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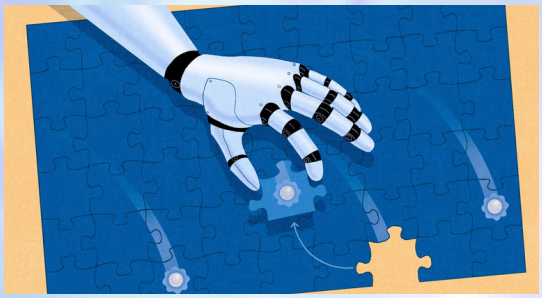
Byte Quest

Department of CSE



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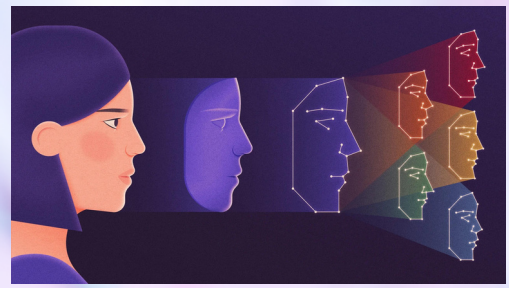
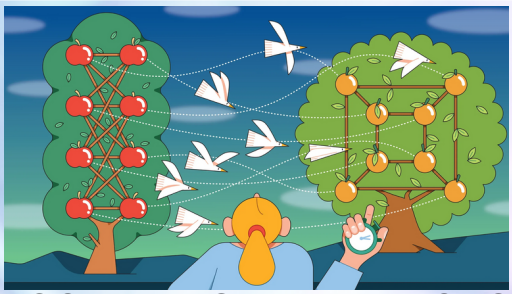
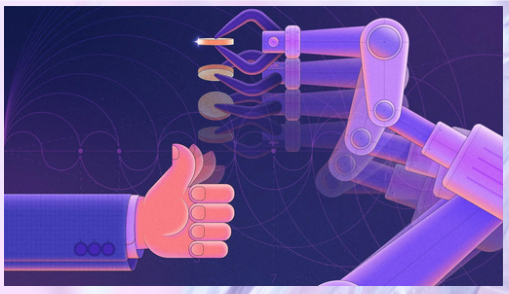


SYNTHETIC DATA REVOLUTION



ALGORITHMIC BREAKTHROUGH



PRIME CONSTRUCTION FUSION

Department Vision

To be a center for academic excellence in the field of Computer Science and Engineering education to enable graduates to be ethical and competent professionals.

Department Mission

To enable students to develop logic and problem solving approach that will help build their careers in the innovative field of computing and provide creative solutions for the benefit of society.

FACULTY COORDINATORS

DR. BHARGAVI PEDDIREDDY
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(ASST. PROFESSOR)

STUDENT COORDINATORS

VAMSI (3/4) CSE C
SPOORTHI (3/4) CSE C

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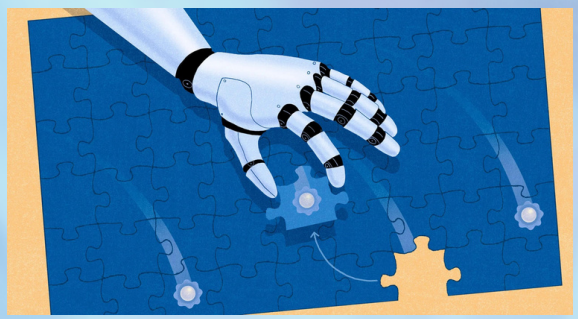
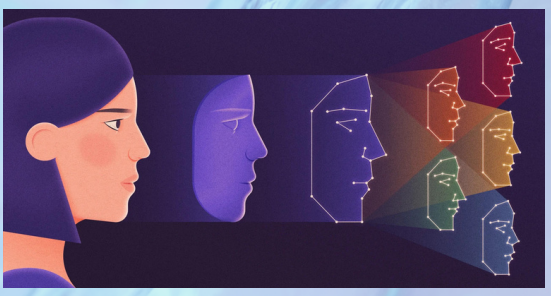


Physicists are adopting sparse convolutional neural networks (SCNNs) to revolutionize data analysis in experiments worldwide. Originally developed for recognizing sparse Chinese handwriting, SCNNs selectively focus on relevant information, accelerating real-time data processing in particle experiments.

Physicists, traditionally at the forefront of algorithmic development, now embrace computer science innovations like SCNNs. Applied to neutrino experiments at Fermilab and the IceCube Neutrino Observatory in Antarctica, SCNNs prove to be up to 20 times faster than conventional methods. The transition signals a notable shift where computer science advancements lead in the computational aspects of physics research.

SYNTHETIC DATA REVOLUTION



Researchers increasingly rely on synthetic data to address challenges in acquiring real data for training AI systems. Microsoft's lab, for instance, created a dataset of 100,000 synthetic faces, offering privacy and diversity advantages in facial recognition.

Improved graphics processing units enable the generation of more realistic synthetic data, as seen in eye-tracking experiments producing one million images at a fraction of the cost and time of real images. In medicine, synthetic data aids in training neural networks for interpreting radiological images without breaching patient privacy. Synthetic data is emerging as a vital component in AI development, with some envisioning its potential to replace real data entirely.

Synthetic data, poised to replace real data, accelerates AI development by overcoming privacy issues, bias, and scarcity in training datasets.

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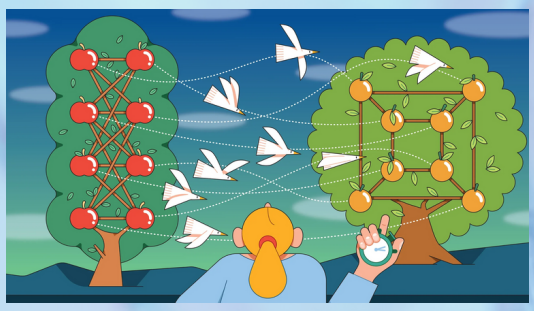
ALGORITHMIC BREAKTHROUGH

Computer scientists have made progress in the quest for efficient algorithms, particularly in determining when two mathematical groups are identical. While it's a seemingly simple question in everyday scenarios, the computational complexity arises in defining sameness in computer science. Xiaorui Sun of the University of Illinois, Chicago, presented a faster algorithm for the group isomorphism problem, focusing on identifying when two mathematical groups are the same.



The breakthrough involves a novel approach to a specific class of groups, overcoming a long-standing speed limit. Sun's work, building on the concept of isomorphism where structures remain the same despite superficial differences, has potential implications for various mathematical and computational problems. The study addresses a bottleneck in progress, as advancements in graph isomorphism have outpaced those in group isomorphism. Sun's method involves splitting matrix spaces, akin to breaking down complex problems into manageable parts, achieving a notable improvement in algorithmic efficiency. While the exact speed category remains undetermined, Sun's work provides a promising step towards faster algorithms for comparing diverse mathematical objects, hinting at broader computational advancements in the future.

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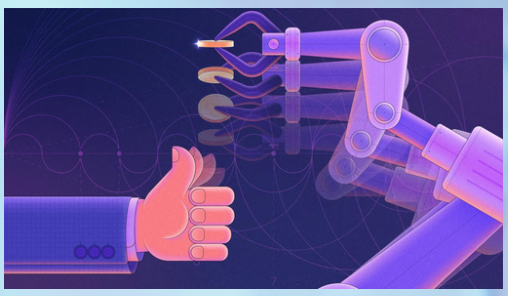

Computer scientists have developed a groundbreaking algorithm that combines randomness and determinism to reliably construct large prime numbers.

Traditional methods involve either inconsistent random guessing or computationally expensive deterministic algorithms. The new algorithm, introduced in May, effectively merges these approaches, producing a reproducible prime number of a specific length. With potential applications in cryptography, the pseudodeterministic algorithm operates in polynomial time, a significant improvement over prior subexponential methods. Though simple and versatile, it may not deterministically cover all digit lengths. The ultimate goal remains a deterministic algorithm free of randomness. Nonetheless, this development underscores the powerful link between randomness and computational complexity in various scientific disciplines.

Computer scientists have developed a groundbreaking algorithm that combines randomness and determinism to reliably construct large prime numbers.

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