TOP 3 USES OF AI IN HIGHER EDUCATION

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In the education sector, artificial intelligence is taking off in a big way. On top of the aforementioned uses, you also have applications such as language learning programs, lesson planning software, adaptive learning and assistive technology for the hearing or visually impaired.

As advancements in artificial intelligence technology move forward at an ever more rapid pace, the possible applications within Higher Education are complex and varied.

Among other applications, AI can help to achieve:

- Better learning outcomes
- More efficient teaching
- Faster breakthroughs in key areas of research
- Reduced costs
- More secure campuses

ACCELERATED RESEARCH WITH AI

Research is one area where AI offers huge potential. The ability to process and analyse data in a fraction of the time taken by hardware accelerators saves time, money and energy.

Model Development

In fact, we have all witnessed the merits of AI being used for research purposes in the past few years as it was a driving force in the fight against coronavirus. According to the Council of Europe, the predictions of the virus structure generated by AI saved scientists months of experimentation.

One of the AIs put to use against Covid-19 was the Linearfold algorithm.

Published in 2019 by the Chinese technology company Baidu alongside the University of Rochester and Oregon State University, it was later released to the medical and scientific communities during the outbreak.

Using this algorithm, Baidu AI scientists were able to generate the secondary structure prediction for the Covid-19 RNA sequence 120 times faster than it would have been without the use of Linearfold.

Understanding this secondary structure prediction allows scientists to better understand how any given virus transmits across a species. This allowed them to begin developing mRNA vaccines that were more stable and effective than they would have been without the research predictions readily available.

Data Sourcing

According to IBM, workers waste 8.8 hours a week searching for information. The same is also true for researchers, who are often forced to spend large chunks of their time doing literature reviews and mapping studies, which collectively can last months or even years.

Even worse, as time goes on, the amount of data out there increases exponentially. With 2.5 billion gigabytes of data being produced every day and 2.5 million research papers being published yearly in English alone, finding key research to form or support a hypothesis becomes more and more daunting. Especially when you consider the fact that generally, only 5-10% of previously published research is relevant to an individual conducting their own research in any given area.

The use of certain AI algorithms means researchers can conduct targeted navigation through scientific literature.

Platforms like Semantic Scholar or Iris.ai can use artificial intelligence to understand the intent behind a researcher's query and scan through and collate findings from a variety of sources to provide a summary of relevant information.

They do this through a combination of data mining, computer vision and natural language processing to identify relevant, key elements from different sources.

Simulations

AI can also be highly beneficial when it comes to running simulations.

Firstly, it can help steer researchers towards the most efficient type of simulation for whatever given task they're studying. Simulation workflows can be extremely complex due to the array of systems, methods and data points at a researcher's disposal. Through a process called 'multi-fidelity optimisation', these variables can be whittled down to a more palatable pool of options, as AI can pick out the simulation method it deems to be most efficient.

Once the simulation method is set, AI can act as a virtual agent that can monitor simulations in a number of ways. For instance, IBM's AI-enriched simulation platform can cross reference the steps taken to previous simulations, and if it finds processes that are being repeated, simply input the old data to shave off computational time.

Similarly, AnyLogic's AI was used in conjunction with a digital recreation of power transformer core manufacturing to create a digital 'line manager' of sorts; one that could act in a supervisory capacity within the simulation and seek the optimal route for each situation to avoid unnecessary movements, resolve conflicts, respect delivery dates and anticipate any aspects of the system that needed prioritising.

DEEP LEARNING TEACHING KITS

Another particularly popular facet of AI is deep learning, a subdivision of machine learning.

AI continues to become more formidable as more people learn to understand it better and discover new applications for using it. Deep learning is the practice of teaching a program or computer in a similar manner to how a human might approach and learn something.

And as it turns out, AI can be a very useful tool when it comes to teaching deep learning.

How Deep Learning Works

Deep Learning creates neural networks that can analyse complicated concepts and extrapolate patterns and relationships from the data. The end result is that the computer can learn independently and undertake tasks without human supervision.

Unfortunately, deep learning is high on GPU utilisation. Consequently, when students are learning about artificial intelligence itself, it's not uncommon that a faculty may not have the resources to match the number of students, especially considering many universities still use CPUs and low-powered clusters in their courses, despite the fact that GPUs are the go-to technology in the industry.

It can be difficult and expensive to provide the value for money that students expect, especially when trying to do so with limited computer resources.

Deep Learning Teaching Kits

Fortunately, through the use of Deep Learning Teaching Kits, it is possible to address the problem of limited GPU and excess student demand. These kits can fractionalise the GPU usage and automatically allocate the fractional GPUs to those needing them, whether they are students or faculty. It ensures that each student has an allocated quota they can use, and as such, other students will no longer need to wait for their peers to finish their work before they can take their turn.

OCF's teaching kits achieve this by using a Lenovo 3U server with up to eight A100 80G GPUs. Kubernetes containers are installed as per NVIDIA best practices and Run:AI software sits on the server and acts as an intelligent orchestration layer to schedule jobs and manage GPU use by users and their privileges. This setup provides formidable AI computation and I/O capabilities.

The kits come with popular software packages (such as Jupyter Notebook, TensorFlow, PyTorch and Keras) readily installed, making it easy for tutors to develop workshops and for students to access them. This solution offers a plug-and-play, optimised, AI environment ready to be utilised by tutors and their students.

As a result, class and lab planning time are both saved, as the kit provides the lesson plan and resources to carry it out. This in turn saves costs, not only in terms of allocating working hours to educators but also in terms of resources, as these deep learning teaching kits grant GPU access to users through the cloud. Cloud computing also allows for the ingesting and management of large datasets so that deep learning models can scale efficiently.

The reduced costs, planning times and increased access to resources also lower the barriers to entry of learning about AI considerably.

Why Deep Learning Teaching Kits Are Important

> *"Young people's lives will be infused with AI, from their homes and transportation to the workplace. They need to understand this technology so they can think critically about it and consider what career options it might open up for them."*
>
> - James McClung, Higher Education and Research Business Development Manager, Nvidia

Ensuring that your students not only understand artificial intelligence but are also adept at working with it becomes more critical with every passing year.

As technology becomes more capable, more and more workers are starting to become redundant, to the point where it's predicted that around half of all employees will need to be reskilled by 2025, as 85 million jobs are displaced and the division of labour between humans and machines is shifted.

However, a further 97 million jobs may later emerge; jobs that are better adapted to the new division of labour between humans, machines and algorithms. With that in mind, understanding our new digital coworkers will become a more and more marketable skill as we bound ever further into the future. Especially when you consider the predictions that 65% of children entering or currently in primary school will go on to work in jobs that don't currently exist.

SMART CAMPUS

While we're heading towards an AI-heavy future for the job market, it's worth reiterating that with or without an AI-focused education, the students of today are already digital natives. In fact, we are quickly approaching the point where young adults enrolling in University won't recall a time before the smartphone.

As such, it's not just research and lessons that need to jump forward into the digital era, but also institutions themselves.

At a Smart Campus, artificial intelligence can be effectively used to create a more secure and efficient campus.

A.I. can often work with the hardware you already have, such as security cameras spread across many higher education facilities. Through the marriage of A.I. with your existing technology, you can program your facility to run with some level of autonomy.

Safety & Security

Security is incredibly important at any university. With the campus being many students' homes away from home, they need to feel safe and secure when moving around. Similarly, protecting equipment and facilities is obviously also very important.

Subsequently, using AI to effectively police campuses is a smart and perhaps necessary move. For starters, AI can manage who has access to your laboratories, offices or restricted areas through facial recognition. Working from a database of authorised personnel, the system can grant easy immediate access to those who need it, while denying access to unauthorised visitors.

In the case of forced entry, or suspicious individuals, AI-enhanced security systems have the ability to monitor, track and alert security officers to the location of a potential security breach, whether that be a single person or a vehicle.

Through deep learning algorithms, these systems can learn to differentiate between genuine threats, disturbances or intrusions, and more trivial matters such as weather damage or problems caused by small animals.

In fact, these algorithms have become so adept at pattern recognition that in 2017 researchers from the University of Granada were able to teach their system how to identify a gun being drawn in real-time and sound an alarm.

Meanwhile, during the pandemic, universities were able to implement a slight alteration in facial recognition which would instead pinpoint students who were neglecting to wear a mask.

Well-Being & Engagement

This facial recognition system can also be used for tasks outside of countering any potential wrongdoing. For instance, it can be used to monitor attendance by identifying who is in a classroom at any given time. If you were to correlate this with other data surrounding a student (such as assignment submissions), you could potentially identify at-risk students and reach out, say by automating a check-up text to make sure everything's okay.

The more systems and smart devices you have in place, the more your options open up.

This greater level of engagement between your students and your facility will inevitably lead to higher levels of student satisfaction and retention.

CONCLUSION

Higher Education facilities should consider making the necessary investment in Artificial intelligence solutions now if they wish to reap the rewards in the future.

Faster, more efficient research processes will lead to more breakthroughs, whilst leaving educators more time to focus on nurturing their students.

Deep learning kits offer students the right preparation for their future and the upcoming overhaul of the workplace. This will attract more applications from prospective students, and place forward-thinking universities at the forefront of their industry.

As well as proving your institution can provide a fulfilling curriculum, being able to provide an equally enthralling campus life will no doubt also help attract more students; something that is extremely important in a post-Covid world where everyone is reassessing where they want to go in their future.

By showcasing your institution's ability to embrace AI and, subsequently, the future, you can prove to both your students and your faculty that your institution is worth investing in.