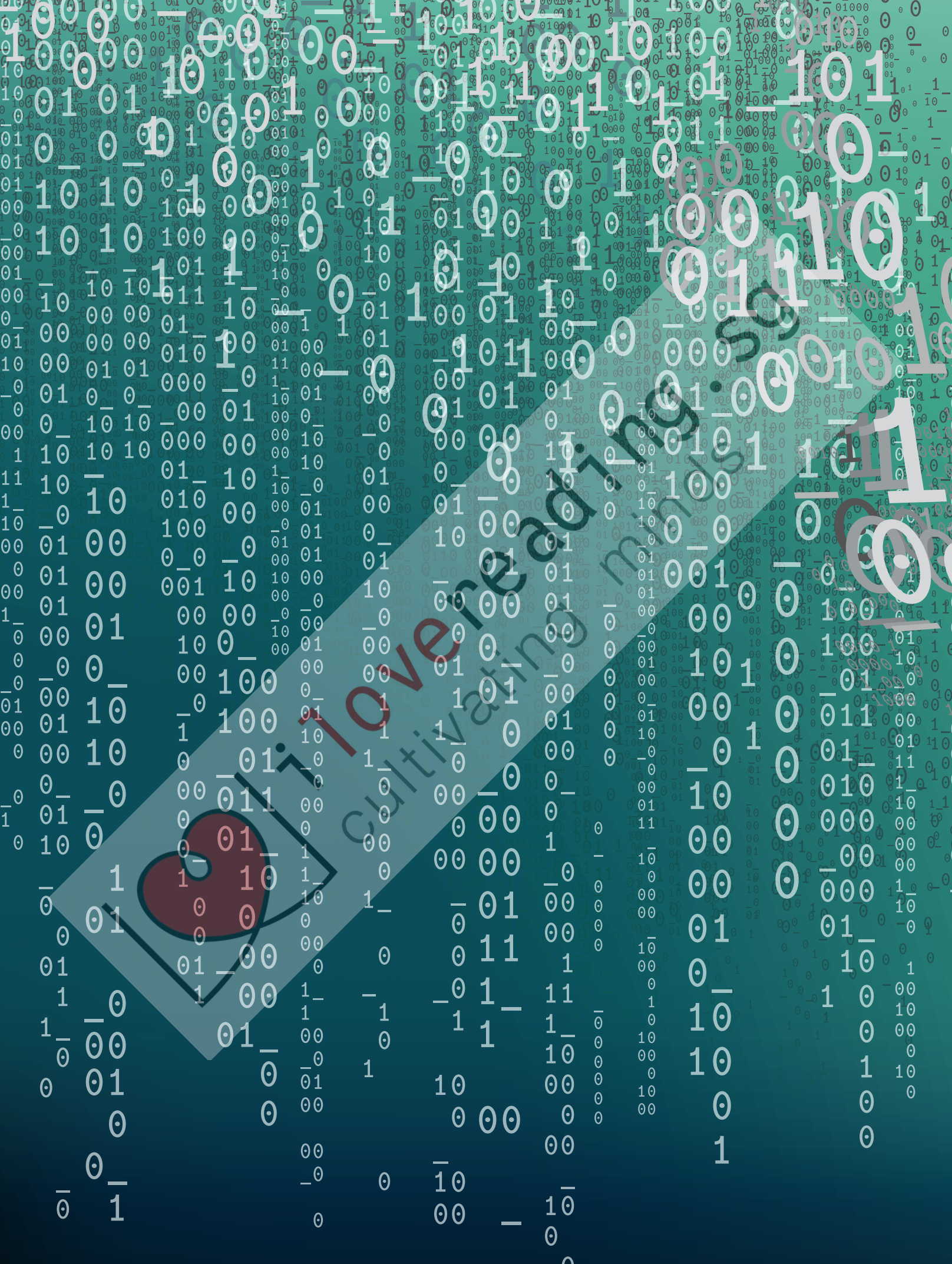
2 Chat with a loved one at home or call one of them at work. Share with them how you're feeling. Ask if they could simply listen to you, without giving any feedback or advice.
How did the experience go?

3 On a scale of 1-10, how light/weighed down do you feel now?
1 – Extremely weighed down
10 – Extremely light

4 Remember, reach out to a loved one regularly to share your worries during stressful exam periods or assignment preparation. Even just sharing how you're feeling and having someone listen and validate what you feel can make you feel much better.

Write down the names of 3 people you can talk to when you feel stressed.

www.ilovereading.sg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Cultivating minds