Weekly Discovery

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10 Mar – 14 Mar 2025

AI

AI Tools Are Spotting Errors in Research Papers: Inside A Growing Movement

"Late last year, media outlets worldwide warned that black plastic cooking utensils contained worrying levels of cancer-linked flame retardants. The risk was found to be overhyped — a mathematical error in the underlying research suggested a key chemical exceeded the safe limit when in fact it was ten times lower than the limit. Keen-eyed researchers quickly showed that an artificial intelligence (AI) model could have spotted the error in seconds.

The incident has spurred two projects that use AI to find mistakes in the scientific literature. The Black Spatula Project is an open-source AI tool that has so far analysed around 500 papers for errors. The group, which has around eight active developers and hundreds of volunteer advisers, hasn't made the errors public yet; instead, it is approaching the affected authors directly, says Joaquin Gulloso, an independent AI researcher based in Cartagena, Colombia, who helps to coordinate the project. "Already, it's catching many errors," says Gulloso. "It's a huge list. It's just crazy."

The other effort is called YesNoError and was inspired by the Black Spatula Project, says founder and AI entrepreneur Matt Schlicht. The initiative, funded by its own dedicated cryptocurrency, has set its sights even higher. "I thought, why don't we go through, like, all of the papers?" says Schlicht. He says that their AI tool has analysed more than 37,000 papers in two months. Its website flags papers in which it has found flaws – many of which have yet to be verified by a human, although Schlicht says that YesNoError has a plan to eventually do so at scale.

Both projects want researchers to use their tools before submitting work to a journal, and journals to use them before they publish, the idea being to avoid mistakes, as well as fraud, making their way into the scientific literature."

Source: Nature (7 Mar 2025)

AI

New Research Explores How AI Can Build Trust in Knowledge Work
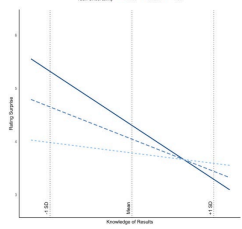
"In today's economy, many workers have transitioned from manual labor toward knowledge work, a move driven primarily by technological advances, and workers in this domain face challenges around managing non-routine work, which is inherently uncertain. Automated interventions can help workers understand their work and boost performance and trust. In a new study, researchers explored how artificial intelligence (AI) can enhance performance and trust in knowledge work environments. They found that when AI systems provided feedback in real-time, performance and trust increased.

The study, by researchers at Carnegie Mellon University, is published in Computers in Human Behavior. The article is part of a special issue, "The Social Bridge: An Interdisciplinary View on Trust in Technology," in which researchers from a range of disciplines explore mechanisms and functions of trust in people and technologies.

"Our findings challenge traditional concerns that AI-driven management fosters distrust and demonstrate a path by which AI complements human work by providing greater transparency and alignment with workers' expectations," suggests Anita Williams Woolley, Professor of Organizational Behavior at Carnegie Mellon's Tepper School of Business, who co-authored the study. "The results have broad implications for AI-powered performance management in industries increasingly reliant on digital and algorithmic work environments.""

Source: Eurekalert! (10 Mar 2025)

AI

How A Paralyzed Man Moved a Robotic Arm with His Thoughts

"Researchers at UC San Francisco have enabled a man who is paralyzed to control a robotic arm that receives signals from his brain via a computer.

He was able to grasp, move and drop objects just by imagining himself performing the actions.

The device, known as a brain-computer interface (BCI), worked for a record seven months without needing to be adjusted. Until now, such devices have only worked for a day or two. The BCI relies on an artificial intelligence (AI) model that can adjust to the small changes that take place in the brain as a person repeats a movement – or in this case, an imagined movement – and learns to do it in a more refined way.

"This blending of learning between humans and AI is the next phase for these brain-computer interfaces," said neurologist, Karunesh Ganguly, MD, PhD, a professor of neurology and a member of the UCSF Weill Institute for Neurosciences. "It's what we need to achieve sophisticated, lifelike function."

The study, which was funded by the National Institutes of Health, appears March 6 in Cell."

Source: UCSF (6 Mar 2025)

AI

AI-Based Math: Individualized Support for Schoolchildren

"An up-to-date PC, a good graphics card and a standard webcam: according to research by Prof. Achim Lilienthal, that's all you need to identify pupils' strengths and weaknesses in mathematics. The principle: a webcam tracks the eye movements. Depending on the task, specific patterns emerge that can be displayed digitally on a heatmap, with red indicating areas where the children look frequently and green the areas where they glance only briefly. This helps the researchers analyze the data. "The AI system classifies the patterns," says the TUM robotics professor. On this basis, the software selects learning videos and exercises for the pupil.""

Source: TUM (3 Mar 2025)

AI

## New Method Significantly Reduces AI Energy Consumption

"The arrival of more complex AI applications in the coming years will substantially increase the demands on data center capacity. These applications will use up huge amounts of energy for the training of neural networks. To counteract this trend, researchers have developed a training method that is 100 times faster while achieving accuracy comparable to existing procedures. This will significantly reduce the energy consumption for training.

The functioning of neural networks, which are used in AI for such tasks as image recognition or language processing, is inspired by the way the human brain works. These networks consist of interconnected nodes called artificial neurons. The input signals are weighted with certain parameters and then summed up. If a defined threshold is exceeded, the signal is passed on to the next node. To train the network, the initial selection of parameter values is usually randomized, for example using a normal distribution. The values are then incrementally adjusted to gradually improve the network predictions. Because of the many iterations required, this training is extremely demanding and consumes a lot of electricity."

ARCHITECTURE

Architecture For Neurodiversity: Designing For Control, Choice, And the Senses
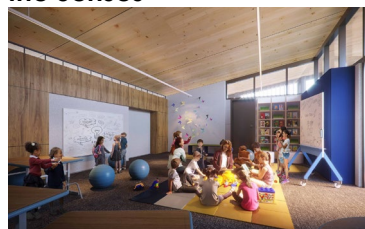

"Publicly occupied spaces can be overwhelming. Airports, schools, stadiums, and workplaces all feature environments with visual chaos that can be disorienting and stressful for individuals, especially those who are neurodiverse. The bombardment of stimuli, unpredictable movements, and competing visual information can create barriers to occupant comfort. Architects are regularly encouraged to create spaces that recognize and honor individual differences. Designing for neurodiversity is one way of championing inclusivity and extending principles of universal design.

Conservatively, one in five people are considered neurodivergent, meaning they process information differently than what's considered the norm. As studies progress, researchers are finding that "typical" processing is becoming a narrower margin - every individual processes information uniquely. In built environments, the largest design challenges are sensory: sound, temperature, lighting, acoustics, proximity to others, and touch. While these elements impact an occupant's ability to focus and succeed, for neurodivergent individuals, these impacts can be debilitating rather than merely irritating.

Designing for neurodiversity means creating environments that allow all occupants to find the right sensory settings to thrive. It requires considering concepts like environmental stimulation, social interaction, safety, predictability, and cognitive load, while supporting refuge and autonomy. Creating clear navigable paths, intuitive wayfinding,"

DESIGN

The Art of The Ramen Bowl Charts the Design History of The Noodle Dish
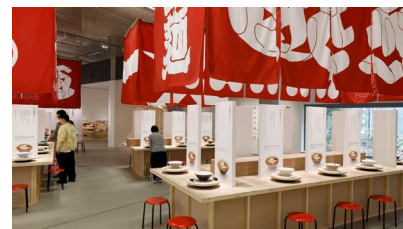
"An exhibition has opened at 21_21 Design Sight in Tokyo revealing the craft history behind the Japanese ramen bowl.

The Art of the Ramen Bowl features over 300 examples of the traditional noodle dish, both historic and contemporary, showcasing highly specialised ceramic techniques.

Ten artists and designers were commissioned to create new bowl and spoon sets for the show, including 21_21 co-director Naoto Fukasawa.

The other contributions came from Yuko Higuchi, Morihiro Hosokawa, Shigesato Itoi, Shun Sasaki, Katsuhiko Shibuya, Yui Takada, Naoto Takenaka, Mina Tabei and LiSA.

The show also features three playful reinterpretations of the ramen stall: a boat-like design by Takashi Nakahara, a metal-framed cart by Tonerico:Inc and a thatched stand presented by Takenaka Corporation.

The Art of the Ramen Bowl was curated by 21_21's Taku Satoh and writer Mari Hashimoto, building on a topic the pair first explored in a show back in 2014.

The ramen bowl provides a lens through which to explore the 1300-year history of Mino ceramics, the name given to pottery produced in Japan's western Tono region.

"Even those who eat ramen daily hardly know that some 90 per cent of ramen bowls are produced in western Tono," said the duo in their curatorial statement."

IMAGING

Decoding The Neural Basis of Affective Empathy: How the Brain Feels Others' Pain

Observer | Demonstrator
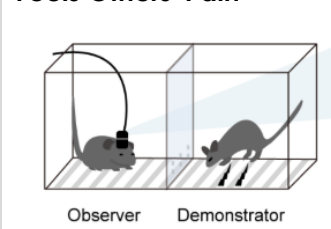
"A research team led by Dr. KEUM Sehoon at the Center for Cognition and Sociality (CCS) within the Institute for Basic Science (IBS) in South Korea has uncovered key insights into how the brain processes others' distress. Using miniature endoscopic calcium imaging, the researchers identified specific neural ensembles in the anterior cingulate cortex (ACC) that encode empathic freezing, a behavioral response in which an observer reacts with fear when witnessing distress in others.

To investigate this phenomenon, the team conducted a series of real-time brain imaging experiments in mice, tracking individual neurons as they observed another mouse experiencing mild foot shocks. The results showed that specific ACC neurons were activated both when the observer experienced pain firsthand and when they witnessed another in pain, reinforcing the idea that observing distress triggers a neural response similar to direct pain experience.

The study further revealed that ACC population activity during empathic freezing closely resembles the neural representation of affective—rather than sensory—aspects of direct pain experiences. This suggests that witnessing another's pain triggers activation in the ACC as if the observer were experiencing pain themselves, highlighting the ACC's specialized role in processing the emotional aspects of pain."

strategic use of color, and designated retreat zones for overwhelmed individuals is one way of addressing these needs."

"Diversity in technique and function make Tono a microcosm of the history and development of Japanese ceramics," they stated."

RESEARCH MANAGEMENT

How A PhD Student's Lab Size Affects Their Chance of Future Academic Success

"Postdoctoral students, graduate students and other junior scientists in large research groups are more likely to drop out of academia than are their peers in smaller groups, according to a new study of more than one million early-career researchers.

But the analysis also found that researchers trained in large groups who stay in academia have more career success. The work was published Monday in Nature Human Behaviour, amid a mass exodus of scientists from academia and a mental-health crisis among PhD students.

The findings are consistent with past anecdotal studies and survey results, but this is the first attempt to quantify the effects of different types of scientific mentorship, says co-author Roberta Sinatra, a social-data scientist at the University of Copenhagen.

"I hope that this helps guide the choices of PhD students," she says."

ROBOTICS

Worm-Like Robots Install Power Lines Underground: Bio-Inspired Approach Simplifies Underground Construction

"After January's Southern California wildfires, the question of burying energy infrastructure to prevent future fires has gained renewed urgency in the state. While the exact cause of the fires remains under investigation, California utilities have spent years undergrounding power lines to mitigate fire risks. Pacific Gas & Electric, which has installed over 1,287 kilometers of underground power lines since 2021, estimates the method is 98 percent effective in reducing ignition threats. Southern California Edison has buried over 40 percent of its high-risk distribution lines, and 63 percent of San Diego Gas & Electric's regional distribution system is now underground.

Still, the exorbitant cost of underground construction leaves much of the U.S. power grid's 8.8 million kilometers of distribution lines and 180 million utility poles exposed to tree strikes, flying debris, and other opportunities for sparks to cascade into a multi-acre blaze. Recognizing the need for cost-effective undergrounding solutions, the U.S. Department of Energy launched GOPHURRS in January 2024. The three-year program pours $34 million into 12 projects to develop more efficient undergrounding technologies that minimize surface disruptions while supporting medium-voltage power lines.

One recipient, Case Western Reserve University in Cleveland, Ohio, is building a self-propelled robotic sleeve that mimics earthworms' characteristic peristaltic movement to advance through soil. Awarded $2 million, Case's "peristaltic conduit" concept hopes to more precisely navigate underground and reduce the risk of unintended damage, such as breaking an existing pipe."

SENSORS

Touchless Tech: Control Fabrics with A Wave of Your Finger

"A team of researchers from Nottingham Trent University (UK), Helmholtz-Zentrum Dresden-Rossendorf (HZDR) and Free University of Bozen-Bolzano (Italy) has created washable and durable magnetic field sensing electronic textiles – thought to be the first of their kind – which they say paves the way to transform use in clothing, as they report in the journal Communications Engineering (DOI:10.1038/s44172-025-00373-x). This technology will allow users to interact with everyday textiles or specialized clothing by simply pointing their finger above a sensor.

The researchers show how they placed tiny flexible and highly responsive magnetoresistive sensors within braided textile yarns compatible with conventional textile manufacturing. The garment can be operated by the user across a variety of functions through the use of a ring or glove which would require a miniature magnet. The sensors are seamlessly integrated within the textile, allowing the position of the sensors to be indicated using dyeing or embroidering, acting as touchless controls or 'buttons'.

The technology, which could even be in the form of a textile-based keyboard, can be integrated into clothing and other textiles and can work underwater and across different weather conditions. Importantly, the researchers argue, it is not prone to accidental activation unlike some capacitive sensors in textiles and textile-based switches. "By integrating the technology into everyday clothing people would be able to interact with computers, smart phones, watches and other smart devices, transforming their clothes into a wearable human-computer interface", summarizes Dr. Denys Makarov from the Institute of Ion Beam Physics and Materials Research at HZDR."

TRANSPORTATION

Urban Air Mobility (UAM) Market Set to Expand at A Staggering 30.2% CAGR, Reaching $30.7 Billion By 2031

"According to a new report published by Allied Market Research, titled, "Urban Air Mobility(uam) Market," The urban air mobility(uam) market size was valued at $2.3 billion in 2021, and is estimated to reach $30.7 billion by 2031, growing at a CAGR of 30.2% from 2022 to 2031.

Urban air mobility is now proving to be a practical means of transport for moving people and cargo in innovative, cost-efficient ways. Urban air mobility guarantees to improve the current transportation ecosystem from congested roads and traffic conjunction. Urban air mobility has the potential to boost the effectiveness of the current transportation systems by minimizing distance traveled and enhancing sustainability. Urban air mobility will be thoroughly incorporated using the existing infrastructure and networks for transportation for connections at the first and last miles. The development of eVTOL aircraft which are able to take vertical takeoff has gotten the attention of major market players in urban transportation, which is a major factor estimated to propel the urban air mobility(UAM) market demand in the upcoming years.

However, some of the disadvantages of urban air mobility include its high initial investment cost. Urban air mobility is a flying vehicle that is developed to operate both on road and air but it requires to create of a suitable infrastructure for operating these vehicles in urban cities mostly in densely populated cities which includes a high investment cost in developing suitable infrastructure as well as there is chances of increase in noise pollution as these vehicles are using rotary blades for flying. These factors are going to hamper the urban air mobility(UAM) market growth in the forecasted period."