Use of Artificial Intelligence in Education

Prof Anusha Ramanathan

What Is Artificial Intelligence?

Like many technologies, Artificial Intelligence (AI) can also be used to make tasks easier and simpler, reducing human effort through automation. However, while automation is primarily used for routine, repetitive tasks and follows a pre-programmed use, artificial intelligence goes beyond this. An example of automation can be seen in the use of spreadsheets wherein the functions such as finding sum and average are already entered. Whereas AI can be used for non-repetitive tasks such as analyzing data, creating data, and writing entire books. AI mimics human behavior (Turing the scientist who coined this term, visualized AI as a process which would be difficult to distinguish from human effort). Now the aim of many working on AI is to make it even excel human intelligence.

AI is expected to process, evaluate and even predict the future. Machine learning is the fundamental basis of AI. Just as humans learn from experiences and change their behavior based on these, AI-based systems too evolve as they learn from new data. Apple, Facebook, Netflix, Google etc. all use AI to understand customers and guide interactions. The businessman Elon Musk and the scientist Stephen Hawking, among others, have opined that as AI gets better, it can even excel humans at thinking and this could lead to the end of our civilization. While this dystopian view may not be true, it is a fact that AI, like humans, seeks patterns in data presented to it, adapts its learnings based on new experiences and tailors its responses to situations presented to it.

Today AI can recognize queries that have mistakes in them, throw up related searches that are based on our past surfing habits, the geography in which our IP addresses are located

and even link us to our other interests based on our search words. All this is done within a fraction of a second. AI is used to autofill phrases as we type based on our earlier typing matches. These autofills are unique to each person and also change as one writes newer phrases. This is a feature that many of us are already familiar with as we search online or type messages and so on. Today, even drawings can be recognized in a variety of ways and the systems are constantly evolving. See https://quickdraw.withgoogle.com/ (home page image given below) as an ongoing experimental example of machine learning research. Thus 'machine learning' process allows the technology to keep learning from 'experiences' (which is really interacting with data), without requiring explicit programming for such learning.
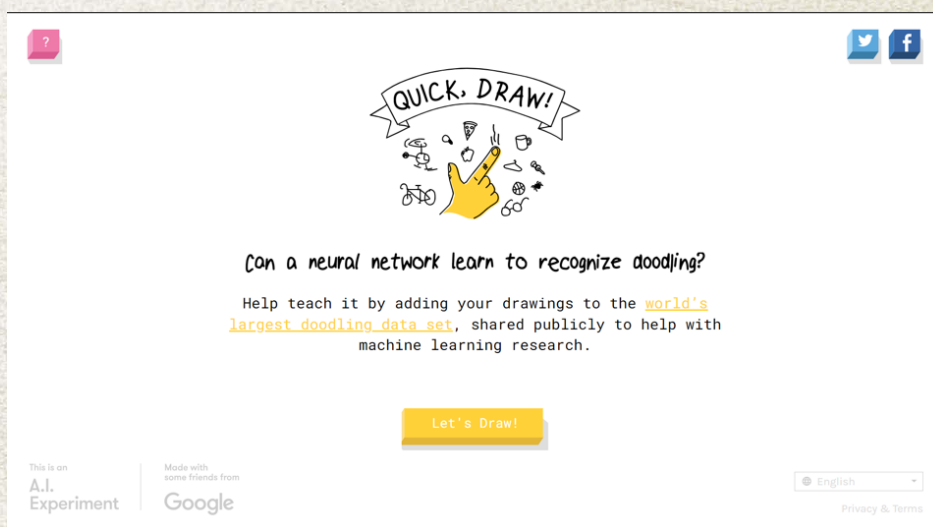

Fig. 1: Home Page of Quick, Draw, an image-based machine learning research

Another example is the ability of the Apple Watch, which monitors the pulse and decides if an alarm has to be raised regarding the health of the user. It has features that assess nearby hospitals and make distress calls to the appropriate contacts to ensure that aid reaches the person wearing the watch within the critical period. While the Apple Watch cannot replace an echocardiogram currently, it is able to read pulse, oxygen levels and proactively solve problems. Such examples are but precursors of how much AI can affect our daily lives.

Coming to the question, whether AI can really create content? Well, entire books have been written by AI! Search the internet with a simple phrase, "Books written by AI" to get an ever-expanding list of such books. In fact, there are sites one could go to create poems and stories using AI. One such TalktoTransformer (https://app.inferkit.com/demo) where you can try creating your own story. It is free upto 10,000 characters per week and does not even require you to sign up. The essence of the 'AI' here is that, an unaware reader would find it difficult to guess that these were not written by human beings.

Use Of AI In Education

Since education is all about 'learning', it would be interesting to explore how 'machine learning' can impact education. AI requires large amounts of data to 'learn' from and the Covid-19 pandemic has ensured that more and more data is being digitized and made available to systems. Use statistics of learning materials such as videos and PDFs, time spent on material, interactions with the materials are already tracked on platforms such as DIKSHA (a Government of India developed open educational resources repository). This in turn can inform creators what kinds of materials attract engagement. Like YouTube suggests the next set of videos to watch, based on its assessment of ones viewing preferences, the DIKSHA platform could suggest materials of nature similar to what the users have appeared to prefer. The platform could even create similar videos on its own, 're-mixing' bits from different other materials.

Machine translations (such as Google Translate) are improving continuously. Auto readers can read even unfamiliar words, though often with inaccurate pronunciations. We can not only choose captions in a language comfortable to us, but also have it spoken by a machine. Map applications already do this. This can have huge implications for education, by allowing the much larger educational resources available in English to be translated and made available in Indic languages to those Indian students who are not comfortable with English. The huge advantage English has, over Indic languages, of much larger volumes of educational resources, can thus be neutralized to a large extent. The main point is that, even if the automatic (machine) translation is not of good quality now, with increasing use, the quality will improve steadily and at some point, match and exceed translations by experts.

Conventional AI systems are already seen in monitoring such as recording attendance, sending automated mails to those with low attendance and such. These are more automated actions than AI-based. However, AI could be used to prompt students to attend, send them reminders based on tasks assigned to them, suggest deadlines, automatically update our calendars and set up notifications for us. Amazon's Alexa or Apple's Siri scan our speech and decide to dim lights, play music, search the internet, or even entertain us when we say we are bored. Perhaps, the future of education may lie in applications that study habits and guide students to content that might suit their viewing/learning habits. Thus, individualized pathways of learning could be developed using AI.

The most extensive use of AI in education is perhaps seen in China where it is used to monitor students' engagement with content. Some Chinese schools have robots that monitor students' well-being, their mood and engagement with learning, identify what sparks their interest etc (Wall Street Journal, 2020; Yoo, 2020). This experiment is expected to enable AI based decisions on placing students in appropriate learning circles, guiding students to specific content that will suit their respective learning styles and reducing the load on the teacher to choose materials for their students. This is also expected to open avenues for home-schooling which has emerged as a need in this era of disrupted learning. AI then seems to almost take on the role of the teacher to guide students to appropriate
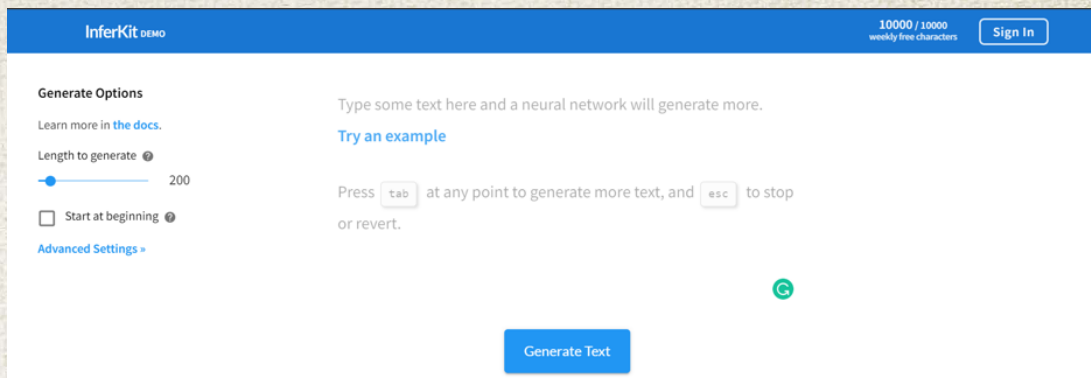
Fig. 2: HomePage of TalktoTransformer, an AI-based story generator

content, analyze student engagement and moods, predict student behavior and offer corrective strategies, document and even appropriately report to parents.

However, this begs the question - to what extent is the use of AI in education permissible, even desirable and where and when do we draw a line? Yuval Harari, in *21 Lessons for the 21st Century* (2018), speaks of the dangers of creating a 'useless class' among humans who are trained for work that can easily be automated. He highlights the need to make our education system more robust and focused on developing communicative skills, creativity and critical thinking so that our future generations may be ready to adapt to changes wrought by climate change and technological advances. Can AI be deployed to enable us to become more creative and be able problem-solvers?

Let us take the example of creativity. Mentioned earlier was the fact that entire texts can be written by AI. Today, as we use applications like Zoom or Google Meet, we are also given the option of enabling live transcription. Applications such as Otter (https://otter.ai) are used to generate transcription of lectures. Earlier when one would note-take, one would doodle, one would highlight, underline, draw, and create new short forms that only one could understand. Today with the availability of an artificial intelligence based application that generates verbatim notes of a lecture, what should the student do? As these notes maintain the linearity of the information presented, where would the students' creativity in organizing information, connecting ideas etc be accommodated? What abilities may be getting lost as a result of using this AI technology?

However, there are other counter questions to also explore: Is notetaking a critical role or an essential strategy for the student? Is it the only pathway to ensure learning or creativity of a student? If we can AI in our classrooms to save time and effort, without diluting meaningful learning possibilities, should we decry its use? After all, since the dawn of civilization, human beings have designed and developed technologies to enable a better lifestyle and to ease their labor. Then why not leverage AI? Still the question remains: how?

How Much AI Is Too Much AI?

There is no easy answer to how to deploy AI in education, and when, where and how much. The contexts in our education system are too varied for a 'one size fits all' strategy.

One way of responding to this, would be to identify the routinized tasks students do and understand the cognitive development implications of not doing those tasks, such as writing by hand when voice notes might type up better comprehensible and neat notes? We need to identify if other tasks might serve the same purpose of developing these abilities. We might want to develop the skill of writing, but more for purposes other than overtly utilitarian ones, much as we develop skills in drawing or craft or music in schools. The value of such classes for social-emotional well-being and the holistic development of a student is undeniable.

However, these classes do not cater to the industrial age requirements of using machines and engaging in commerce. Now as we have moved past the machine age, we might need to rethink societal values placed on productivity and occupation through work. If AI can do many of the tasks in a fraction of the time and effort required, then would there be a need for as many employees? If all do not find work, then would there be chaos? Or would we then develop newer ways to entertain ourselves? Would our work hours be reduced leading us to boredom that could lead us to be more creative? Would there be less stress as people had more time? Would there then be more tolerance? It should be noted these questions are not new, the renowned economist Keynes articulated similar thoughts during the industrial revolution. Perhaps an analysis of the history of labor saving machines may give us insights into the future of work under AI.

AI is here to stay. AI gets better as it learns continuously from big data that it feeds on. This need not portend a tragedy. If we can reimagine education, if we move out of an industry catering mode to preparing our future generations to be adaptive, to be holistically developed, then perhaps AI can be a lever to accomplish our goals. AI can be used for the good, however, the direction of AI depends on who controls its design, development and use. Currently, it is largely in the hands of for-profit proprietary technology companies such as Amazon, Apple, Google, Microsoft and Tesla.

We need to be vigilant about the AI production modes. While 'free' AI services may be made available by the Big Tech companies, the reliance on blackbox algorithms can reinforce social inequities and false beliefs. While customers who can pay (with their money or with their data) may be benefitted from the use of AI, it also can lead to surveillance with harmful political and economic consequences.

While there are efforts being made in public sector and in not-for-profit spaces, these efforts do not match the investments of the Big Tech companies. If education is taken over by for-profit entities, the intent and means used are unlikely to serve the underprivileged, and may not bring about equity.

Teachers, educational institutions, governments, parents, researchers, all need to come together to seriously consider the ramifications of AI and plot alternatives to ensure that our students are ready to build the future we want ◆

References

1. Harari, Y. (2018). 21 *Lessons for the 21st Century*. Jonathan Cape.

2. McCarthy, J. (1979). 'Ascribing mental qualities to machines'. *Philosophical perspectives in artificial intelligence*, ed. M. Ringle. Atlantic Highlands, N.J.: Humanities Press.

3. Wall Street Journal. (2020). 'How China Is Using Artificial Intelligence in Classrooms.' Wall Street Journal, YouTube. https://www.youtube.com/watch?v=JMLsHI8aV0g&t=11s

4. Yoo, A. (2020). AI in Education in China. Will it turn students into mindless drones?' *MathGenie*. https://www.mathgenie.com/blog/ai-in-education-in-china.-will-it-turn-students-into-mindless-drones