NJIT | Institute for Data Science

NJIT to Offer New Graduate Programs in Artificial Intelligence

NJIT's Department of Data Science in the Ying Wu College of Computing is launching two new graduate programs in artificial intelligence during the 2023 academic year, in support of the increasing demand for qualified AI engineers and analysts to facilitate problem-solving and decision-making in the digital world of the future.

The new programs will address the dramatic growth and proliferation of AI technologies into the mainstream, such as the recent debut of the ChatGPT application.

OVERVIEW:

- Student & Faculty Updates
- Recent Awards
- Publications

Center for AI Research

Center for Big Data

Cybersecurity Research Center

Structural Analysis of Biomedical Ontologies Center (SABOC)

37th IEEE International Parallel & Distributed Processing Symposium

May 15th - 19, 2023
Hilton St. Petersburg Bayfront Hotel
St. Petersburg, Florida

Fuhuan Li
A 2nd-year Doctoral Student in Computer Science presented a poster during the Ph.D. Forum: poster title: "High-Performance Community Detection for FinTech Data Using Arachne"

Oliver Alvarado Rodriguez
3rd-year Doctoral Student in Computer Science
presented a poster during the Ph.D. Forum poster title "Arachne: An Open-Source Framework for Interactive Massive-Scale Graph Analytics"

Oliver was awarded a travel award for this conference: selected for the IEEE TCPP award to attend IPDPS 2023

Center for AI Research:

Alon Lerner:
Graduated in May and has joined Bank of America. Alon was Professor Grace Wang's (Center Director)undergraduate research assistant. Congratulations!

Jingyi Gu:
A Ph.D. student of Professor Grace Wang's obtained the Excellence in Teaching Award as a Teaching Assistant! She also defended her proposal on "Exploring the Stochasticity Characteristics of Stock Market with Deep Learning". Congratulations!

Summer Internship Announcements:

Ankan, **Muntasir**, **Jingyi**, and **Junyi**, Ph.D. students of Prof. Grace Wang, accepted internship offers from Samsung, QualComm, and NEC, and will spend their summers at Mountain View, San Diego, Princeton, and San Jose, respectively.

Congratulations!

Cybersecurity Research Center:

Ph.D. Dissertation Defense

Mojtaba Zaheri
04/24/2023

Title: "Towards Better Web Privacy: Cross-Site Leaks and Countermeasures"

Dissertation advisor: Reza Curtmola

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written by: Michael Giorgio
link to article

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The new programs will address the dramatic growth and proliferation of AI technologies into the mainstream, such as the recent debut of the ChatGPT application.

The M.S. in Artificial Intelligence is scheduled to launch this summer. The Graduate Certificate in Artificial Intelligence is currently enrolling. Credits earned in the certificate program may be carried over to the master's degree for those wishing to begin immediately. Both programs are offered at NJIT's Newark and Jersey City locations as well as online and are one of the few dedicated AI graduate programs offered in the New York Metro area.

The AI programs will equip students with theoretical and practical knowledge in applied machine learning and intelligent systems — techniques to solve real-world problems that are easy for humans but hard for computers — as well as methods to scale these techniques to vast quantities of data. The curriculum will include courses such as natural language understanding, reinforcement learning and trustworthy AI. Graduates will be prepared to effectively design and deploy AI solutions for large-scale systems and applications.

AI is at the core of modern technology and drives many business sectors today, including finance and e-commerce, along with futuristic applications such as faster medical diagnosis and self-driving vehicles.

AI is one field that has remained in high demand despite the pandemic, with recruiting growth for these roles increasing by 32% since 2019, according to LinkedIn. Glassdoor cites the national average salary for AI engineers to be $119,297 per year in the U.S. Continued.

NJIT Launches Ph.D. Program in Data Science

written by: Michael Giorgio
link to Full article

As in other doctoral programs, NJIT's Ph.D. in Data Science provides candidates one-to-one mentorship by faculty to pursue their passion in research areas of their choice. The results of this research are shared with the community by publication in professional and peer-reviewed journals, and presentation at leading scientific conferences. More enterprising students can commercialize their research at a later stage, resulting in real-world impact.

Oliver Alvarado Rodriguez, a Ph.D. candidate, states that he is having the time of his life, thanks to the guidance of his supervisor, Distinguished Professor David Bader, who encouraged him to "take a deeper dive" and go beyond his comfort zone. With Bader's support, Rodriguez delivered the student keynote presentation at the spring 2022 Academic Data Science Alliance Annual Meeting in Irvine, California. "I never thought I would ever do something like this and was quite nervous, but Dr. Bader convinced me that it was within my grasp," he said.

Alvarado Rodriguez completed his undergraduate degree in computer science with a concentration in security at another university. He was surprised and honored when Bader, a prominent national figure in the field of data science who is also credited with building the first Linux-based supercomputer, approached him about joining his research team with no significant data science background. He now realizes that this is where his true passion lies and is glad he decided to "dive in."

NJIT's Institute for Data Science, of which Bader is the founder and director, provided research opportunities for Rodriguez and other Ph.D. candidates. "I'm collaborating on research, co-authoring papers, and writing grant funding proposals. NJIT and the College of Computing have really empowered me to be a leader through this program in so many ways," Alvarado Rodriguez added.

Cybersecurity Research Center:

Journal of Computer Security

Center Director Reza Curtmola along with collaborators was recently published in the Journal of Computer Security vol. 31, no. 2, pp. 153-184, 2023, published April 2023. Titled: "Towards verifiable web-based code review systems." Afzali, Hammad; Torres-Arias, Santiago; Curtmola, Reza et al. Link to Paper.

IEEE Symposium on Security and Privacy (IEEE S&P 2023)

"Privacy Leakage via Unrestricted Motion-Position Sensors in the Age of Virtual Reality: A Study of Snooping Typed Input on Virtual Keyboards." Authors: Yi Wu, Cong Shi, Tianfang Zhang, Payton Walker, Jian Liu, Nitesh Saxena, Yingying Chen To learn more about this conference click here.

ACM Conference on Security and Privacy in Wireless and Mobile Networks (ACM WiSec 2023)

"Out-of-Sight Clean Voice Command Injection Attacks through Physical Barriers." Authors: Payton Walker, Tianfang Zhang, Cong Shi, Nitesh Saxena, Yingying Chen. To learn more about ACM WiSec 23' Click Here.

ACM/IEEE International Conference on Automation of Software Test (AST 2023)

"Detecting Potential User-data Save & Export Losses due to Android App Termination." Authors: Sydur Rahaman, Umar Farooq, Iulian Neamtiu, Zhijia Zhao. Learn More.

PUBLICATIONS

Bader Research Team:

IEEE Transactions on Big Data

"Anomaly Detection in Catalog Streams," C. Yang, Z. Du, X. Meng, X. Zhang, X. Hao, and D.A. Bader, IEEE Transactions on Big Data, 9(1):294--311, 2023.

IEEE International Parallel and Distributed Processing 2023 Symposium

"Billion-scale Detection of Isomorphic Nodes," Luca Cappelletti, Tommaso Fontana, Justin Reese and David Bader, Workshop in Graphs, Architectures, Programming, and Learning (GrAPL), held in conjunction with The IEEE International Parallel and Distributed Processing Symposium (IPDPS 2023), St. Petersburg, FL, May 15, 2023.

RESEARCH UPDATES

NSF EAGER

NSF has awarded the Institute a supplemental award to continue the work of project titled: "EAGER:High Performance Algorithms for Interactive Data Science at Scale." To date this project has been awarded $2,123.142.

New Jersey Economic Development Authority

Has awarded the Institute for Data Science with an award to provide administrative support to the New Jersey Big Data Alliance. This is an MOU between NJIT and NJEDA.

University of Maryland College Park - ARLIS

The applied research laboratory for Intelligence and Security has subcontracted to the Institute for Data Science to work on a project titled "US2QC Test and Evaluation Development."

Accenture Working with Institute for Data Science to Combat Software Supply Chain Attacks

written by: Michael Giorgio
link to Full article

Accenture, a leader in information consulting services, is collaborating with NJIT's Institute for Data Science, led by Distinguished Prof. David Bader, to develop methods to mitigate risks arising in the use of open-source components in the software supply chain.

Modern cloud-based software is incredibly complex and often uses open-source code, which is cost-free and provides developers with countless libraries of prewritten functions. But that openness is also a risk, because anyone can change the code and it's not always clear who made the changes or what motivated them. A recent malicious exploit in open-source code grabbed headlines in 2021, and continues to pose a risk today.

Lisa O'Connor, global leader of cybersecurity research and development for Accenture, shared the importance of this collaboration. "Understanding supply chain cyber risk is a business resilience imperative. It's not enough to know the application or service, it's essential that we understand the code components that make up the application or service," O'Connor said.

Traditional software bill-of-materials (SBOM) applications — inventories of all the components of a software program, such as containers, licenses, microservices, security patches and versions — may no longer be sufficient to keep track of the software supply chain for security purposes.

Bader and his team, along with peers at Accenture, aim to explore the benefits of next-generation software bills of materials and the traceability of the software supply chain to identify security threats. They are applying structures known as knowledge graphs to model the connections between the software components. continue.

Speaking Engagements:

2023 SIAM Conference on Computational Science and Engineering

Director David Bader gave a talk at the "Massive Graph Analytics in Arkouda," Minisymposium on Scaling Data Science, AI, and, ML on Massively Multi-Threaded Systems, 2023 SIAM Conference on Computational Science and Engineering (CSE23), Amsterdam, The Netherlands, February 27 - March 3, 2023. Learn More.

Cyber Research Salon

David Bader invited to speak with his presentation titled "Future of Security," Accenture, Washington, DC, April 4, 2023.

82nd HPC User Forum

"Massive Scale Analytics for Real-World Applications" David Bader presented at the 82nd HPC User Forum, Princeton, NJ, April 18, 2023. View Presentation.

Data Intensive Studies Center (DISC) Symposium

"Solving Global Grand Challenges with High Performance Data Analytics," Data Intensive Studies Center (DISC) Symposium, Tufts University, Medford, MA, April 21, 2023. David Bader was the keynote click here to view the Keynote Info.

Speaking Engagements:

IPDPS 2023
May 15th - 19, 2023
St. Petersburg, Florida

David Bader was a panelist on May 17th for a panel discussion on the "Next Big Application(s) for HPC after Deep Learning" during the 37th IEEE International Parallel and Distributed Processing Symposium

Panel topic: Next Big Application(s) for HPC after Deep Learning
In the last 5-10 years, Deep Neural Networks (DNNs) not only emerged as a new target class of applications for HPC researchers, but papers focusing on these workloads have started dominating HPC conferences. Rapidly increasing size of state-of-the-art DNN models has continued this strong interest, with efforts being made in each of the areas of architectures, programming systems, algorithms, and tuning of applications. Year 2023 may be a good time for the community to ask: "*What will be the next big application class or classes that will excite and drive HPC researchers in the near future.*" Trends in life sciences, materials, climate, secure computing, and/or others may provide certain clues in answering this question. This panel will examine this open-ended question with a set of leading researchers and with active audience participation. Click Here to Learn More.
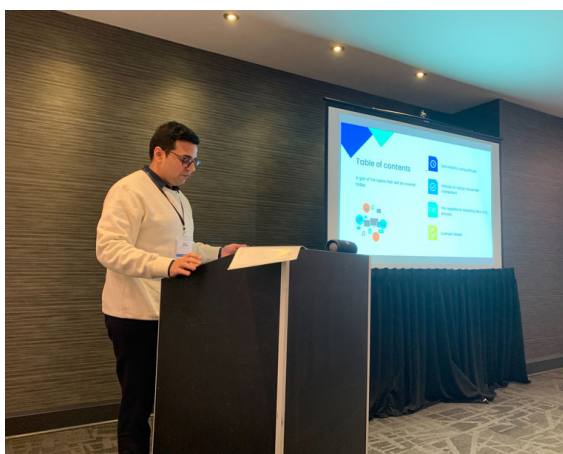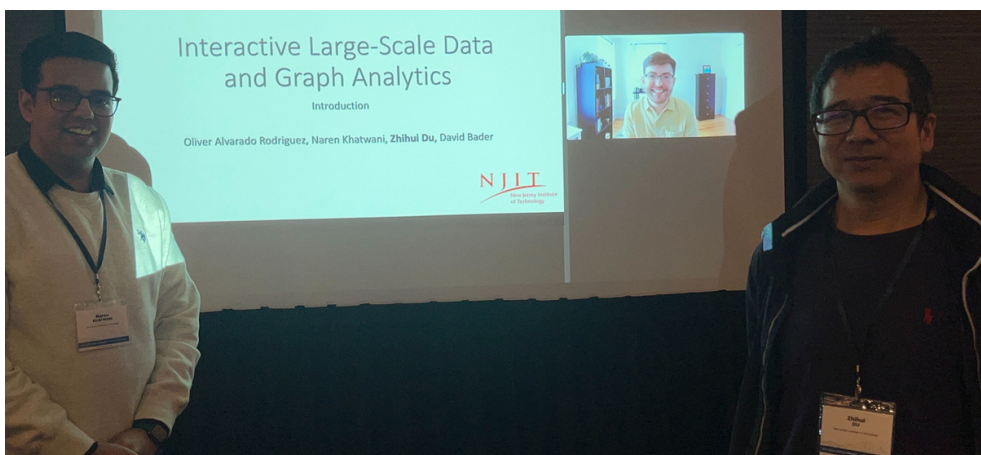
Tutorials:

PPoPP '23
February 25th - March 1st
Montreal, Canada

At the ACM Principles and Practice of Parallel Programming 2023 Conference three team members presented a tutorial on Arkouda Oliver Alvarado Rodriguez, Naren Khatwani, and Zhihui Du. Dr. David Bader was also a contributor and author of the presentation titled "Interactive Large-Scale Data and Graph Analytics.''

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