

AI RFI Responses, October 26, 2018

Update to the 2016 National Artificial Intelligence Research and Development Strategic Plan RFI Responses

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Subject: RFI Response: National Artificial Intelligence Research and Development Strategic Plan

From: Austin Carson

Thank you for the opportunity for NVIDIA to provide input on revisions to the 2016 National Artificial Intelligence Research and Development Strategic Plan.

Strategy 1: Make long-term investments in AI research.

Private industry is making significant investments in commercially applicable AI research, according to the National Science Foundation (NSF). However, the aggregate R&D investment of the United States is leveling off, with China expected to surpass it by 2020. The President's budget makes a laudable investment in artificial intelligence. Further investment into new techniques for unstructured data, computing infrastructure – particularly for colleges and universities – and expanding access to AI would have a multiplying effect on private investment, improving the trajectory laid out by the NSF and maintaining U.S. leadership in the competitive international environment.

AI development requires massive, labeled data sets and the expertise to architect a neural network effective at processing them. Focusing research on unsupervised or weakly supervised techniques will open up a new universe of data with which companies and institutions of higher learning can participate in AI R&D. However, existing methods that automatically choose the appropriate neural network structure, such as meta-learning, still require expertise in the field, along with an order of magnitude higher computing power for what is already a compute-intensive task.

America's strength in AI comes from its colleges and universities that built today's AI technologies. With access to the infrastructure to apply AI, they will further advance what AI can do for this country and economy. Simply put, investments into their computing capacity are critical. The vast number of academic research computers are three to five years old and incapable of modern AI development. They need the funding to modernize. NVIDIA provides grants, compute, and expert assistance to universities, but the private sector cannot keep up with the need.

Additionally, research into technologies that lower the barrier to entry for applying AI will further increase university AI development, and open up new segments of private sector participation in AI. Through the NVIDIA Inception program, we support approximately 1,000 startups across the U.S. with resources to implement AI. These companies, however, already possess a sufficient degree of technical expertise and are operating within known verticals. With investments aimed at expanding the universe of AI applications and the ease of applying them, more small businesses and startups can create disruptive innovations that have historically driven the larger economy.

For more foundational questions, large-scale incentive efforts such as DARPA's AI NEXT program are effective and should be expanded. Increasing these programs will allow the U.S. to stay on the cutting edge of fundamental AI research in a sustained manner.

Strategy 5: Develop shared public data sets and environments for AI training and testing.

The federal government possesses the largest domestically available data sets, but most are unlabeled, unreadable by machines, or proprietary. A first step would be disclosure of what data sets are available so that private expertise can assist in prioritizing migration to an accessible form, cleaning, and structuring. Releasing existing data sets that are known to be valuable should also be a top priority.

For information that cannot be shared externally for privacy or security reasons, creating testbeds should remain a focus as suggested in the 2016 plan. Progress made on that front should be accelerated to ensure that other countries with more actionable data do not surpass the U.S. Testing within a sandbox will demonstrate the potential outcomes from AI implementation in the federal government, as well as new avenues for private sector efficiency.

Public environments for research and development, whether it be on-premises GPU clusters or cloud accessible, will allow more universities to conduct groundbreaking research. These environments could also be leveraged for private companies that lack the necessary compute to develop AI applications. The U.S. is making important investments in supercomputing, such as with Summit, the NVIDIA-powered fastest supercomputer in the world, but current efforts are not general-purpose and accessible enough to support the needs of all interested research institutions and companies. In Japan, the AI Bridging Cloud Infrastructure (ABCi) at the University of Tokyo meets those qualifications and is designed to propel a broad range of AI applications. The U.S. would benefit from similar shared computing initiatives.

Strategy 7: Better understand the national AI R&D workforce needs.

Competition within private industry for AI researchers is fierce. According to Element AI, there are at most 90,000 people in the world with the right skill sets. The federal government should engage with industry on their experience attracting experts.

Finding or training engineers is similarly challenging, and industry models could be helpful as the U.S. evaluates its talent acquisition, upskilling, and early education efforts. For instance, NVIDIA's Deep Learning Institute is leading a grand initiative to train the next generation of scientists and technical experts. NVIDIA also engages in K-12, gap year, university, and post-grad programs to encourage students across the education system to specialize in AI and help them develop skill sets. We have global engagements with the top 10 AI research laboratories (Pioneers of AI program) and government agencies, e.g. the National Institutes of Health. Many of these programs have insights transferrable to federal considerations.

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