Understanding and Fostering Regional Artificial Intelligence Ecosystems: A Case Study in Maine

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Editor-in-Chief’s Note: Artificial intelligence (AI) represents a novel force in both global and regional developments, transcending geographical, industrial, and academic borders. This article presents a case study in surveying AI challenges and opportunities in the state of Maine, in exploring ways to develop its AI ecosystem, and in fostering collaboration and development aligned with its strengths. It also showcases the potential when academics, government, and industry work together.

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1. Introduction

Tech ecosystems are not born in a vacuum. They are products of their environment, emerging in response to a constellation of local interests. Silicon Valley, for instance, can trace its origins to World War II–era defense research and the web of entrepreneurial activity coming out of Stanford Research Park (National Research Council, 2013). A similar example can be found in Boston’s biotech position, which has benefited from world class hospitals and universities in the area. Wall Street and Hollywood, meanwhile, owe their origins partly to geographical advantages: the heavily trafficked mouth of the Hudson River and the pleasantly diverse environs of Southern California.

It is tempting to look at these histories and compare them to a gold rush—a zero-sum free-for-all with power coalescing around the early winners. That may be true in some cases, but artificial intelligence (AI) represents a novel force in regional development, with the potential to transcend many geographical, industrial, and academic borders. In a 2021 report, Brookings identified 87 communities and metro areas in the United States as potential “centers of future AI growth,” noting AI’s power to increase “regional productivity as well as transform local labor markets” (Muro & Liu, 2021). Combining cloud computing, the Internet of Things, and big data into a dispersed and scalable global infrastructure, AI may prove more transformative than the Internet itself (Gates, 2023). That AI is as powerful as it is will test conventional wisdom about how innovation hubs form. If nothing else, it indicates enormous potential for regions with less-developed tech ecosystems, regions that have sizable dependence on heritage industries, regions like the state of Maine.

2. Planting the Seed

As the most rural state in the country, Maine is not exactly known as a tech haven. It is perhaps better known as a vacation destination with storied industries in logging and fishing. Some of that reputation is earned. Maine’s economy is heavily reliant on tourism, forest products, and aquaculture (Maine Office of Business Development, 2022), and its population is aging and far-flung. Sixteen percent of households do not have access to broadband Internet (U.S. Census Bureau, 2018), and the median age is 44.7—the oldest in the country (U.S. Census Bureau, 2022). Companies often favor manual processes, and local investors are sometimes wary of technologies they perceive as overly disruptive.
Viewed under a different light, these challenges make Maine a fascinating regional case study in how to survey and foster an AI ecosystem. Wanting to put that idea to the test, two institutes at Northeastern University—the Institute for Experiential AI and the Roux Institute—partnered up to examine the unique promises and challenges of AI in Maine.

Several months of research involving 50 interviews with business leaders, policymakers, educators, and researchers culminated in the publication of a 64-page report called *The State of AI in Maine* (Institute for Experiential AI at Northeastern University [EAI], 2023). The report captured a snapshot of Maine’s diverse and evolving AI landscape. Coincident with the report’s release, a conference at the Roux Institute in Portland assembled a unique roster of local luminaries and stakeholders to discuss and explore new paths for AI in the state. The level of interest from various communities—business, government, education, and the general public—was surprising to the organizers both in its depth and breadth.

3. **Why Maine?**

In 2019, Maine governor Janet Mills laid out her administration’s vision for the state in a [10-year economic development plan](#). It was the first such report in decades to identify Maine’s unique opportunities and challenges. One stated goal of the governor’s vision is to attract 75,000 workers by 2030 and to grow annual wages by 10% (Maine Department of Economic & Community Development [DECD], 2019). That was a tall order in 2019, given the state’s long-term employment declines. Labor force participation rates in Maine have consistently hovered below the national average and been falling since the early 1980s (Workforce Innovation Opportunity Act [WIOA] State Plan, 2020). In that time, Maine has fully transitioned into a tourist economy, with visitors contributing one in five dollars, one in six jobs, and 20% of gross state product (Soucier, 2019).

The first glimmer of a paradigm disruption shone through during the COVID-19 pandemic. Between 2020 and 2021, Maine was the only state in the country whose median age grew younger (U.S. Census Bureau, 2022), as Boomerangs and young, tech-savvy remote workers flocked to the state’s attractive climes. Another glimmer could be seen in the recent explosion of AI investment, with tens of millions of dollars in federal funding going to research ventures and technical education throughout the state (Mills, 2023).

As both a report and an ongoing project, *The State of AI in Maine* sought to document and foster this activity, with the ultimate goal of creating an AI ecosystem that is finely tuned to Maine’s unique character. The primary goal of this first report was to set a baseline for future comparisons and understand where progress happens as the AI journey continues.

4. **The Report**

Centering on five key pillars—**health care, financial services, natural resources, education, and manufacturing**—*The State of AI in Maine report* revealed a fascinating correlation between the state’s AI advances and its industrial makeup, at the heart of which are its wilderness and windy shores. As the most forested state in the
country with a meandering coastline longer than California’s, Maine’s sea and woodlands are both culturally significant and economically vital.

In 2022, the Maine Jobs and Recovery Plan earmarked millions of dollars in federal funding to drive new innovations and solutions for Maine’s sea and forest industries (Mills, 2021). And for the first time ever, the forthcoming 2023 Maine Innovation Economy Action Plan will include a section on AI, aligning state interests with global trends in environmental protection, pollution prediction, wildlife screening, precision agriculture, and drone-based crop monitoring (EAI, 2023).

As the climate changes, the Gulf of Maine is warming faster than 99% of the world’s oceans (Pershing, 2015). Given the volume of data required to study critical waterways, experts have cited AI as an ally in the battle to protect both habitats and livelihoods. In Portland, for example, the Gulf of Maine Research Institute is using boosted regression trees, a fairly common machine learning technique, to improve the accuracy of groundfish stock estimates. In the woodlands, AI monitoring tools are helping optimize sawmills and protect trees from invasive species. Maine’s landscapes also harbor enormous potential for renewable energy. As much as 72% of the state’s in-state electricity generation now comes from wind, water, forest, and solar energy (U.S. Energy Information Administration, 2022). Some utilities, like Dynamic Grid, are harnessing AI to enhance grids, coordinate electricity distribution, and increase storage capacity (Cordes, 2020).

Once a cornerstone of the Maine economy, nonfarm manufacturing is now a mere pittance, having slipped from a 31% share of gross state product in 1988 (Maine State Planning Office Executive Department, 1990) to just over 10% in 2022 (National Association of Manufacturers, 2022). Despite this trend, there are glimmers of hope that AI could help align the sector with global development. The University of Maine, for example, is home to two advanced manufacturing research centers, one of which includes the largest 3D printer in the world. It was recently awarded a $35 million federal grant to “advance large-scale, bio-based additive manufacturing using advanced technologies such as artificial intelligence” (Collins, 2022).

Likewise, with such a rural and elderly population, Maine’s economy depends heavily on health care, accounting for 17% of jobs in the state (WIOA State Plan, 2020) and a growing chunk of its budget. Spending on health care is expected to reach 27% in 2026—up from just 17% in 2002 (Maine AllCare, 2019). It is no surprise, then, that policymakers cited medical uses of AI as a priority growth area in the Maine Innovation Economy Action Plan (2023). Meanwhile, in the private and nonprofit sectors, Maine research institutes like the Jackson Laboratory and Mount Desert Island Biological Laboratory are using machine learning to facilitate drug discovery and are recruiting data science teams from the University of Maine and the Roux Institute.

5. The Event

More than a survey of AI activity, “The State of AI in Maine” conference provided an opportunity to bring together key stakeholders in a single location in order to raise public awareness, highlight solutions, and spotlight pitfalls:
The event drew record-breaking attendance and leading press coverage. Speakers discussed many of the ways AI is both helping—and complicating—Maine’s transition to a modern tech economy, including:

- Growing and expanding Maine’s AI talent pipeline
- Addressing emerging ethical and regulatory challenges
- Developing predictive tools for protecting Maine’s woods and waters

A CEO panel featuring executives from leading Maine brands—including L.L. Bean, Sun Life, Tilson, Unum, Wex, and Bangor Savings Bank—discussed their own AI investments. And a post-event networking hour helped spawn new initiatives and connections, building bridges between state, local, academic, and private partners.

6. Future Directions

One of the key discoveries to emerge from the project was Maine’s unique potential for clean energy innovation. Bridging AI and sustainability in Maine makes sense because much of the critical infrastructure is already in place: databases for estimating groundfish stocks, aquaculture farms using tools to predict toxic blooms, forest sensor networks for collecting and measuring soil moisture, algorithms to detect budworm infestations, computer vision systems that analyze timber health—all enriched by a local network of colleges and universities with historic investments in natural resource management (EAI, 2023). That, more than anything, speaks to Maine’s unique environment and potential as a hub for AI-driven sustainability research.

As an attempt to kickstart an AI ecosystem, The State of AI in Maine project has established a baseline, and we intend to continue to monitor the developments in AI in the state. Like AI itself, budding tech hubs are in constant flux, vulnerable to all kinds of environmental disruptions. In Maine, those vulnerabilities could come in the form of a declining population, climate change, industries that are resistant to disruptive technologies, and a conventional mindset that is reluctant to ‘move fast and break things.’ Other regions may face similar,
overlapping, or entirely different challenges. To identify them, we recommend taking a collaborative approach that crosses industries and disciplines, leveraging the resources of academia while allowing room for the kind of expansive, qualitative analysis unique to journalistic investigation. Moreover, if such a venture is to be successful, it must be ongoing.

Northeastern University, for its part, plans to broaden its investment in the state, engaging stakeholders, nurturing assets, and developing partnerships that, together, provide a blueprint to roll out across its global campus. And the Institute for Experiential AI has set about developing its own climate research team to be based in Maine.

When we first envisioned The State of AI in Maine project, we thought we would find a familiar set of off-the-shelf tools. What we did not expect to find was such a tight matchup between Maine’s biggest challenges and its biggest strengths. With its rural population, legacy industries, and shifting demographics, Maine has not only proven to be a great laboratory to study AI’s impact over time, but also a model to examine the same impact in other regions.

That may yet be the state of AI—an opportunity to examine how AI, in its ideal form, serves to harmonize and complement what people do best. We hope the conversation has only just begun.

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References


Institute for Experiential AI at Northeastern University. (2023). *The state of AI in Maine.* https://ai.northeastern.edu/saim23/


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