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AI:10

GET INSIGHTS ON AI UNDER 10 MINUTES

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WHAT'S HOT

THE AI PHARMACIST

HEADLINE NEWS IN A FLASH

- Artificial Intelligence project aims to improve standards and development of AI systems
- Gartner advises tech leaders to prepare for action as quantum computing spreads
- Humans in the metaverse (and how to create them)
- Nixon's unheard moon-disaster speech is now a warning about the deepfake future
- The humanoid AI artist Ai-Da has been detained on suspicion of being a spy
- Google's Gated Multi-Layer Perceptron (gMLP) Outperforms Transformers Using Fewer Parameters

UNIVERSITY - INDUSTRY PARTNERSHIP IN AI

The Respective Roles of Academia and Industry

THE AI PHARMACIST

ARTIFICIAL INTELLIGENCE — THE ULTIMATE OPTIMIZATION ENGINE — IS MEETING ONE OF ITS BIGGEST CHALLENGES: UNTANGLING THE MESSY, SLOW AND EXPENSIVE WORK OF DRUG DEVELOPMENT.

WHY IT MATTERS

Even as computing power has gotten faster and cheaper, drugs remain slow and costly to develop, in part because of the sheer work in selecting a candidate and getting it across the finish line.

- AI — with its ability to rapidly identify patterns in galaxies of data — can provide a vital shortcut.

WHAT THEY'RE SAYING

"What you're seeing [with AI] is a platform for a new generation of drugs, biologics, life extension, all of which is being built at a rate that is impossible to describe," says Eric Schmidt, former CEO of Google and the co-author of the new book "The Age of AI."

THE BIG PICTURE

Drug development is a great business — if you don't mind repeated, expensive failure.

- The process of discovering and developing a new drug can take over a decade and costs $2.8 billion on average — and even then, 9 out of 10 therapeutic molecules fail Phase II clinical trials and regulatory approval.
- The possible failure points are many — identifying a candidate drug from the more than 10^{60} atomic configurations that exist in chemical space, optimizing it for delivery, and testing it in animals and humans to see if it is both safe and effective — and they all add to the overall cost of drugs and health care.
- "Imagine you're building 10 skyscrapers, and you can guarantee that nine will crumble," says Isaac Bentwich, CEO of the new AI drug discovery startup Quris. "But you have no idea which ones will fall, so all you can do is build them and charge a higher rent on the one that keeps standing."
- "That's the problem we're trying to solve."

HOW IT WORKS

AI can offer a boost at nearly every point of the drug development cycle, evangelists argue.

- Exscientia's "Centaur Chemist" AI platform computationally sorts through and compares millions of potential small molecules, looking for a handful to synthesize, test and optimize in the lab before selecting a candidate for clinical trials — all of which enabled the company to help get a cancer drug into trials in just eight months, compared to a more standard four to five years.
- Quris is working to speed the trial process by testing drugs on miniaturized organs and tissues on a chip that "represent the full genomic diversity of the potential patient population," notes Bentwich, which in turn generates data that can help train its AI platform to predict the clinical safety and efficacy of novel drugs.
- Lantern Pharma is partnering with digital health care company Deep Lens to use AI to match the right kind of novel molecule with the right patient profile for clinical trials for accelerated clinical trials.
- That AI-driven approach "can rescue hundreds of millions of dollars in prior drug development costs by ensuring it's being tested on a very specific patient platform," says Panna Sharma, Lantern Pharma's CEO.

BY THE NUMBERS

The AI market for pharmaceuticals rose from $200 million in 2015 to $700 million in 2018, and it's projected to grow to $5 billion by 2024, while AI-related job listings in the drug industry have tripled over the past two years.

THE CATCH

Even as AI becomes more powerful, the data sets for drug development can involve millions of compounds, which can exceed the capabilities of current machine learning tools.

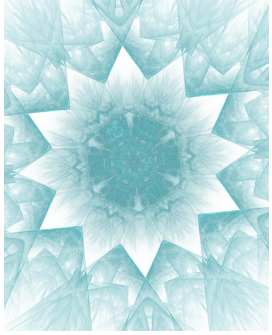
- The ultimate ability of AI to change the fundamentals around an industry as enormous, as expensive, and as regulated as drug development is "yet to be proven," Paul Nioi, senior director of research at Alnylam Pharmaceuticals, told Genetic Engineering and Biotechnology News.

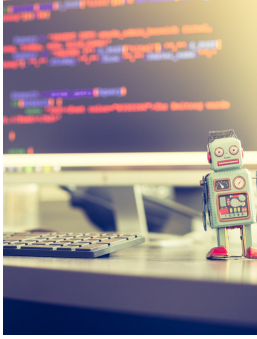
THE BOTTOM LINE

Sharma argues that will change — over the past 20 years, technology has "smashed the product development costs in everything except drug development," he says.

- "And over the next 20 years, it's going to totally change this industry."

Source: Axios



ARTIFICIAL INTELLIGENCE PROJECT AIMS TO IMPROVE STANDARDS AND DEVELOPMENT OF AI SYSTEMS

STANDING Together, being led by University Hospitals Birmingham NHS Foundation Trust (UHB), aims to develop standards for datasets that AI systems use, to ensure they are diverse, inclusive and work across all demographic groups. The resulting standards will help regulators, commissioners, policymakers and health data institutions assess whether AI systems are underpinned by datasets that represent everyone, and don't leave underrepresented or minority groups behind. NHSX' NHS AI Lab, the NIHR, and the Health Foundation have awarded in total £1.4m to four projects, including STANDING Together.

Source: birmingham.ac.uk

GARTNER ADVISES TECH LEADERS TO PREPARE FOR ACTION AS QUANTUM COMPUTING SPREADS

A possible solution to deal with the immense problem of managing the overcrowded prisons is to turn to the use of smart technology. The past few years have seen rapid advances in the use of artificial intelligence (AI) solutions in prisons globally. China and Hong Kong are using AI to continuously monitor inmates. Hong Kong's first smart prison, Tai Tam Gap, opened this year and uses Fitbit-like tracking wristbands to monitor prisoners' locations and activities, including their heart rates. In addition to biometric technology, some prisons, such as Pik Uk, are also using facial recognition and video analytic monitoring to detect changes in prisoner behaviour (for example, self-harm or violence against others) and send alerts to prison staff. Drones and robotic guards are further used to regularly patrol the prison.

Source: Venturebeat.com

HUMANS IN THE METAVERSE (AND HOW TO CREATE THEM)

The metaverse is no longer science fiction. The future is already here. A BMW factory in Germany now has its identical digital twin in the metaverse, designed and operated in a real-time 3D simulation where digital humans and robots perform various real-life tasks. The real factory is gigantic: it occupies 600,000 square feet, employs 57,000 people, contains tens of thousands of objects, thousands of materials, and produces hundreds of cars simultaneously. And the digital factory is an exact copy of the real one. The way it looks and functions, and even the materials, textures, and lighting are physically accurate – and obey the laws of physics. Thanks to such precision, BMW's teams can now fully simulate complex workflows with humans, robots, and vehicles working in sync.

Source: creativebloq

NIXON'S UNHEARD MOON-DISASTER SPEECH IS NOW A WARNING ABOUT THE DEEPFAKE FUTURE

On September 29, the Emmy for interactive documentary went to 'In Event of Moon Disaster', a film that uses AI to create a fake video featuring former US President Richard Nixon. The film shows him delivering a speech that was prepared in case the Apollo 11 mission failed, leaving astronauts Neil Armstrong and Buzz Aldrin to die on the moon. The idea behind this seven-minute film was to show what online misinformation will look like in the future. The project was "not just an opportunity to do cool stuff with our technology, but also to showcase what these technologies are capable of". In the years to come, deepfake videos might become more common on social media and more difficult to spot, with awful consequences at the societal level. It's already known that fake news tends to travel faster. An MIT study showed, for instance, that false claims are 70% more likely to be shared than truth.

Source: zdnet.com

THE HUMANOID AI ARTIST AI-DA HAS BEEN DETAINED ON SUSPICION OF BEING A SPY

Ai-Da – the British robot that made history as the world's first AI humanoid artist – was seized by Egyptian border agents last week, on the way to her first exhibition in the country. Scheduled to show works at the Great Pyramid of Giza, the ultra-lifelike robot was apparently suspected of being part of an undercover espionage effort. As reported by the BBC, Ai-Da has now been released after being held for 10 days by Egyptian authorities, who detained her at customs. Aiden Meller, the creator of Ai-Da, claims that border guards detained the groundbreaking robot because they were suspicious about her modem. They also raised questions about her "eyes", which are actually cameras that she uses to produce drawings based on algorithmic responses to what she observes.

Source: dazeddigital

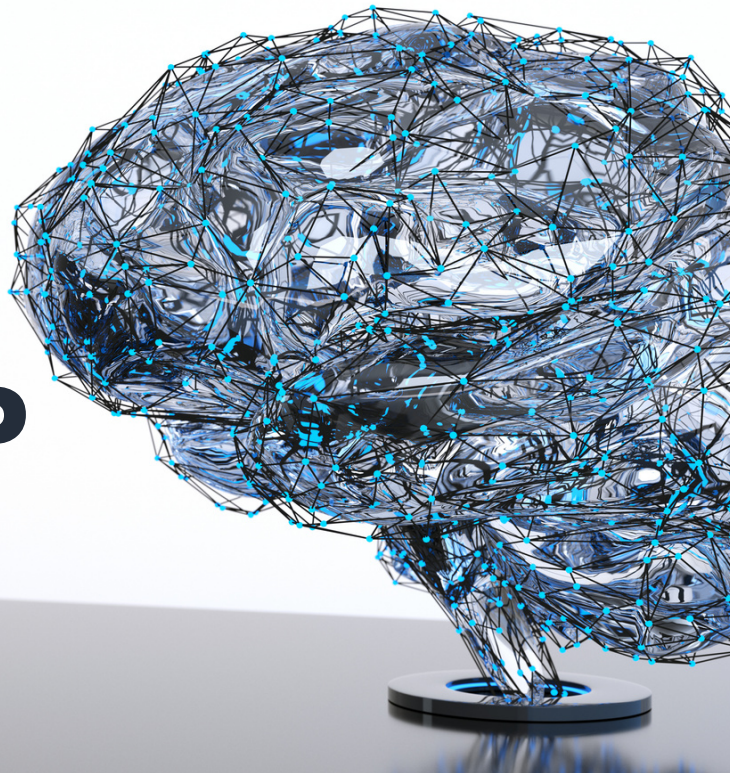
GOOGLE'S GATED MULTI-LAYER PERCEPTRON (GMLP) OUTPERFORMS TRANSFORMERS USING FEWER PARAMETERS

Researchers at Google Brain have announced gMLP, a deep-learning model that contains only basic multi-layer perceptrons. Using fewer parameters, gMLP outperforms Transformer models on natural-language processing (NLP) tasks and achieves comparable accuracy on computer vision (CV) tasks. The key feature of the Transformer is the multi-head self-attention mechanism, which learns spatial interactions between elements of a sequence. Now researchers are questioning if this mechanism is necessary to the Transformer's high performance.

Source: Alarabiya News

UNIVERSITY - INDUSTRY PARTNERSHIP IN AI

THE RESPECTIVE ROLES OF ACADEMIA AND INDUSTRY



> **Academics focus more on basic research, education, and training, while industry focuses more on applied research and development in commercially viable application domains. In the field of AI in recent years, however, this distinction between the roles of academia and industry has eroded.**

Although academia and industry have each played central roles in shaping AI technologies and their uses, their efforts have been loosely coordinated at best. Now, as AI takes on added importance across most of society, there is potential for conflict between the private and public sectors regarding the development, deployment, and oversight of AI technologies.

The last five years have seen considerable debate regarding the appropriate roles and relationship of academia and industry in the development and deployment of AI applications. This debate arises from two facts. First, the commercial sector continues to lead in AI investment, research and applications, outpacing academia and government spending combined. In the US, private enterprises have spent over $80 billion on AI, while non-defense investment by the federal government in research and development is estimated at only $1.5 billion in 2020. Second, many researchers are opting out of academia for full-time roles in industry, and the long-term consequences of this shift are potentially worrying.

To understand the extent to which these concerns might affect how AI develops and shapes society, we must consider the range of ideal roles academia and industry might play.

RESEARCH AND INNOVATION

It is now easier than ever to translate basic AI research into commercially viable products, thanks to the availability of relatively inexpensive, large-scale cloud computing, powerful open-source libraries, and pre-trained models for language, vision, and more. Access to such technology has created new incentives for university researchers, including faculty, postdocs, and graduate students, to create startups or seek other mechanisms to commercialize their intellectual property.

Meanwhile, the presence and influence of industry-led research at AI conferences has increased dramatically. This shift raises concerns that published research is becoming more applied (and perhaps less free to confront issues at odds with corporate interests), at the risk of stifling long-term innovation and value. On the other hand, industry's increased presence might be helping catalyze the search for innovative solutions to real-world problems.

This increased mixing of academic and industrial research has raised concerns about the impact of "keeping up with the Joneses." A study of the amount of computing resources needed to train large natural-language processing models, such as the models known as transformers,6 noted that researchers trained nearly 4,800 models using the equivalent of 27 years of GPU compute time at an estimated cost of $103K-$350K (at cloud-compute market prices at the time). Such AI investments are impossible for most academic researchers.

Creating ways to share such models and evaluation environments would provide steps toward alleviating this imbalance. How to ideally allocate resources is an open problem that requires ongoing attention.

RESEARCH INTO SOCIETAL AND ETHICAL ISSUES

As the line between academic and industry research in AI blurs, additional social and ethical issues come to the fore. Academic and industry researchers might have different perspectives on—and hence take different approaches to—many sociotechnical challenges that can be at least partially addressed by technical solutions, such as bias in machine-learned models, fairness in AI decision-making algorithms, privacy in data collection, and the emergence of polarization or filter-bubbles in social-media consumption.

In addition, tighter coupling of academic and industrial research may reduce the focus on both longer-term problems and on those that might run counter to commercial interests. There is also a separate ethical consideration around IP ownership when students work directly with faculty whose intellectual products are partly owned by a company.

Companies that want to keep their customers satisfied have strong incentives to act when it comes to issues of privacy and fairness in the use of AI. One example of an action taken is corporate investment in The Partnership on AI, a nonprofit coalition of industry and university stakeholders committed to the responsible use of artificial intelligence. But an incentive to act is not necessarily aligned with the desire to get it right.

DEVELOPMENT AND DEPLOYMENT

Application of advanced research and technology in real-world settings has traditionally occured outside of academia largely because of the high costs associated with development and deployment at scale. These include the costs of infrastructure, engineering, and testing; verification for robustness; and safety, logistics, and delivery—all of which are often most easily absorbed by companies with a commercial interest in deployment and the specific skills needed to manage these activities.

While this dynamic remains largely intact in AI, the last few years have seen academic researchers increasingly able to take their technological innovations out of the lab and deploy them in the wild. A notable example is Duolingo, a language learning system built by academics at Carnegie Mellon, which went public in 2021 with a $5 billion valuation.

Of course, not all real-world deployment is profit-oriented, and there's no reason that nonprofit applications that benefit the public can't be quickly created and put to use. For example, Oxford and Google collaborated on tracking COVID-19 variants, and, in the US, several universities are cooperating with companies c3.ai and Microsoft to promote urgent applications of AI for future pandemics. These developments have also played a major role in fostering non-commercial collaborations between industry and academia.

EDUCATION AND TRAINING

Many people from across the academic research spectrum have decried a perceived brain drain as a large number of AI researchers have left university and research institute posts to join the industrial ranks. Research suggests that this trend has intensified in recent years. According to one study, 131 AI faculty departed for industry (including startups) between 2004 and 2018, while another 90 took reduced academic roles for such pursuits.

As student interest in computer science and AI continues to grow, more universities are developing standalone AI/machine-learning programs, departments, and related degree programs. Such programs include both traditional delivery and those that are partly, if not entirely, online. The trends outlined above raise questions as to who will staff these programs, and how they will feed into the pipelines needed to produce AI talent, from software and application developers to Ph.D. students and the next generation of academic leaders.

A partial answer is to encourage industry to play a broader role in training. Internships, for example, where students spend a few months working in a company, offer current and recent students the ability to obtain valuable hands-on experience while addressing applied research questions or strengthening their skills in AI development and deployment. Such opportunities amplify university-based education and can often jumpstart students' careers. Moreover, company-led courses are becoming increasingly common and can fill curricular gaps, especially if more students want access to basic AI education than universities can handle, or if students seek specialized skills that are best learned in the context of real-world applications.

SOCIETAL IMPACT: MONITORING AND OVERSIGHT

When it comes to the societal impacts of AI, stakes are high in the academia-industry relationship. Beyond questions of privacy and fairness lie concerns about the potential for AI and machine-learning algorithms to create filter bubbles or shape social tendencies toward radicalization, polarization, and homogenization by influencing content consumption and user interactions. However, studying and assessing these issues is easiest when academic-industry collaborations facilitate access to data and platforms.

Reducing some of the negative consequences of this more enmeshed relationship may require government regulation and oversight, particularly to guide how societal impacts are monitored, promoted, and mitigated. Any changes in regulation, however, should be made in consultation with the researchers who have the clearest idea of what the key issues are and how they should be addressed. Serious research is needed to guide effective policy, and that's where academic/industry collaboration can have the greatest impact.

Source: Standford

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