MIDAS

Annual Highlights

MICHIGAN INSTITUTE FOR DATA & AI IN SOCIETY
UNIVERSITY OF MICHIGAN

YEAR IN REVIEW 2024

MICHIGAN INSTITUTE FOR DATA & AI IN SOCIETY
UNIVERSITY OF MICHIGAN

Annual Highlights Table of Contents

MIDAS By The Numbers

560+
Affiliate Faculty

$222M
External funding secured with MIDAS support

90
MIDAS Funded Research Projects

50+
Postdocs

Dear MIDAS Community,

As I reflect on the remarkable research breakthroughs and the profound impact our community has achieved in 2024, I am filled with pride and gratitude. This year has been another transformative chapter for data science and AI, underscoring the power of innovation, collaboration, and responsibility in advancing knowledge and addressing society's most pressing challenges.

At MIDAS, our efforts in 2024 have focused on empowering researchers to adopt cutting-edge methods, fostering the rigorous, reproducible, and responsible use of data and AI, and forging impactful partnerships across disciplines. Together, we are shaping a future where data and AI are leveraged for both groundbreaking discoveries and meaningful societal progress.

Leading the Way in AI Training and Research Collaboration
One of the most pressing questions for researchers today is how to leverage AI effectively and adapt to the profound changes it brings to their work. In response, MIDAS has significantly expanded training opportunities through our summer academies and year-round tutorials. Our most intensive initiative, however, is our postdoctoral program—one of the largest of its kind in the world. These exceptional fellows, guided by faculty mentors and collaborative networks, exemplify the transformative potential of interdisciplinary research.
In 2025, we will broaden the scope of our postdoctoral training through the Eric and Wendy Schmidt AI in Science African Faculty Fellows program. This ambitious initiative will empower African researchers to harness AI methods in science and engineering, fostering global innovation and strengthening the foundation for international scientific collaboration.

Championing Responsible AI and Data Science
Ethical and responsible AI remains at the core of our mission. In 2024, we launched the first round of a nationwide NIH-funded training program on rigor and reproducibility in data- and AI-intensive research. Additionally, our collaboration with Microsoft on AI policy, governance, and societal impact reflects our commitment to advancing scholarship in these critical areas. By prioritizing responsible AI, we are ensuring that emerging technologies are both innovative and trustworthy.

Building Collaborative Ecosystems Across Sectors
Collaboration has always been the heart of MIDAS. With over 560 affiliate faculty members across the university, we have facilitated countless partnerships that drive interdisciplinary progress. This year, we expanded our reach beyond academia by intensifying collaborations with industry, government, and community stakeholders. Recognizing the challenges posed by AI-enabled research, we launched an NSF-funded study to create a model for public-private collaboration. This initiative aims to co-design data and AI systems that align seamlessly with the needs of scientific inquiry and policymaking.

Looking Ahead to 2025
As we embark on a new year, MIDAS remains dedicated to deepening its role as a catalyst for groundbreaking research while fostering a more inclusive, agile, and interconnected research community. Our collective creativity, curiosity, and unwavering commitment to science and society continue to inspire and guide us.
On behalf of the entire MIDAS team, I extend my heartfelt gratitude to each of you for your contributions to this shared mission. Wishing you a joyful holiday season and a successful start to 2025.

Warm regards,
H.V. Jagadish
Director, Michigan Institute for Data and AI in Society

MIDAS Mission

MIDAS promotes advancements in data science and artificial intelligence, and enables their transformative use in a wide range of research disciplines to achieve lasting scientific and societal impact.

Research

Enabling innovative and interdisciplinary research for both methodology and applications

Enabling the wide and speedy adoption of cutting-edge data science and AI methods

Promoting responsible use of data and AI

Training

Training faculty and other researchers

Postdoctoral training:
- Eric and Wendy Schmidt AI in Science Program
- Eric and Wendy Schmidt AI in Science African Faculty Fellows Program
- Michigan Data Science Fellows Program

Collaboration

Partner with industry, academia, and public sector organizations

Promoter of data science and AI for social good

Founding member of the Academic Data Science Alliance; and the Midwest Big Data Hub

Research Community

560+ MIDAS affiliate faculty members come from all schools and colleges at U-M's Ann Arbor campus, and the U-M Dearborn and Flint campuses, making MIDAS one of the largest and most scientifically diverse data science and AI institutes at any US university.

Our community also includes postdoctoral researchers in our training programs, staff data scientists across the campus, and more than 1000 students in data science and AI organizations.

The graph (right) illustrates the grant proposal development collaboration of MIDAS faculty members from various schools and colleges.
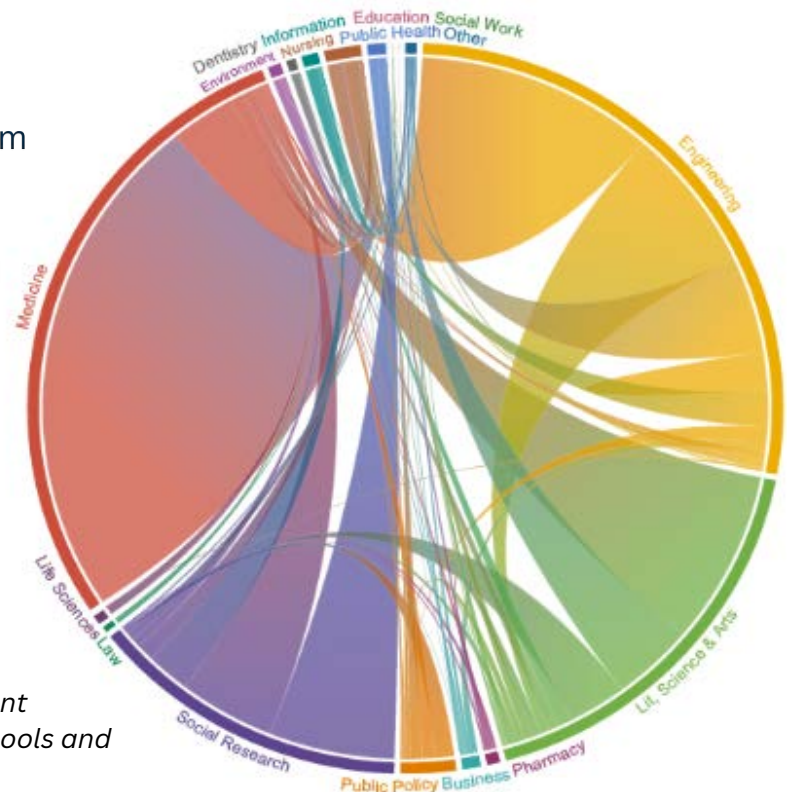
Helping Researchers Adopt Rapidly Emerging Technologies

AI is revolutionizing the landscape of research by enabling unprecedented levels of automation and innovation, and facilitating major breakthroughs across all fields. Through interdisciplinary research incubation workshops, hands-on tutorials, and other research events, MIDAS is wholly committed to helping researchers at the University of Michigan seamlessly adopt new technologies into their research at speed and at scale.

Our work is based on the principles articulated in an article in the Harvard Data Science Review, authored by Drs. Jing Liu and H.V. Jagadish.

> The current norm of relying on individual researchers for new technology adoption is no longer adequate. It is time that academic institutions and their research organizations such as our own (the Michigan Institute for Data Science) develop new mechanisms to help researchers adopt new technologies, especially those that cause major seismic shifts such as generative AI. We believe this is essential for helping academic researchers stay at the forefront of research and discovery, while preserving the validity and trustworthiness of science.

Special Issue 5: Grappling With the Generative AI Revc   Published on May 31, 2024   DOI   10.1162/99608f92.2c8e7e81

Institutional Efforts to Help Academic Researchers Implement Generative AI in Research
by Jing Liu and H. V. Jagadish

Generative AI research resources hub

Generative AI models, capable of creating novel, diverse, and coherent content, are revolutionizing numerous domains. They've demonstrated their capabilities across the arts, music, chemistry, drug discovery, and much more. The MIDAS Generative AI Resources Hub is being updated frequently with a user's guide and examples of how Generative AI is being used in research and studies developed by U-M researchers. The hub now features 14 GenAI overviews written in layman's terms and more technical vernacular.

🌐 **Visit the GenAI Resources Hub**

AI + X research events

MIDAS offered [a series of research symposia and workshop](#)s in 2024, in collaboration with U-M units and external organizations, which gathered world-renowned researchers and U-M faculty members to highlight themes where data/AI promises research breakthroughs.

- Interdisciplinary open science in social and behavioral research (with ICPSR)
- Technology meets creativity: exploring the potential of AI in creative arts (Arts Initiative and MCAIM)
- Understanding biodiversity in a changing planet (with IGCB)
- Ethical AI (with Rocket Companies)
- Health AI ethics and policy (with DLHS and e-HAIL)
- Advancing Behavioral Science through AI and Digital Health (MIDAS in support of BRISP)
- AI Horizons - Energizing Great Lakes Science Through Machine Learning and AI (MIDAS in support of CIGLR)
- Generative AI, from theory to scientific applications (with ECE)
- Vesuvius scrolls: from ancient manuscripts to AI (with Classical Studies)

The annual AI in science and engineering symposium focused on four inter-related themes: *Speeding Up Research, The Nature of Creativity in Research, Trusting the AI Researcher, and Expanding the Limit of the Human Researcher.*

U-M President Santa Ono giving the opening remarks at the annual AI in science and engineering symposium (left), Panel discussion on "expanding the limit of the human researcher (right)
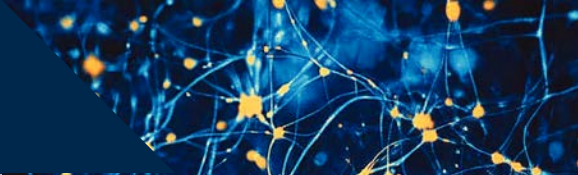
Pilot grant funding support - PODS and DATA

CENTER FOR DATA-DRIVEN DRUG DEVELOPMENT AND TREATMENT ASSESSMENT

Transforming Research with Data Science and AI

The Michigan Institute for Data and AI in Society (MIDAS) has unveiled the recipients of its 2024 Propelling Original Data Science (PODS) grants and the annual DATA awards, recognizing groundbreaking research at the intersection of data science, artificial intelligence, and societal impact.

This year, 14 University of Michigan research teams received PODS awards to drive innovation in areas such as health care, environmental sustainability, and AI ethics. Projects range from enhancing U-M soccer performance with AI to designing sustainable aviation fuels and optimizing health policies through responsible AI practices.

The PODS program, now in its eighth year, continues to be a catalyst for interdisciplinary research, having generated over $125 million in additional external funding since its inception. This year's awards include collaborations with leading organizations like Microsoft and U-M's Institute for Healthcare Policy and Innovation, emphasizing the transformative potential of AI in research, industry, and policy.

"These projects showcase the power of AI to transcend traditional research limits while ensuring its ethical application," said MIDAS Executive Director Jing Liu.

Learn more about how MIDAS is shaping the future of AI-driven research and innovation.

📖 **Read about the 2024 PODS and DATA Awardees**

Faculty research connection series

The large community of MIDAS faculty affiliates come from a diverse range of research domains on a vast campus. To help develop research collaboration, especially interdisciplinary collaboration, MIDAS has started a monthly research connection /faculty social series. The discussion at each session focuses on a research theme, sometimes around funding opportunities. The first three themes were

- AI and humanities research
- Research at the intersection of AI and biology
- AI, formal methods, and mathematical reasoning

The [Center for Data-Driven Drug Development and Treatment Assessment (DATA)](#), a unit of MIDAS and a national center that is part of NSF's [Industry-University Cooperative Research Center](#) program, awarded funding to its second cohort of research projects in the Spring of 2024. The five funded projects employ data science and AI in the design and assessment of clinical treatment through the entire span of the development pipeline.

Faculty-student research connection

MIDAS Student Organizations Council consists of 10 data science and AI student organizations and programs, with a total of more than 1,000 graduate and undergraduate students. They constantly seek opportunities to develop skills through real-world research. Meanwhile, many faculty members on campus don't have access to students with data science / AI training. MIDAS faculty-student research connection program helps faculty and students find each other.

Three times a year, we collect faculty research projects and ask students to express interest. Faculty members will interview students and make hiring decisions.

📖 **Learn more about the program**

Training Programs Continue to Flourish

MIDAS operates one of the largest postdoctoral training programs in the world for AI-enabled research breakthroughs. We have now expanded the program to Africa, with the goal of training African faculty researchers to apply AI in research.

MIDAS summer academies, aiming to equip faculty and other academic researchers with skills to implement data science and AI methods in domain research, has expanded into a multi-week program, and will expand significantly in 2025.

MIDAS postdocs making research breakthroughs

The Eric and Wendy Schmidt AI in Science Fellowship program and the Michigan Data Science Fellowship program catalyze the transformative use of data science and AI in a wide range of domain sciences. Our postdocs are already making impact in many ways. A few examples include:

- Improving Unmanned Aerial Vehicle (UAV) Flights with Smarter Models (Elena Shrestha)
- Mass extinction 66 million years ago triggered rapid evolution of bird genomes (Jacob Berv)
- Bringing Knowledge Exchange Inside & Outside of Correctional Facilities (Matthew Moreno)
- California's Grasslands Transform Rapidly Under Climate Stress (Yiluan Song)
- Anonymous tips work to prevent school shootings and suicides, new study finds (Elyse Thulin)

Supporting AI-enabled research in Africa

With $5.6M funding from Schmidt Sciences, the MIDAS postdoctoral training programs now expands to include a residential program for faculty researchers from African universities. The focus is to enable the use of AI to address research questions that are in math and physical sciences, engineering, biological sciences, and environmental and earth sciences. Read more.

We are grateful for the support from our partners: African Academy of Science; African Center for Aquatic Research and Education, African Studies Center (U-M); African Undergraduate Research Adventure (U-M); Center for Complex Particle Systems, Ecosystems, Finance and Health; Global REACH (U-M); Masakhane Research Foundation; Science for Africa Foundation.

Transforming Your Research with GenAI Tutorial Series

To equip researchers with the necessary skills to transform their research with generative AI, MIDAS collaborated with campus units to offer a year-round series of tutorials by U-M experts on using GenAI to:

- Enhance professional productivity
- Improve research programming efficiency
- Integrate generative image AI in research workflow
- Design custom research solutions
- Acquire and analyze text data
- Assist writing and presentation
- Search and summarize research literature
- Analyze, visualize, and present data

Explore the tutorials

Panelists at " GenAI Governance and Sensitive Data Use Guidelines at Michigan Medicine"

Data science and AI Summer Academies

More than 200 faculty, staff, postdocs and students attended our 2024 summer academy Series to develop conceptual understandings of key concepts such as machine learning, deep learning, generative AI, causal inference, and making data "AI ready", and to build practical skills to implement such methods in their research.

Our goal is to help researchers start on building data science and AI skills, and better collaborate with data science and AI methodology experts.

Stay tuned for our 2025 announcement! We will offer multiple weeks of training including:
- Concepts and principles;
- Python-based implementation
- Advanced topics with applications in domain sciences
- Methods to improve research rigor and reproducibility

Responsible Data Science and AI

As data science and AI become major forces in science and society, so too do issues such as bias and equity become major concerns. In addition, the trustworthiness of science is being tested when the rapid advancement of data science and AI methods exceeds the traditional pace of technology uptake in research. MIDAS promotes ethical data science and AI by developing guiding principles and establishing best practices, and train researchers to improve rigor and reproducibility of research.

Training for research rigor and reproducibility

Building on our work since 2019 to promote and enable research rigor and reproducibility, we received an NIH grant in 2023 to offer the Data and AI Intensive Research with Rigor and Reproducibility (DAIR³) training program to academic researchers nationwide, focusing on faculty and staff. The central component is a weeklong bootcamp in the summer that focused on ethical issues in biomedical data science; data management, representation, and sharing; rigorous analytical design; the design and reporting of AI models; reproducible workflow; and assessing findings across studies.

This program is also a significant component of our DEI effort. The program team includes personnel from the University of Michigan, the College of William and Mary, and two Minority-Serving Institutions: Jackson State University, and University of Texas San Antonio. We strive to support researchers from diverse demographic, professional, scientific, and institutional backgrounds so that to promote the equitable participation in the scientific discovery process.

70 researchers joined us in the summer of 2024 for the inaugural round of bootcamp. 80% from public universities; 30% from Minority-Serving Institutions; 60% women and 40% under-represented minorities. Their research spanned evenly among -omics, molecular / cellular, physiology, clinical and healthcare, and population and epidemiological research.

📖 **Read more about the program**   👆 **2025 Bootcamp applications here**

AI regulation and policy research

As AI becomes the dominant force to reshape science and society, the issue of AI policy and regulation looms large. MIDAS and Microsoft have started a multi-year initiative to support U-M research on AI policy, governance, its impact on society, and how to train researchers to use AI ethically and responsibly.

Along the same line, MIDAS has started collaboration with the U-M Institute for Healthcare Policy and Innovation (IHPI) to support research on the policy and governance of health AI.

With this initial effort, MIDAS will expand its effort to support strategic directions of U-M AI policy and governance research.

See the article on page 4 (PODS awardees) for information on funded projects.

📖 **Read more about the initiative**

Ethical AI symposia

In collaboration with Rocket Companies and the U-M Department of Learning Health Sciences, MIDAS organized an Ethical AI symposium and a Health AI Policy and Ethics symposium. Featured speakers from multiple sectors include:

Government: Bill de Blasio (former Mayor of New York City)
Industry: Michael Tjalve (Microsoft Philanthropy), Brian Martin (AbbVie)
Academia: Sharon Davis (Vanderbilt), Jennifer Gibson (University of Toronto), Min Kyung Lee (University of Texas, Austin), Kelly Owens (New York University), Yasir Tarabichi (Case Western Reserve)
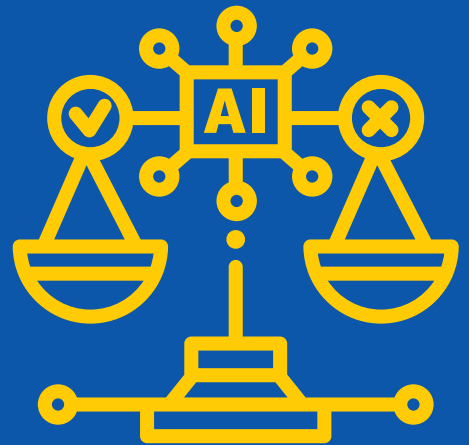
📖 **Read more about the symposium series**

Building Collaboration

The scale of research, with the aid of data science and AI, is constantly increasing. Collaboration among academia, industry, government and community organizations is increasingly essential for the coordinated access of research resources (funding, data, compute, AI models), talent, and for maximizing the positive impact of research on society. MIDAS is investing intensified effort to build such collaboration.

📖 **Read more about MIDAS effort to build cross-sector partnership**

An exercise of research co-design with cross-sector collaboration

MIDAS received NSF funding for a project on research and development strategic visioning, focusing on establishing a collaborative mechanism for academia, industry, and the public sector. The project's scientific focus will be the co-design of database research and AI research, so that they inform each other, align with the needs of the end users of data and AI - domain scientists and government tech teams, and improve the trustworthiness of scientific research and data- and AI-assisted decision making.

Participants in this project include database and AI researchers and database developers from U-M and Microsoft, U-M researchers across domains whose research is data- and / or AI-intensive, and the data team from the City of Detroit. In 2025, this group will work closely to understand the current mechanisms of research design in academia and in industry; the current collaboration mechanisms especially how end users and database / AI researchers inform each other; identify opportunities and challenges; and carry out exercises of goal alignment, communication, equitable participation so as to develop effective approaches to collaboration.

📖 **Read more about the co-design project**
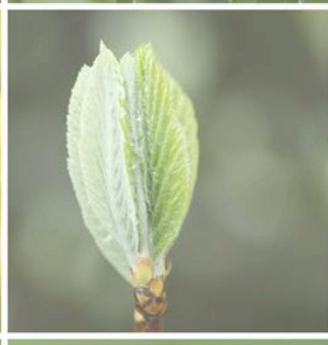
BioBlend: Integrating Multimodal and Crowdsourced Data for AI-Driven Biodiversity Monitoring and Conservation

BIOBLEND

The BioBlend workshop (May 21-24), hosted by Schmidt AI in Science postdoctoral fellows Nathan Fox, Eliot Miller, and James Boyko, brought together postdoctoral fellows in Schmidt AI in Science programs at nine universities around the world, other academics at all career stages, professionals from industry, NGOs, museums, and the Karuk Tribe's wildlife team. Such a diverse group of attendees reflected the broad interdisciplinary and cross-sectoral nature of biodiversity monitoring, with an emphasis on Indigenous perspectives in conservation. The workshop fostered collaboration, facilitating meaningful discussions and innovative approaches to integrating AI and citizen-sourced data.

The workshop featured keynote presentations, research presentation sessions, and data challenges. Researchers explored AI solutions for biodiversity monitoring using multimodal and crowdsourced data. During data challenges, participants used data sources like citizen science platforms, camera traps, and acoustic monitoring to work on team projects. These challenges allowed collaboration and understanding of different researchers' thought processes, combining varying AI skill levels for hands-on learning from experienced colleagues.

Collaboration with academic institutions

Hosting the Academic Data Science Alliance 2024 meeting

This year, MIDAS hosted our Annual Summit in conjunction with the Academic Data Science Alliance (ADSA) (ADSA) Annual Meeting. By partnering with ADSA, we leverage the reach of this national organization for data science and AI institutes in academia; expand the scope of our Summit; and bring together data science and AI leadership, researchers and educators from around the country.

The central theme of the event was "Data Science and AI – Keeping Humans in the Loop." The summit focused on the crucial role that humans play in data and AI - humans as data producers and data engineers, humans as AI designers and developers, humans represented in data, and humans as data and AI users and as the beneficiaries or victims of data and AI.

Faculty, staff, and trainees from more than 100 universities attended the event.

See the keynote presentations from the Summit

Captions: *MIDAS Executive Director Jing Liu and ADSA Founder/Executive Director Micaela Parker at the 2024 summit*

Future Leaders Summit 2024

The annual Future Leaders Summit (FLS) brought together outstanding graduate students and postdocs from major research universities, Midwest universities and Minority-Serving Institutions, engage them in research discussions and provide mentoring as they grow to become future research leaders in data science and AI.

*Attendees of the Summit collaborate on a presentation*

The theme of the Summit was "responsible data and AI" and included the following topics:
- Equity and fairness, particularly in automated decision making
- Explainability of analytical results
- Reproducibility and replication of scientific results
- Systemic issues and protecting marginalized populations
- Responsible AI in science and engineering

A diverse pool of career mentors offered advice from effective networking and job search to interview skills and to being a successful junior faculty member.

Caption: *Future Leaders Summit Cohort 2024*

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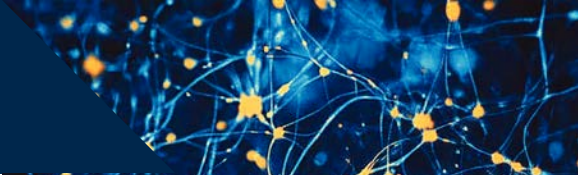
Community Highlights

The achievements that we are able to showcase on this page are truly a tiny percentage of all the amazing work that our researchers do. We are honored to be able to support you all!!
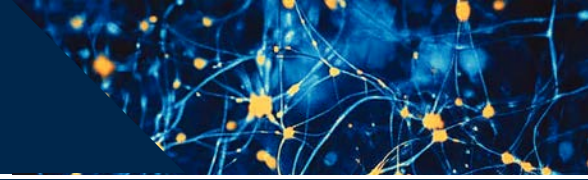
Research highlights

- Parker Solar Probe finds fresh clues to decades-old mystery surrounding the sun (Mojtaba Akhavan-Tafti)
- AI guardrails can fall short in health care (Nikola Banovic, David Fouhey, Michael Sjoding, Thomas Valley, Jenna Wiens)
- 3 strategies healthcare can copy from aviation to refine medical AI (Elizabeth Bondi-Kelly)
- Michigan Minds: One medicinal chemist's mission to bring better medicine to sick and dying species (Tim Cernak)
- Annotation is dead (Jason Corso)
- Twisting Light: Unveiling the Helical Path to Ultrafast Data Transmission (Hui Deng)
- Computer expert hacks Dominion Voting Machine in front of judge, changes votes with Bic pen (J. Alex Halderman)
- Shifting power operations to reduce wildfires (Ruiwei Jiang)
- U-M Biological Station activates snowpack sensor to study changing winters (Branko Kerkez)
- Nanoscale engineering brings light-twisting materials to more extreme settings (Nicholas Kotov)
- Atlas of the human ovary offers huge potential for new treatments (Jun Li)
- Using AI to decode dog vocalizations (Rada Mihalcea)
- Fixing human vision with the help of computer vision (Nambi Nallasamy)
- Study examines carbon footprint of urban-farmed food (Joshua Newell)
- A leaky sink: Carbon emissions from forest soil will likely grow with rising temperatures (Peter Reich)
- Widely used AI tool for early sepsis detection may be cribbing doctors' suspicions (Karandeep Singh, Thomas Valley, Jenna Wiens)
- Researchers with African and East Asian names are less likely to be mentioned in U.S. media (Misha Teplitskiy)
- Can mathematicians help to solve social-justice problems? (Tian An Wong)
- Study: Black patients less likely to get home health care referral than white peers (Olga Yakusheva)
- Why Is Your Heart on the Left? Unraveling the Mysteries of Biological Chirality (Robert Ziff)
- A leap toward carbon neutrality, CO2 to methanol (Paul Zimmerman)

Grants

- $15M to fund U-M, Los Alamos National Laboratory collaboration (Alex Gorodetsky, Brendan Kochunas)
- Nicholas Kotov receives $10 million grant for nanoparticle design research
- Stange receives federal grant to classify college courses at scale (Kevin Stange)
- UMich receives a $17.9 million grant to research improving first-time mental health treatment (Elyse Thulin)
- U-M receives NSF grant to study climate migration in Lake Victoria Basin, Great Lakes Region (Derek Van Berkel)

Awards and Elected Fellowships

- Anne Draelos named a Sloan Fellow
- H. V. Jagadish receives Stephen S. Attwood Award from the College of Engineering at U-M
- Nicholas Kotov named AAAS fellow
- Jeffrey Lagarias elected to National Academy of Sciences
- Christian Sandvig recipient of 2023 public engagement award in recognition of research impact
- Yajuan Si elected to the International Statistical Institute
- Dawn Tilbury elected to National Academy of Engineering
- Kevin Ward elected to the National Academy of Inventors

Read more about our affiliate faculty's accomplishments

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MIDAS Team

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Tim Cavnar
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Joyce Chai
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Responsible Data &
AI Advisor

H.V. Jagadish
Director

Scott Kemps
Communications
Specialist

Jing Liu
Executive Director

Do-Hee Morsman
Assistant Director

Kayvan Najarian
Associate Director

Kelly Psilidis
Faculty Training
Program Manager

Ken Reid
Data Scientist

Ben Surgalski
Project Manager

We also thank former staff members for their contributions this year:
Jennifer Lewis, Postdoctoral Program Manager; Rachel Sutton, Project Manager; Beth Uberseder, Research Manager

Winter and Spring 2025 Key Dates

Jan.
(10) MIDAS Welcome Back Faculty Social
(21) Staff Collective for Data Science social

Feb.
(15) Submission deadline for spring/summer term faculty-student research connection
-PODS pilot grant program call for proposals released
-Postdoc program acceptance notifications

March
(18-20) Annual AI for Research Symposium
-PODS Letters of Intent due

April
-PODS full proposals due

May
(12-17) Data- and AI-Intensive Research with Rigor and Reproducibility (DAIR3) bootcamp

June
(16-21) Data- and AI-Intensive Research with Rigor and Reproducibility (DAIR3) bootcamp
-Introduction to Data Science and AI Summer Academies start (runs through Aug. 2025
-PODS awards announced

MIDAS is a university-wide organization that advances data science and artificial intelligence (AI) and enables their transformative use across a wide range of research domains for lasting scientific and societal impact. We support innovative research and collaboration and provide research resources, offer training for faculty and other researchers, host two postdoctoral training programs, and develop extensive research collaboration with academia, industry and government.