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URI Libraries' AI Lab--Evolving to Meet the Needs of Students and Research Communities

Harrison Dekker
University of Rhode Island, hdekker@uri.edu

Angel Ferria
University of Rhode Island, aferria@uri.edu

Indrani Mandal
University of Rhode Island, indrani_mandal@uri.edu

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Chapter 2

URI Libraries' AI Lab—
Evolving to Meet the Needs of Students and Research Communities

Harrison Dekker, Angelica G. Ferria, and Indrani Mandal

Introduction

In 2018, the University of Rhode Island launched what was most likely the world's first library-based artificial intelligence (AI) lab. While an AI Lab may seem incongruous with traditional perceptions of the library, it is actually consistent with a growing trend of libraries providing space and support for students, faculty, staff, and communities engaged in computational research. Across the literature, new job titles such as data librarian, emerging technologies librarian, and reproducibility librarian are emerging to provide support for data-intensive research.[1] Depending on the desired level of service a library intends to provide, these positions may demand domain expertise and technical skills in programming and statistical analysis that are not traditionally associated with librarianship.[2]

Behind this trend are the same technological factors that are driving rapid change across society—namely, faster computers and networks, open software, and research practices that utilize ever-expanding amounts of data. Just as libraries have traditionally provided support to researchers requiring guidance in the often complex scholarly publishing landscape, modern library professionals are guiding researchers through new domains associated with data-centric research.[3] Given the rapid pace of change, and the inability of the academic curriculum to keep pace, librarians are finding new roles as

trainers and advisors to researchers who have high levels of domain knowledge but less experience with programming platforms.

But how farfetched is it for librarians to be taking on these new roles? Considering the interrelationship between scientific research and the open source software movement, clues can be found for why librarians are finding an affinity for these roles. For instance, building, maintaining, and navigating the evolving ecosystem of open source software tools parallels the traditional librarian ability to select, manage, and search databases and collections. In the past, when a researcher wanted to utilize an analytical method not provided by any commercially available software, it was usually necessary to build a new software tool from scratch, which, depending on the complexity of the task, might require a significant investment in programming expertise. Now, free and open source programming platforms allow new functionalities to be added to existing software packages with significantly less investment. In conjunction with this trend has been the evolution of trusted distribution networks such as CPAN,* CRAN,† and PyPI,‡ which facilitate sharing, discovery, and reuse of community-developed software tools. As a result, assisting researchers in finding and selecting the right tool for the job in a constantly shifting landscape is not unlike the service librarians provide in helping users navigate more conventional repositories of information.[4] Similarly, traditional librarian knowledge of search, information organization, and provenance all come into play.[5] Moreover, the traits expressed in the open source software environment—free or nominal cost, easily and reliably shared, and continuous development with version control—would thrill libraries if adopted by publishers.

Accompanying this evolution of library services has been a parallel trend of libraries offering dedicated *maker* and *data lab* spaces to facilitate access to software, equipment, and expertise that fall outside their traditional purview.[6] Justifications for this phenomenon have been explored in the literature. John Burke makes the case that "if an academic library can commit time, space, and a little money, and serves a campus community that is interested in exploring experiential learning, a makerspace and making programs can be built and can thrive." His argument is based on two distinct justifications, the first having to do with the demand for and efficacy of experiential learning and the second revolving around the inherent suitability of the library environment for delivering these opportunities.[7] Building upon these ideas, "A Studio Model for Academic Data Services" uses the metaphor of an academic art or design studio as a framework to explore the characteristics of successful library data service spaces.[8] The key ingredients include staff with specialized expertise, resources, space, and a learning community engaged in creative, iterative, and self-directed work.[9]

The URI Library AI Lab extends this data studio model by focusing not just on data and code but also on AI technology, like programmable robots, high-end laptops (TensorBook§), and access to high performance computing (HPC) resources. This equipment is

* The Comprehensive Perl Archive Network(CPAN), see: www.cpan.org.
† The Comprehensive R Archive Network (CRAN), see: https://cran.r-project.org/.
‡ The Python Package Index (PyPI), see: https://pypi.org.
§ TensorBook, see: https://lambdalabs.com/deep-learning/laptops/tensorbook.

available to any student who chooses to use the lab, whether for a course assignment or to simply explore an interest outside their major field. Positioned in a prominent location in the library lobby and promoted as a place where all are welcome, the AI Lab is intended to create a space where students feel free to collaborate regardless of background to address the challenges of AI, which are, after all, fundamentally interdisciplinary.

History and Funding

The URI University Libraries' Artificial Intelligence Lab (AI Lab) is a product of a collaboration between multiple URI colleges, academic groups, and university technology services. Working with partners, URI Libraries submitted a proposal to the Champlin Foundation, a local organization with a long-standing history of supporting the University of Rhode Island in technology projects that deliver a positive impact to Rhode Island residents.

A group consisting of professors from the College of Engineering (biomedical) and the College of Arts and Sciences (philosophy), the head of the university's Big Data Initiative, and the library's data librarian formed the core AI Lab team. Envisioning "an easy-to-access facility at a centralized location," the AI Lab team described "an information rich source for those wishing to learn about artificial intelligence both theoretically and practically"—the first library-based lab of its kind in the world.

Invited to present the project to the Champlin Foundation Committee, the team drew attention to the joint nature of the endeavor, citing the $60,000 in contributions from the College of Engineering, the Provost's Office, and the library had already set aside to cover the cost of updating wiring, carpet, paint, and furnishing in the Lab's intended location. Supported by the in-kind contributions, the AI Lab team could assure the Foundation Committee that the amount requested in the proposal, an additional $180,000, would go directly to the purchase of equipment.

First Steps

URI's University Libraries AI Lab celebrated its grand opening in September 2018. Behind the scenes, much of the Lab's equipment sat unassembled. In addition, the Lab's most important piece of equipment, the NVIDIA DGX-1 server, had yet to be installed; it sat in the University's Advanced Computing Cluster (a group of servers dedicated to research computing) awaiting a cable that had not been ordered.

Fortunately, enthusiasm for the project, evident as students, faculty, and university administrators detailed the value of the resource, exceeded any setbacks. The AI team shared the Lab's vision with an audience aware of the academic potential. Drawing attention to the location within the library, the team highlighted the Lab's purpose, encouraging cross-discipline collaboration and fostering understanding to ensure responsible development and adoption of future technologies.

The library hired a part-time lab manager, a machine learning (ML) expert also employed at URI as a lecturer in the Computer Science and Statistics Department, as well as several student workers. The lab manager assigned student workers projects intended to

complement their interests. The first tasks completed involved robot assembly from simple "toys" to more advanced machines requiring an understanding of robotics and coding. While the robots attracted the attention of the curious, the first actual users were students seeking advanced computing resources that, without the library's AI Lab, would not have been available. Given the steep learning curve inherent in utilizing these resources, the development of tutorials and learning modules quickly became a priority.

Purchasing

Due to restrictions from both the Champlin Foundation and the university, the AI Lab was planned and proposed with no financial requests for staffing. The amount from Champlin was to go to technology, while the in-kind contributions from the university would provide the minimal wiring, some new carpet and paint, and the furnishings required to transform an outdated government publications office into a small yet engaging AI Lab.

It is a requirement of the Champlin Foundation that funds supporting technology projects be entirely spent within the awarded calendar year. Informed of success in October of 2017, with monies to be dispersed the upcoming January, the library immediately began spending the in-kind contributions, placing necessary work orders and contacting the university's primary furniture vendor.

In recognition of the time requirements of university and State of Rhode Island procurement processes, contact was made with potential vendors, requesting quotes and encouraging those expressing interest to register as both State of Rhode Island and (as a separate process that never failed to cause confusion) university vendors. While the authors' personal experiences regarding the intricacies of procurement processes could easily hijack the rest of the chapter, for the sake of mutual sanity, it is sufficient to say the technology purchases were completed by the December deadline.

Equipment

At the time of writing, the technology purchased with the Champlin Foundation funds in 2018 has met the AI Lab's needs with few additions. Figure 2.1 provides a basic idea of the AI Lab's original equipment.

Engagement

In tandem with establishing a lab space for student skill development, the AI Lab is also committed to creating an intellectual space for the exploration of conceptual and cultural issues related to the development of artificial intelligence today. Within this "space," the library convenes conversations at various levels within and beyond the URI community, first by holding events to identify and bring together faculty and staff with an active interest in AI from diverse vantage points, and second by generating curricular products and public programming that grow out of identified interests. After all, AI is a very timely topic in which global entrepreneurs, scientists, and leaders weigh in on its potential benefits and harms.

Computing	Collaboration
Nvidia DGNvidia DGX-1 (GPU Server) Lambda Tensorbooks (Lab Workstations)	Samsung Flip Digital Display NAS Hard Drives
Robots	**Internet of Things (IoT)**
Robotis Turtlebot 3 Burger and Waffle EZ-Robot JD Humanoid Robot EZ-Robot Revolution Six WiFi Hexapod Vex IQ Super Kit Vex IQ Foundation Motion Add-On Kit	Smartwatch Amazon Echo Apple Home Xbox controller Nighthawk XR (router) Jetson RX2 Development Kit
List does not include peripherals (keyboards, monitors) and consumables (batteries, IoT kits, sensors, etc.).	

Figure 2.1
AI Lab Equipment Table

Discussion of AI, no matter the level of technological complexity, includes exploration of potential impacts, be they ethical, societal, philosophical, or economic. Leveraging the library as a crossroads of knowledge, the flexibility of AI as a topic for themed programming, special events, and community outreach is limitless. The URI AI Lab has utilized AI's novice-to-expert span of appeal to develop, deliver, or host everything from AI Summer Camps for students from disadvantaged secondary schools to partnering with NVIDIA to deliver a Fundamentals of Deep Learning in Computer Vision workshop to graduate students.[10]

While a more comprehensive list of AI Lab activities may be found in appendix 2A. A few are highlighted below.

University Libraries' Artificial Intelligence Summer Camps

Beginning in summer 2019 (at the time of writing, the AI Lab had finished delivering the 2020 camps), the AI Lab has run a series of week-long, full-day summer camps for Rhode Island secondary school students. While it is important to note the AI Lab actively pursues, encourages, and supports diversity, inclusion, and equity at every opportunity, the manner in which the AI Summer Camps in particular are offered provides insight into the Lab's commitment to inclusivity.

The original AI Summer Camp offered in 2019 charged campers a rate similar to URI's other Summer Camp offerings. Limited to fifteen students, these face-to-face camps delivered AI Lab-designed content and curriculum taught by URI graduate students to Rhode Island students in grades three to twelve. Finishing the five-week series in July, the AI Lab partnered with the College of Engineering's Diversity Office to run an additional camp for students from underprivileged Rhode Island schools. Delivering this free camp allowed the AI Lab to engage with local schools while exploring the feasibility of offering camps free or at a reduced cost.

In February 2020, the AI Lab began planning for summer. Knowing the operational costs and ability to re-use many of the robots, kits, and supplies of the previous year, it was decided the cost of the camps would be reduced, an early-registration discount would be offered, and a few seats in each camp would be reserved for scholarship campers (application process not entirely determined). That plan, rough sketch that it was, was dropped as the COVID-19 pandemic took hold. By the beginning of May, it was apparent that the suspension of face-to-face and group activities would continue into the summer.

The AI Lab decided to embrace society's mass online migration and run virtual Summer Camps. Redesigning the curriculum of both previous and upcoming camps (those that could be adapted) to an online format, a schedule of full-day virtual camps was created. Recognizing that the new camps could not offer the day-camp experience and yet were much more accessible, it was decided the camps would be free (the fifteen-camper limit was maintained to ensure the quality of instruction would remain). Preference was given to applicants who self-identified as students of under-privileged Rhode Island schools.

Exploring Evidence: Ethics and AI Workshop Series

Scheduled for spring 2020, the AI Lab partnered with a lecturer in the Philosophy Department to offer three interactive workshops exploring the intersection of artificial intelligence, society, and ethics. Each hour-and-a-half in-person workshop would introduce attendees (limited to twenty individuals) to the increased potential for human rights violations and discrimination engendered by the unethical application of AI technology. In addition, these workshops were designed in a manner that would allow the AI Lab to offer one, or all, again at a future date with an AI Lab graduate student or librarian as instructor.

OLLI Artificial Intelligence: The Game Changer

One of the AI Lab's more surprising audiences, the Osher Lifelong Learning Institute (OLLI) at URI, has expressed continued interest in AI Lab operations and events. Frequent attendees of the AI Lab and AI-RI Meetups, the OLLI members requested that the AI Lab present to their group in fall 2019. Accompanied by two student workers, members of the AI Lab team shared the Lab's mission, goals, and programs supplemented with slides detailing Lab equipment and technical specifications. After providing a basic introduction to machine learning and artificial intelligence, AI Lab student workers stepped in, presenting their projects and explaining how the work related to their classes and future career prospects.

In the resulting thank you, the organizer expressed the group's appreciation for the AI Lab team's willingness to stay beyond the scheduled presentation time and for defining AI-associated acronyms, mentioning in particular the benefit of having NLP (natural language processing) explained, as it had been a reoccurring topic in the news at the time. After commenting on the growing ubiquity of AI, the note emphasized the value of the students' presentations "…as they are soon to be in the AI workforce and contributing to the well-being of those who did not grow up digital natives."

The Vision Meets Reality

The necessity of operating within constraints has shaped an AI Lab that embodies the vision if not the structure presented in the proposal. The original proposal described the AI Lab as two very separate entities: a physical space and an incorporated space where "creative ideation around Artificial Intelligence" could occur. In practice, the AI Lab is much more of an advanced technology access point, guided by the theory that to advance understanding of AI in all forms, the learners should be met where they are.

Two critical factors impacted how the project evolved. First, in contrast to the collaborative nature of the original proposal, deployment was delegated entirely to the library. This meant that library staff handled the selection and procurement of actual equipment and that ultimate staffing decisions were directed by the library. Given the low level of domain expertise within the library, it was necessary to work with partners to recruit hourly staff with sufficient expertise to fill the gaps. Another decision made on the fly was to realign the position of the recently hired data librarian, who had relevant programming expertise as well as experience with establishing a library-based lab for data analysis.

The second factor critical to understanding the priorities that emerged in the rollout of the AI Lab was that the librarians involved were actual AI novices. As exciting as it would have been to have the lab full of technology experts building autonomous robots and the like, the reality was that most users needed to focus on the basics, like learning to program, which was something the Lab was prepared to teach. In this regard, the staff's status as AI novices actually worked to their advantage in planning and implementing the new service.

It would have been easy to pigeonhole the Lab, focusing primarily on the high-tech equipment comprehensible to only a small subset of the community and foregoing the problems involved in making the Lab accessible to any user regardless of prior experience with AI technology. However, such a decision would be in conflict with the library's commitment to accessibility, equity, and inclusion, values that had been made clear to stakeholders throughout the project proposal. As learners themselves, the small team behind the AI Lab could explore topics, projects, partnerships, technologies, and programs through a broad lens, ensuring the Lab could adapt to the interests and needs of multiple groups.

The Lab was simultaneously trying to engage a community ready and able to tackle topics such as "What is human?" and develop partnerships to build a framework of workshops and resources to introduce beginners to complicated technology equipment and methods. Luckily, libraries and librarians are adept at supporting users in a way that is consistent with their individual level of expertise.

Lessoned Learned

Staffing

A fundamental challenge in establishing the AI Lab was how to address the imbalance between the rich collection of AI technology afforded through the initial grant with the library's comparatively limited staffing options. This is, of course, a familiar library scenario.

The library was fortunate to have a librarian on staff who, while only able to offer an interim commitment to working with the Lab, had the expertise to teach programming workshops and consult on high performance computing needs. The Lab was even more fortunate to find a part-time lecturer from the Computer Science and Statistics program with expertise in machine learning and a strong commitment to undergraduate as well as K-12-level instruction. A key factor in keeping the individuals in these positions engaged was to give them nearly complete autonomy in how they chose to invest their limited time, accepting that many decisions would be made on the fly and by not setting arbitrary assessment metrics.

This culture of self-direction was encouraged among the student workers who were given opportunities to play with the technology as they assembled new equipment or assisted visitors. Given the amount of enthusiasm the first batch of employees showed for the Lab, this approach seemed to work well during the initial start-up phase as evidenced by their willingness to invite fellow students to the Lab, take part in volunteer activities, or participate in off-campus events.

One unanticipated phenomenon was the number of students interested in doing volunteer work. In hindsight, presented with the ubiquitous predictions surrounding AI's impact on the future job market, this should not have come as a surprise, since it's natural for students to seek applicable experience. For the most part, the Lab avoided creating formal volunteer positions, since students can freely access the Lab and its equipment, but this "non-policy" may be revisited in the future.

Technological Demands

The AI Lab received its startup funding in the form of a grant for the purchase of equipment. Much of this equipment came unassembled, and some items turned out to be highly susceptible to damage or, in a few cases, defective on arrival. The most cost-intensive purchases, namely the DGX-1 server and TensorBooks, required significant setup as well as ongoing system administration and software and hardware maintenance. Student workers assemble, maintain, and troubleshoot most of the non-computer equipment, and the Lab has been fortunate to find and hire students with the requisite skills.

Setup and administration of the TensorBooks were also done in-house, with the exception of a collaboration with URI's IT Research Computing Service in which a portal for remote access was created. The Lab has also relied on the campus IT department to host, maintain, and troubleshoot the DGX-1 server and provide occasional technical support to users, although the Lab is capable of providing training and support to onboard new users. It must be pointed out, however, that many of the users have never worked in a high performance computing environment and, therefore, in almost all cases, require assistance. The biggest barrier for users thus far is the requirement that their AI code is run within a container environment, which in this case is an open source tool called Singularity.* Containers are a critical tool to solve the system administration challenge of creating a unique computational environment that meets the needs of individual users without impacting the environments of other users or the base system.[11] In scientific computing, this is particularly important, since there is rarely a one-size-fits-all solution, due to interdependencies between the various programming components.

* Singularity, see: https://sylabs.io/singularity/.

Community Building

By providing access to equipment previously unavailable to students and faculty, the AI Lab has laid a foundation for fundamentally changing how teaching and learning about AI technology and issues is carried out at URI. One critical impact that has remained elusive, however, is the integration of the Lab's resources into the curriculum. While some students do utilize the Lab on their own initiative, the reality is that for most students, particularly in STEM disciplines, the curriculum does not afford them much spare time. Faculty routinely express interest in modifying their syllabi to introduce an assignment that utilizes the Lab, but it is a lot of work for them to take this on, particularly if they are unsure of the outcome. One success on this front was the inclusion of an assignment in an undergraduate class that required the students to make use of the high-end laptops. Ideally, more faculty will make the leap and adapt their courses to take advantage of lab resources in the future. However, given the steep learning curve of our AI resources and the amount of hands-on assistance required, it may be the case that one-off student projects, such as capstone projects and independent study, will have the most impact in this regard. That said, if collaboration with external departments remains elusive, the library will develop and teach its own for-credit courses.

An important step taken by the library toward community-building has been the creation of a faculty position shared between the library and the Department of Computer Science and Statistics. A key responsibility of this position in addition to teaching will be to pursue funding opportunities to help support AI Lab activities.

Conclusion

The growth in demand for AI resources and training that motivated the creation of the AI Lab is part of a broader technological trend that allows for the creation, transmission, and processing of ever-expanding amounts of data. Given the popularity and demand for the AI Lab's programming workshops and ongoing discussions about a campus need for a centralized interdisciplinary data consulting and training service, it seems likely that there will be some sort of convergence. If that does occur and the AI Lab is able to offload some of its current offerings, the future is likely to more prominently feature some combination of the following:

- continuation of the speaker series, with a focus on emerging social, ethical, and professional topics
- focus on AI-specific equipment in support of STEM education, both for URI students and the K-12 programs, and a continued push for new or modified courses to ensure continuous and predictable demand for services (This trajectory would be enhanced by the creation of a position for someone with the requisite STEM background to mentor students and collaborate with faculty.)
- development of a research agenda around the application of AI technologies, such as natural language processing or certain forms of image processing that are aligned with specific library needs (If successful, this could also help position the library as a campus center for expertise in these types of AI applications and strengthen its role as a research partner across disciplines.)

Appendix 2A
AI Lab Workshops

Machine Learning
Fundamentals of Deep Learning for Computer Vision—NVIDIA Deep Learning Institute.

Presented in partnership with the Department of Computer Science and Statistics and NVIDIA, this workshop teaches deep learning techniques for a range of computer vision tasks through a series of hands-on exercises.

Natural Language Processing (NLP)
Learn two methods of NLP—text mining and topic modeling—through hands-on R programming practice.

Machine Learning Boot Camp
Advanced Machine Learning for research and coursework.

Intro to Machine Learning
Build machine learning models with us through WebEx sessions. Integrate machine learning into your research.

Data Science

Introduction to Python
Python for Data science focuses on those researchers who have been using R or SAS for their data science research. Explore Python with us and integrate it in your research.

- Data cleaning—Pandas
- Plotting—Matplot, NumPy
- Database programming in Python

Python
Four online workshops on Python, Python for Data Science and Machine Learning. We will work on some code together and learn how to integrate Python in your research.
Introduction to Python

- Lists, loops, and functions
- Classes and objects
- Inheritance/Dictionary
- Introduction to ROS

R

- Introduction to R
- R for the Social Sciences
- Data Carpentry Bootcamps

GitHub

- Building a Professional Portfolio with GitHub
- Use the popular code-sharing platform GitHub to showcase samples of your academic or professional work.

Appendix 2B
Meetup Events

Inaugural Rhode Island AI Meet-up!

February 23, 2018	Inaugural Rhode Island AI Meet-up!	Karim Boughida, the dean of the URI Libraries will give a short introduction about the new AI Lab, which is slated to open in the fall of 2018. Check out the news article about the new AI Lab here: https://www.insidehighered.com/news/2018/01/17/rhode-island-hopes-putting-artificial-intelligence-lab-library-will-expand-ais-reach. Free discussion to follow afterward. This will be our first meeting! We will welcome everyone, share our interests in AI, and talk about what topics we want to discuss at future meet-ups.
March 30, 2018	Rhode Island AI Meet-up: building AI lab programs	This will be our 2nd meeting! We will welcome everyone to share ideas on how to build a community-based AI lab at URI.
April 4, 2018	#POCAI18 (People of Color-AI) Rhode Island AI Meet-up	This is our 3rd meetup. Join us to discuss ethical considerations underlying AI and machine learning projects and how diversity and inclusion are handled in the field of AI. We welcome all of the URI Community and beyond; this is an interdisciplinary event. A light lunch will be served: Program: 12:30 pm–3:00 pm: Introduction: Donald Dehayes, Provost and Vice President for Academic Affairs, URI Welcoming remarks: Naomi Thompson, Associate Vice President and Chief Diversity Officer, URI Moderator: Karim Boughida, Dean of University Libraries, URI Presenters: Dr. Timnit Gebru: researcher at Microsoft Research, New York City in the FATE (Fairness Transparency Accountability and Ethics in AI) group. She was a PhD student in the Stanford Artificial Intelligence Laboratory and Co-founder of the group Black in AI. Dr. Ahmed Bouzid: Co-founder and CEO at Witlingo. Previously, Head of Product with Amazon.com's Alexa/Echo group, and earlier VP of Strategy & Innovation at Genesys. This event is sponsored by the URI Office of Community, Equity and Diversity and the Multicultural Student Services Center and a partnership of URI Libraries Big Data Collaborative and Diversity Initiatives.

December 4, 2018	Ethics and Artificial Intelligence	Join us in the URI Library for an update on the AI Lab's first semester, followed by an open conversation on Ethics and Artificial Intelligence with Doug Friedman, Data Science Manager (Johnson & Johnson), Associate Prof. Harrison Dekker (URI Libraries), and Prof. Cheryl Foster (URI Department of Philosophy. Moderated by Prof. Joan Peckham and convened by AI Lab Instructor, Indrani Mandal. Light fare provided.
March 4, 2019	Robots with Legs	About Yeuhi Abe: Yeuhi Abe is a Senior Roboticist at Boston Dynamics. He received his PhD on physics-based methods for animating humanoid characters at MIT. About the talk: As our society becomes accustomed to automation in the realm of digital information, many predict an extension to the physical world. As robots will become a common tool, they will wander our streets, enter our homes, and help maintain our wild lands. What physical characteristics will these robots take and how will they move? Legs are a nature-inspired solution, fit for go-anywhere mobility. This talk will discuss the advantages and challenges of legged robots, with a focus on Boston Dynamics' history of legged robot development.
March 22, 2019	Bias, Jobs and the Future of AI and Robotics / Peter Haas	Should we be scared of robots and AI? Peter Haas Associate Director of the Humanity Centered Robotics Initiative (Brown University) touches on the social impacts AI and Robotics will have in the next ten years. He explores topics of algorithmic bias and automation-driven job displacement, painting a future picture that is simultaneously grim and hopeful.
April 11, 2019	The Future of Work / Darrell West: Author Lecture and Book Signing	From automation and digital economies to health care and life-long learning, "The Future of Work" explores possible solutions to the social, economic, and political challenges facing society as the concept of "work" is redefined. Join the RI-AI Meetup and Darrell West, founding director of the Center for Technology Innovation at Brookings and Editor-in-Chief of TechTank, as we discuss "The Future of Work." *The Future of Work: Robots, AI and Automation* can be found at the URI Campus Bookstore and available during the event. Hardcover: 9780815732938; Ebook: 9780815732945.

April 30, 2019	Artificial Intelligence: American Attitudes and Trends / Baobao Zhang	Baobao Zhang University of Oxford—Center for the Governance of AI; Yale University, Department of Political Science Baobao Zhang will present her report around the American public's attitudes toward artificial intelligence (AI) and AI governance, based on findings from a nationally representative survey of 2,000 American adults. As the study of the public opinion toward AI is relatively new, she and her team aimed for breadth over depth, with questions touching on: workplace automation, attitudes regarding international cooperation, the public's trust in various actors to develop and regulate AI, views about the importance and likely impact of different AI governance challenges, and historical and cross-national trends in public opinion regarding AI. Results provide preliminary insights into the character of US public opinion regarding AI. Zhang, Baobao and Dafoe, Allan, *Artificial Intelligence: American Attitudes and Trends* (January 9, 2019). Available at: https://isps.yale.edu/sites/default/files/files/Zhang_us_public_opinion_report_jan_2019.pdf.
November 7, 2019	How Neuroscience Can Help Computer Vision *and vice-versa	Summary: Artificial vision has often been described as one of the key remaining challenges to be solved before machines can act intelligently. Recent developments in a branch of machine learning known as deep learning have catalyzed impressive gains in computer vision—giving a sense that the problem of vision is getting closer to being solved. In this talk, I will provide a brief overview of recent deep learning developments followed by a critical assessment of our actual progress toward achieving human-level visual intelligence. I will discuss the implications of the successes and limitations of modern computer vision algorithms for biological vision and the prospect for neuroscience to inform the design of future artificial vision systems. Speaker bio: Thomas Serre is Associate Professor in Cognitive Linguistic & Psychological Sciences at Brown University. He received a PhD in Neuroscience from MIT in 2006 and an MSc in EECS from Télécom Bretagne (France) in 2000. Dr. Serre is Faculty Director of the Center for Computation and Visualization and Associate Director of Brown's animal behavioral core and the "SmartPlayroom."

November 7, 2019	How Neuroscience Can Help Computer Vision *and vice-versa	Thomas Serre bio (continued): Dr. Serre has served as an area chair for machine learning and computer vision conferences including CVPR, AAAI, and NeurIPS. He is currently serving as a domain expert for IARPA's Machine Intelligence from Cortical Networks (MICrONS) program and as a scientific advisor for Vium, Inc. He is the recipient of an NSF Early Career award as well as DARPA's Young Faculty Award and Director's Award. His research seeks to understand the neural computations supporting visual perception and has been featured in the BBC series "Visions from the Future" and appeared in several news articles (*The Economist*, *New Scientist*, *Scientific American*, *IEEE Computing in Science and Technology*, *Technology Review*, and *Slashdot*).
November 21, 2019	AI in libraries: case studies from Finland	Libraries all over the world are increasingly starting to apply artificial intelligence in their work. AI technologies, most notably machine learning, are used to support different aspects of library work, including creating metadata, enhancing logistical operations, and supporting information discovery. Join the RI-AI Meetup and Pirjo Kangas, Information Specialist from Humak University, Finland and Fulbright Finland Grantee 2019, to discuss recent developments with AI in Finnish libraries. Pirjo is currently a Fulbrighter at the University of Maryland libraries. Her current research is focused on exploring AI initiatives in Nordic and US libraries.
December 5, 2019	AI and Big Data: The Promise and Perils to Diversity and Fairness	Summary: It is no longer possible to have a career as a private citizen in the United States, and indeed much of the world, without the direct or indirect influence of complex algorithms churning over big data. As of today in the United States and most other countries, you have almost no rights to view your data, let alone ensure that your data are correct, nor do you have any right to inspect the algorithms which ultimately have large effects on your day-to-day personal and professional life. These algorithms and systems are demonstrably biased based on race, gender, ethnicity, religion, socioeconomic status, and sexual orientation for the few for which we can test. We will discuss the state of research on a number of subjects concerning algorithmic fairness and some of the existing and potential consequences and remedies.

December 5, 2019	AI and Big Data: The Promise and Perils to Diversity and Fairness	Speaker bio: Gabriele Fariello (former interim/transitional CIO here at URI) is an internationally recognized leader in building, improving, and turning around computational science, data science, and information technology organizations. He created and teaches the introductory survey course in machine learning and artificial intelligence at Harvard University. More here: https://people.fas.harvard.edu/~fariello/biosketch/.
February 3, 2020	Apply Machine Learning With Limited Real Data	Dr. Matt Wei is an assistant professor of oceanography at the University of Rhode Island (URI). He got his PhD from UC San Diego. His group uses remote sensing/geophysical data and numerical models to study earthquakes and monitor nuclear tests. In this talk, Dr. Matt Wei would like to share his one-year experience of using machine learning in an area with limited real data. Machine learning is quite powerful but it has many imitations, which he recognized recently. By giving this talk, he hopes to get feedback from the community and inspire more machine learning projects at URI.
February 11, 2020	Harnessing Biomedical Data in a Quest to Understand Complex Genetic Disorders	At the beginning of the 21st century, we are experiencing the tremendous societal and economic impact of common diseases that are molecularly and genetically complex. These complex diseases include cancer, neurological disorders, chronic depression, heart disease, diabetes, and many others. Recent advances in the Next Generation Sequencing (NGS) technology have provided us with large volumes of data, revealing that many complex diseases are linked to the variations in the key genetic mechanisms, as compared to the data from healthy individuals. In this talk, I will introduce our recent work on understanding the effects of molecular mechanisms associated with complex genetic disorders, with the focus on studying how disease-associated changes can impact large-scale molecular networks and tissues. I will describe our recent projects where new machine learning methods were developed to decipher transcriptional signatures of the cell, discover novel mechanisms behind diabetes, and provide the first steps toward early diagnostics of chronic depression and suicidality.

February 11, 2020	Harnessing Biomedical Data in a Quest to Understand Complex Genetic Disorders	Dr. Dmitry Korkin is an Associate Professor and Director of the Bioinformatics and Computational Biology Program at Worcester Polytechnic Institute (WPI) in August 2014. Before coming to WPI, he was an Associate Professor at the University of Missouri-Columbia and the core faculty of Informatics Institute. Dr. Korkin did his postdoctoral research at the University of California San Francisco and Rockefeller University. He received his PhD in 2003 at the University of New Brunswick, Canada, and bachelor and masters at the Moscow State University, Russia. Dr. Korkin is a recipient of the NSF CAREER Award and the University of Missouri Junior Engineering Research Faculty of the Year award. He is a Senior Member of the International Society for Computational Biology (ISCB). His research is interdisciplinary and spans the fields of bioinformatics of complex disease, computational genomics, systems biology, and biomedical data analytics.
February 26, 2020	A Framework for Analyzing Spatial Networks for Utilities	Analyzing spatial networks for utilities (i.e., utility networks) such as electric, gas, or water networks has several critical societal applications and provides tremendous business value. For example, analysis may answer questions about the current state of the network (e.g., what valves need to be closed to fix a gas leak while minimizing the number of affected customers?), help to design future facilities (e.g., how many houses are fed by a transformer and can the transformer supply another house without overloading its capacity?), and help to organize business practices (e.g., create circuit maps for work crews to facilitate damage assessment after an ice storm). Analyzing utility networks is a challenging problem due to (1) the size of the data, which could have many tens of millions of network elements per utility, and billions of elements at the nationwide or continental scale, (2) modeling and analyzing utility assets at high fidelity (level of detail), and (3) the different analysis requirements across utility domains (e.g., water, wastewater, sewer, district heating, gas, electric, fiber, and telecom). This talk describes a framework for utility network analysis called the trace framework that has been implemented in ArcGIS Pro and ArcGIS Enterprise (10.6 and later). The trace framework features algorithms in a services-based architecture for addressing analysis tasks across a wide array of utility domains. It leverages a network model designed for utility networks. Unlike previous approaches that have focused on solving specific problems in specific domains, the trace framework provides a more general, scalable solution.

February 26, 2020	A Framework for Analyzing Spatial Networks for Utilities	Bio: Dev Oliver is a senior software development engineer at Esri, where he leads development efforts for the trace framework, a subsystem used for the analysis of utility networks (e.g., electric, water, gas) and trace networks (e.g., hydrography); the trace framework has been implemented in ArcGIS Enterprise and ArcGIS Pro. Dev graduated with his PhD in Computer Science from the University of Minnesota (2014) in the broad area of Spatial Computing. He also holds a master's degree in Computer Engineering from the University of Florida (2008) and a bachelor's degree in Computer Science from Macalester College (2004). His research and development interests are at the intersection of GIS and Computer Science (e.g., Spatial Networks, Big Data, Spatial Data Mining, Spatial Databases, and Spatial Data Summarization).
March 2, 2020	Mapping With Lidar To Guide Utilities And First Responders	Abstract : Light detection and ranging (LiDAR) technology has greatly advanced the capabilities of remote sensing to gather information on the 3D structures of objects and landscapes. LiDAR data have a wide variety of applications including modeling forest structure, general land cover mapping, and infrastructure mapping and assessment. Automated or semi-automated techniques are typically needed to extract information from LiDAR data across large areas; however, the immense size of these datasets makes them challenging to process. In this presentation, I will discuss projects in which we are using LiDAR for a variety of purposes including the development of models to assess infrastructure vulnerability to damage from trees, mapping utility infrastructure to improve risk assessments, and mapping building interiors to support public safety operations. For each project, I will focus on challenges that we have encountered and the solutions that we have found for working with LiDAR data.

March 2, 2020	Mapping With Lidar To Guide Utilities And First Responders	Bio: Dr. Jason Parent is an assistant professor in the University of Rhode Island's Department of Natural Resources Science. His research uses remote sensing and geospatial technologies to address problems related to natural resources and the environment. Current projects include characterizing forest conditions using LiDAR and unmanned aerial systems, assessing vegetation risk to infrastructure, and evaluating the effectiveness of utility vegetation management strategies. Dr. Parent has a PhD in Remote Sensing and Geospatial Science (2014) and a Masters in Earth Resources Information Systems (2006) from the University of Connecticut. Cosponsored by The URI Big Data Initiative (Library) URI College of Environment and Life Sciences.
April 24, 2020	From Kelp Forests to Coronavirus: an interactive webinar	OK. You've learned R in class. You use it once in a while to run an analysis or make a figure for a paper. Is that all? From kelp forests to coronavirus, Join Jarrett Byrnes, Associate Professor in Biology at UMass Boston, to talk about how his journey in Data Science has fundamentally changed the kinds of science he does. He'll also discuss some new directions in how he's using data science in R to build knowledge. Rather than just a tool for every now and again, he'll talk about how data science in R has become a useful part of his very existence. And, yes, this is an informal discussion/seminar for some good stories of how he learned to stop worrying and embrace R. And how you can, too! Speaker: Dr. Jarrett Byrnes, Assistant Professor of Biology—Marine Ecology, UMass Boston.
June 5, 2020	What today's AI adoption has led us to so far	Free Virtual Meetup: This talk will explore a few socio-economic and political questions that today's AI adoption has surfaced in the areas of production, governance, and labor management. Link will be provided later. Bohyun Kim, Chief Technology Officer and Associate Professor at University of Rhode Island Libraries.

June 11, 2020	Data Ethics related to COVID-19	RI-AI meetup is co-listing with Tech Collective RI. We will send the link 3 hours before. Data Ethics related to COVID-19 Tech Collective understands the power of collective collaboration and together, with our committees, has drafted a plan to support you. [Virtual Event] Our presenters are working on this agenda—Check back soon for details! About the presenter: Joan Peckman is a Professor of Computer Science and Campus-wide Coordinator of Big Data and Data Science Initiatives at the University of Rhode Island. Her research and teaching interests include databases, data modeling, Computer Science and Data Science education, diversity, and interdisciplinary (or convergent) engagement. She has earlier served as program director at the National Science Foundation (2008–2011), and chair of the Computer Science & Statistics Department (2011–2017). She led the development of the Data Science programs at URI. Doug Friedman is the Data Science Manager at Johnson & Johnson's Healthcare Technology Center in Providence, RI. There, he leads a team of data scientists solving some of the toughest analytical problems across the Johnson & Johnson enterprise—pharmaceutical, medical devices, commercial. He has a strong passion for open-source software and agile development. His work can be found at https://github.com/doug-friedman.

Endnotes

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