AI Partnerships Are Improving Defense Health, Business, Disaster Aid

Defense Innovation Unit is bringing commercial AI technologies across DOD to improve mission capabilities.

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The Defense Innovation Unit is incorporating commercial artificial intelligence at agencies across the Defense Department to improve military health, business processes, humanitarian aid and a variety of other areas across DOD.
DIU acts as the connector between DOD partners and private industries to enable DOD to prototype, transition to and scale advanced technologies. While DOD has its own organizations that work to implement technology in improving mission areas, DIU recognizes that industry partners tend to lead in not only AI, but also cyber, autonomous and human systems, space and advanced energy.

DIU Technical Director Jared Dunmon highlighted the AI and machine-learning portfolios and lines of effort that are underway during Tuesday’s FCW event. While these efforts range from AI infrastructure and complex systems control to operational decision support and predictive mission planning, Dunmon grounded these larger efforts in various project areas.

**Improving Defense Health**

Several of the Defense Health Agency’s military treatment facilities, as well as veterans treatment centers and the DOD’s Joint AI Center, are working with the DIU to advance predictive health efforts.

Misdiagnoses impact warfighter readiness and increase the cost of health care delivery, Dunmon said, so the DIU has connected its DOD customers with Google to sharpen diagnostic accuracy and increase early disease state identification with AI and machine learning.

“One thing that machine learning has shown promise in doing is being able to automatically identify areas of a pathology slide where there may actually be a disease or to classify that disease,” Dunmon said. “We worked with the DOD partner to design a workflow where we can make use of these technologies in a way that improves our outcomes, but also still leverages our human expertise.”

This initiative, while only in a prototyping stage, has leveraged large pathology datasets to build image segmentation algorithms for disease detection. It has also used augmented reality microscopes at military medical treatment facilities (MTFs) and Veterans Affairs hospitals that support AI and machine-learning algorithms for disease type detection in a clinical trial setting.
DIU is also working with DHA, the VA Innovation Network and JAIC to advance radiology driven by machine learning. While radiologists typically review large data volumes on a daily basis as part of its standard diagnostic procedures, DIU’s defense health partners realized that the time-intensive nature of this work can slow down assessments and lead to misdiagnosis.

By partnering with San Francisco-based Entilic, DIU has been able to prototype AI and machine learning to assist radiologists with image analysis in its current trial stages. These algorithms are starting to get integrated into the radiology workflow at MTFs and VA medical facilities.

“There are a variety of algorithms that we can use here, everything from just triage and scans ... can I automatically detect hemorrhages or problematic findings on head CT scans?” Dunmon said.

The results have yielded promising results already. Radiologists using AI and machine learning were able to read cases 21% faster in the project’s vendor trials, and these radiologists were also 11% more sensitive and 9% more specific in their work, Dunmon said.

**Intelligent Business Automation**

Although much of DOD uses robotic process automation (RPA) tools to track and resolve discrepancies in enterprise resource management systems, several defense agencies have recognized that these RPA tools require a significant amount of human capital to continuously refine and update.

The JAIC, Office of the Secretary of Defense Comptroller and Army Financial Management and Comptroller were among some of these organizations, and they worked with DIU to seek machine learning-based improvements to their preexisting RPA tools. More specifically, they hoped that machine learning would enable automatic identification, prediction and correction of complex business processes.
“There’s a set of rules or logic processes that determines, given the input, what do I do with it? What are the steps I need to take so those things can be automated?” Dunmon said. “What we can do is actually go through and define machine-learning algorithms that say, ‘Given a kind of unmatched transaction or given a discrepancy, which process should I send it to in an automatic fashion?’ … This is something where we can ideally prevent things like waste, fraud and abuse. We can reduce redundancies and logistics travel and payroll accounting systems.”

DIU is currently in a commercial solutions opening stage of this project, in which it’s “competitively soliciting proposals in merit-based process,” Dunmon said.

**Algorithms for Sharper Disaster Relief**

Natural and humanitarian disaster situations are often sudden and escalate rapidly. Disaster relief agencies at the federal and state levels noted that they usually use earth satellite data to identify and assess natural disaster damage. But this process is manual, labor-intensive and slow, often inhibiting quick delivery of information to disaster responders.

DIU, alongside FEMA, JAIC, NASA, the National Geospatial Intelligence Agency and California disaster response organizations, looked to resolve this obstacle by seeking computer vision algorithms to apply to satellite data in a project called xView2.

The project launched with an international prize competition to develop computer vision algorithms that could automate post-disaster damage assessments with datasets of pre- and post-disaster satellite imagery. With over 2,000 submissions to the contest, DIU selected three solutions with an 80% damage detection success rate, and the top solution was 266% better than government baseline algorithms, Dunmon said.

This top algorithm, Dunmon added, was deployed to assist with the Australia bushfires last winter, as well as this year’s California wildfires to provide metrics on the damage done across the affected areas.

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