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General Comment

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Attachments

Touro RFI Response FINAL 05-29

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As the United States considers priorities to secure its position as the unrivaled world leader in artificial intelligence (AI) while focusing on the federal government's unique role in AI research and development (R&D) over the next 3 to 5 years, we at Touro University respectfully call attention to the ***urgent need for outcomes-based research focused on the proper use of AI, with a focus on biomedical applications***.

Focusing on developing effective AI for the biomedical sciences is an ideal area to catalyze ***significant advances in foundational research on AI*** that the federal government is uniquely positioned to support. Specifically, the effective use of AI in diverse biomedical applications will require novel research on human/AI collaboration and decision support, on machine learning from radically heterogeneous datasets, and understanding the long-term impact of AI on patients and physicians.

Research on human/AI collaboration must go beyond the usual considerations of human-computer interaction and the development of novel user interfaces. We must push for a deeper study of how the involvement of AI in human processes affects team functioning. In other words, we must understand the psycho-social implications of having AI systems working alongside and collaborating with humans; the nature of the AI tools and how they interact with people affects not only the effectiveness of the overall process but also how humans perceive their own roles. This research will necessarily be highly multidisciplinary, including psychologists and social scientists as well as economists, to understand how human motivations are affected by AI and how to design tools and processes to get the incentives right.

Success here is essential, for as the U.S. population ages, we must continue to attract talented young people to the health care professions. These future clinicians need to know that their roles will be valued and that the new technologies will augment their ability to improve patient outcomes—enhancing their role in patient care, not supplanting it. A good example of this is how the Mayo Clinic integrated AI in such a way as to actually increase the number of employment opportunities, as the new tools enabled the clinic to find more productive roles for people to provide better care.[1]

Through the Human Genome Project and other recent advances, the use of machine learning has demonstrated its ability to support the rapid expansion of knowledge in the physical and life sciences. Investment in developing multimodal foundational models that can coherently process text, speech, images, signals, and other inputs will lead to advances in AI that will produce advances in our collective understanding of biological and behavioral systems. Such advances will combine contributions from researchers across the life sciences, physical sciences, and social sciences, working closely with computing professionals and experts in applied mathematics and statistics. Advances in signal interpretation will lead to innovative approaches to the development and implementation of new treatments, be they pharmaceutical, physiological, or behavioral.

Along with funding for foundational research, the U.S. will greatly benefit from the direct development of ***AI technologies for clinical support***. The medical community has demonstrated its ability to adapt to new technologies that improve patient outcomes, for example, through the adoption of robot-assisted surgery.

[1] https://mcpress.mayoclinic.org/healthy-aging/ai-in-healthcare-the-future-of-patient-care-and-health-management/

Just one example of an important biomedical application area that forms a fertile area for AI development is the use of digital twins for personalized simulation and treatment planning. Patient outcomes can be improved by developing technology that can produce an accurate digital twin for each prospective patient in near real-time. The digital twin can then be used as a simulation testbed to predict patient response to proposed interventions to determine the treatment with the greatest likelihood of success.

This goal will require significant integrated research in multiple disciplines and subdisciplines, such as engineering, biophysics, medicine, high-performance computing, data frameworks, domain-specific modeling infrastructure, timeseries analysis, validation, and testing, to name a few. If successful, digital twin models could lead to the development of multimodal, longitudinal predictive modeling for disease progression and intervention impact, leading to a better understanding of biological systems and their interactions. Furthermore, such tools could have a significant effect on the training of medical professionals—educational research will be required to understand how to maximize their positive impact and how best to teach students to use them well.

Critical to the use of AI in clinical practice is building trust between the physician, patient, and AI. In other words, how does AI become a valued member of the medical team, enhancing the clinician/patient relationship? Similarly, how does the training of clinicians need to change to ensure that medical professionals do not inadvertently become dependent upon AI, and we lose the benefit of human-AI collaboration? We must take the warning from the rapid deployment of large language models (LLMs), which proved to produce many inaccurate results and 'hallucinations,' but only after LLMs were deployed in the field. A comparable failure in medicine could be disastrous.

The risk of adverse effects or misuse of AI technology can be mitigated through the development of standards of practice and new approaches to validation of outputs. This will require significant advances both in technical areas such as explainable AI and reality anchoring, as well as in properly structuring processes and team organizations involving AI.

For example, it may be tempting to use AI to streamline and reduce costs in clinical trials, either through simulation or through "smart" selection/placement of participants in a study. AI can potentially reduce cost and the risks of adverse effects in human subjects by reducing the size and length of clinical trials while achieving the same goals. However, using AI for this will require constant evaluation and adaptation to prevent data feedback cycles or other technological side effects that would render the outcomes of such studies unusable, causing increased costs or undesired health outcomes.

Biomedicine is an ideal early proving ground with potential for enormous real-world impact. We note that the very same AI capabilities developed through such initiatives—improved human/AI collaboration, multimodal foundation models, facticity maintenance, and explainability—will unlock transformative advances in other critical domains. We therefore recommend establishing parallel flagship thrusts in areas highlighted in the *National AI R&D Strategic Plan*—sustainability, manufacturing, supply chain, transportation, and education—as prime targets for AI research that serves the public good. Each thrust should be funded at a scale comparable to the biomedical initiatives and share common data-access and evaluation infrastructure, ensuring spill-over benefits and a truly national portfolio.

Applied AI is a critical technology that will benefit from ***federal investment in AI cyberinfrastructure*** to ensure that all academic and non-profit entities can fully participate in research and development efforts that lead to the advances that are critical for US leadership in the development of artificial intelligence technologies. Investment in AI cyberinfrastructure will ensure that foundational and applied advances in R&D remain in the public domain. This infrastructure should include access to datasets, algorithms, theoretical results, large-scale computing platforms, and cybersecurity for the protection of these critical assets.

According to the National Center for Educational Statistics, there were an estimated 3,931 degree-granting institutions in the U.S. as of 2020-2021.[2] As of 2021, only 469 of the U.S. institutions were classified as doctoral universities by Carnegie Classifications.[3] National Clearinghouse (NCL) data shows that U.S. institutions are educating an estimated 16.0M undergraduate and 3.2M graduate students in Fall 2024 (NCL, 2024).[4] To ensure maximal participation in AI research and education, we need AI cyberinfrastructure that is available to researchers across the spectrum of institutions. This is even more important in an environment where research faculty at large universities often have close ties with the industry partners who fund their research. With strategic investment of federal resources, the research community can focus on foundational advances with long-term horizons, even as commercial counterparts develop novel solutions that can be applied in the near term. Both are essential for ongoing economic success and continued U.S. leadership in developing these critical technologies.

The recommendations above will advance the *2025 National AI R&D Strategic Plan* now being drafted under the April 29 RFI and mesh with every AI-focused executive order issued this year: EO 14141, *Advancing U.S. Leadership in AI Infrastructure* (Jan 14 2025); EO 14179, *Removing Barriers to American Leadership in AI* and mandating a government-wide AI Action Plan within 180 days (Jan 23 2025); and *Advancing Artificial Intelligence Education for American Youth* (Apr 23 2025).

Most major advances in science and technology have benefited greatly from federal investment. The aforementioned Human Genome Project was funded by the Department of Energy and the National Institutes of Health. The internet itself was conceived and funded through DARPA. The very foundation for AI technologies was funded by NSF, as was Doppler Radar and breakthroughs in the semiconductor industry.[5] We urge the NSF and the Office of Science and Technology Policy to continue this leadership through funding AI cyberinfrastructure that can increase participation from individuals and institutions across the broad swath of higher education in the US.

In conclusion, only with secure, long-term funding that is available on a competitive basis to all researchers can we bring the full spectrum of innovation and intelligence to bear to develop technologies for biomedical science that we can only dream of today. We believe the three priorities outlined above: foundational advances in AI for biomedical research, AI applications for clinical support, and investment in AI cyberinfrastructure, will catalyze the AI research community, resulting in significant, tangible results in both the near and long term.

Institutional Background

Touro University has an overarching goal to accelerate and support innovative research that will improve public health and knowledge by exploring new frontiers in research. Our university strives to develop new initiatives that build on our current strengths and seeks to recruit and

[2] https://nces.ed.gov/fastfacts/display.asp?id=1122
[3] https://carnegieclassifications.acenet.edu/wp-content/uploads/2023/03/CCIHE2021-FactsFigures.pdf
[4] https://nscresearchcenter.org/current-term-enrollment-estimates/
[5] https://www.nsf.gov/impacts

retain outstanding researchers in Nevada, California, New York, Illinois, Montana, New Mexico, Israel, and more. Touro is a leader in the integration of artificial intelligence across higher education, as the first school in the nation to appoint an Associate Provost of Artificial Intelligence. The university has a system-wide strategy to embed AI into curricula, research, and operations across its global network of schools. This includes the launch of new graduate programs in AI, faculty development through bootcamps and workshops, and a university-wide push for AI literacy education across the disciplines. Touro also supports AI-driven research through internal grants and external collaborations.

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