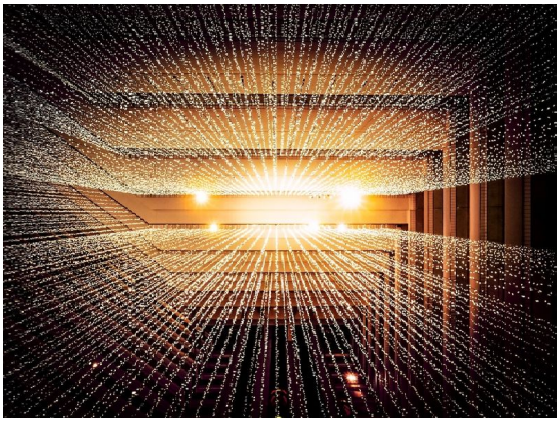
MIT-IBM Watson AI Lab

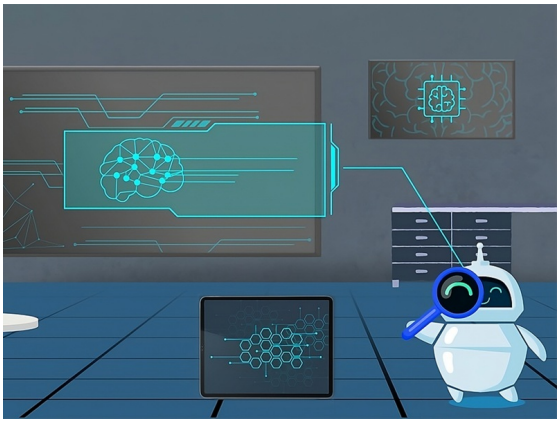
In the Lab



Technique could efficiently solve partial differential equations

[The method could help model complex physical systems.]

Lab researchers Steven G. Johnson, Payel Das, Youssef Mroueh, and their research teams have developed a technique that combines a low-fidelity, explainable physics simulator with a neural network generator. The work is applicable to fields like mechanics, optics, thermal transport, fluid dynamics, physical chemistry, climate, and more.



AI agents help explain other AI systems

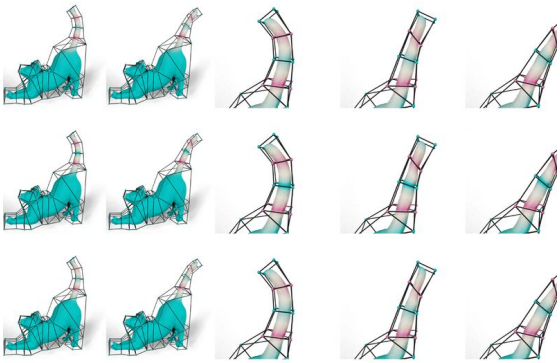
[Method uses AI to automate the explanation of complex neural networks.]

A new technique from the teams of Lab researchers Jacob Andreas and Antonio Torralba uses an LLM-based AI agent to experiment and offer explanations of how another AI network is operating. The researchers pair this with a new standardized interpretability benchmark.

Leveraging language to understand machines

[Using language to design new integrated circuits and make it understandable to robots]

Working with the Lab, master's students Irene Terpstra ’23 and Rujul Gandhi ’22 are creating new hardware with optimized parameters and a method that converts natural language into a form that's friendly to machines.



A flexible solution to help artists improve animation

[This new method draws on 200-year-old geometric foundations.]

The Lab groups of Vincent Sitzmann and Justin Solomon have developed flexible mathematical functions known as barycentric coordinates, which define how 2D and 3D shapes like characters can bend, stretch, and move through space.

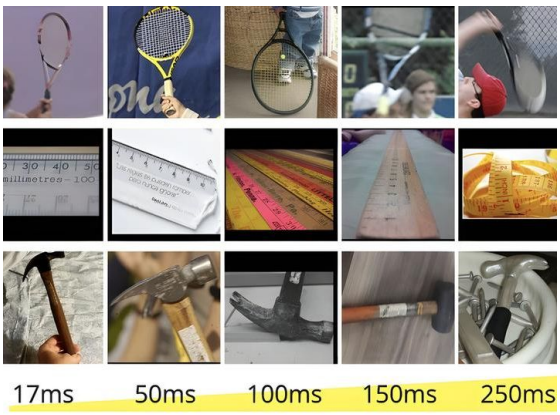


Image recognition accuracy: An unseen challenge confounding today’s AI

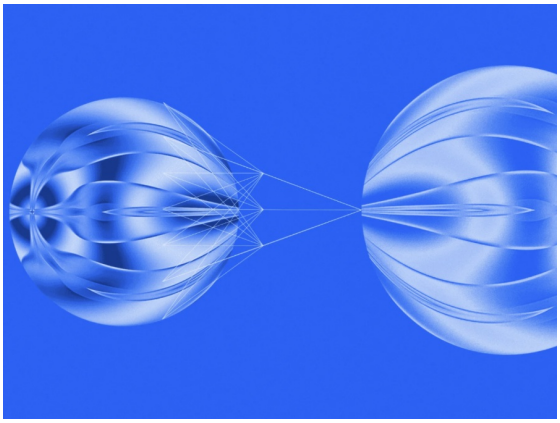
[“Minimum viewing time” benchmark gauges image recognition complexity for AI systems].

Lab researchers Boris Katz, Dan Gutfreund, Andrei Barbu, and their research teams developed a method, which quantifies the difficulty of recognizing an image based on how long a person needs to view it before making a correct identification, gauging models' performance.

A computer scientist pushes the boundaries of geometry

[Justin Solomon solves problems in computer vision, machine learning, statistics, and beyond.]

Lab researcher Justin Solomon's research ranges from developing machine learning models that perform more accurately on target datasets and helping autonomous vehicles identify pedestrians. “The language we use to talk about data often involves distances, similarities, curvature, and shape — exactly the kinds of things that we’ve been talking about in geometry forever."



An AI model that won’t leak personal information

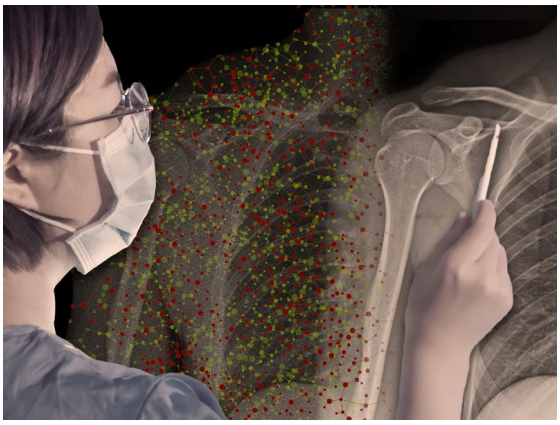
[Bringing privacy-preserving synthetic data closer to its real-world analog]

When it comes to making business decisions, tabular data contains tons of useful relationships, which are essential for making predictions, accompanying the potential for exposing sensitive information. To address this, research from the Lab teams of Kristjan Greenewald, Hao Wang, and Akash Srivastava use synthetic tabular data that's been aligned with real data.

MIT Generative AI Week fosters dialogue across disciplines

[MIT symposia and events examine the implications and possibilities of generative AI.]

The MIT community, including a lineup of Lab researchers, came together to explore applications of generative artificial intelligence technologies across a diverse range of disciplines through multiple talks and panels.



Automated system teaches users when to collaborate with AI

[A customized onboarding process helps a human learn when a model’s advice is trustworthy.]

Lab researchers Dennis Wei, Prasanna Sattigeri, Subhro Das, David Sontag, and their colleagues developed a process that finds situations where the human either over-trusts or under-trusts the AI, describing these as natural language rules, and creates training exercises based on these rules to guide the user.

Unlocking the secrets of natural materials

[Benedetto Marelli develops silk-based technologies with uses “from lab to fork.”]

Lab researcher Benedetto Marelli and his Lab team aim to mitigate several pressing global problems, including developing coatings that extend the shelf life of food. “I liked the idea of pursuing studies that provided me a background to engineer life,” in order to improve human health and agriculture, he says.

In the Media

AI teaches robots the best way to pack a car, a suitcase—or a rocket to Mars

Research from the Lab groups of Josh Tenenbaum, Tomás Lozano-Pérez, and Leslie Kaelbling shows how a diffusion model can be used to perform computationally complex tasks that require holding multiple constrains in mind at once to achieve optimal and efficient results, reports *Scientific American.*

Upcoming Events

MIT's Efforts at Informing AI Policy

Expanding Horizons in Computing
February 2, 1-4 p.m. ET

This in-person, discussion-oriented workshop will consider key questions about how to effectively govern the use of AI through the development of practical, technically informed AI policy. The discussion will build on recently released policy briefs aimed at delivering technically informed recommendations on AI policy, produced by several MIT faculty as part of an initiative led by the MIT Schwarzman College of Computing and MIT Washington Office. It will cover the policy brief on an overarching AI governance framework, as well as issues particular to large-scale generative models, followed by a deeper dive on issues such as auditing, data ownership, and other topics that arise in the discussion. Register and see more event offerings here.

Event Recordings

DiffuseBot: Making robots with genAI & physics-based simulation
Lab researcher Daniela Rus and her team explain their recent Lab work to co-optimize the morphology and control of physical soft robots.

Lab Highlights

Lab researcher Roger Levy received a 2023 School of Science teaching prize for his exceptional instruction.

Online Learning

Artificial Intelligence: Implications for Business Strategy
A joint MIT CSAIL and MIT Sloan School of Management Course begins January 31, 2024.

Machine Learning in Business
A joint MIT CSAIL and the MIT Sloan School of Management Course begins February 7, 2024.

Making AI Work: Machine Intelligence for Business and Society
A joint MIT Sloan & Schwarzman College of Computing Executive and Professional Course begins March 13, 2024.

Unsupervised Machine Learning: Unlocking the Potential of Data
A joint MIT Sloan & Schwarzman College of Computing Executive and Professional Course begins March 20, 2024.