

# AI algorithm trained to predict what ISIL forces will do in different situations

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An F-15E Strike Eagle from the 391st Expeditionary Fighter Squadron flies over Afghanistan. A deeper look at data from areas where Islamic State fighters are active showed that air strikes by different nations resulted in far different reactions by ISIS on the ground. Credit: U.S. Air Force

An elder tribesman in eastern Afghanistan was amazed by the precision of American drone strikes. He had seen attacks hit exactly where insurgents were sleeping. A room exploded and they were no longer there.

He told a Special Forces commander that he called drone strikes "the magic."

"Bring on the magic," he told the soldier.

The future of war will look like magic, according to an ASU professor who interviewed the soldier. Now, enemies die without even being aware of immediate danger. In the future, enemies will find out their opponents somehow know what they're going to do even before they do.

The first step in this direction has been taken by an Arizona State University researcher.

An artificial intelligence algorithm created by Paulo Shakarian learned how to predict what Islamic State forces will do in different situations. Shakarian presented his paper last month in Sydney, Australia. He directs the Cyber-Socio Intelligent Systems Lab, part of the School of Computing, Informatics, and Decision Systems Engineering in Arizona State University's Ira A. Fulton Schools of Engineering.

He used real-world data to test his equation: 2,200 recorded incidents of ISIS activity in the last six months of 2014 obtained from a Washington, D.C., think tank.

"What we wanted to look for was: Are there relationships amongst the actions the Islamic State does that leads to significant increases in activity?" Shakarian said. "When the violence increases that much, we want to understand why that is. We wanted to get insight into what led them to conduct certain military tactics."

ISIS conducts complex military actions spanning several countries. They also switch tactics, moving from conventional military warfare to terrorism to insurgent tactics. They continue to be effective, despite attacks from the anti-ISIS coalition's air power, Shakarian said.

"The key thing that differentiates our approach is we look at

relationships," he said. "One thing we found is that when there was a spike in armed attacks—essentially conventional infantry operations—it was preceded by indirect fire (artillery and mortar fire)."

This is nothing new in warfare, said Shakarian, a West Point graduate and veteran of two tours during the Iraq War with the First Armored Division: Get the other guys' heads down, bottle them up, and then attack with infantry. However, when indirect fire was present, the average increases in probability for an armed attack went sky high.

Shakarian also found car bombs in Baghdad preceded infantry attacks in northern cities. When car bombs were set off, the Baghdad government kept its forces in the capital to increase security presence there, rather than sending them out to attack ISIS fighters.

"Now there's less forces for the Islamic State to deal with when they go to one of these northern cities like Baiji or Balad," he said. "We found that in this case since Balad had something major going on, if there was infantry operations in Balad, if there was indirect fire in Baiji, then there would be a spike in car-bomb activity. ... This was occurring 100 percent of the time, this relationship. ... If they want to see a significant increase in infantry, we're going to see car bombs 100 percent of the time. So we're mixing terrorism and military activity together to keep the (Iraqi) army off base."

The incredible increase of data collection in recent years will be the future of war, said Daniel Rothenberg, Professor of Practice in the School of Politics and Global Studies and co-director of the Center on the Future of War at Arizona State University. He interviewed the Special Forces commander mentioned at the start of this story in the course of editing a book about drones and the future of conflict, "Drone Wars: Transforming Conflict, Law, and Society."

"We've seen a really substantial shift in how war and conflict are managed in regards to information in recent years," Rothenberg said.

"We've seen a transformation in the use of different information for ... classic military actions. It's a story that's beginning to be told."

The future of war will include massive amounts of data being collected and correlated in live time. A program like Shakarian's could be part of a system like that.

"That's how a lot of operations are going to proceed," said Rothenberg, who is also a Lincoln Fellow for Ethics and International Human Rights Law, and executive director of the Center for Law and Global Affairs in the Sandra Day O'Connor College of Law. "What is kind of radical is the power of analytics. ... We don't even know where it's going because this is so new."

Another interesting relationship Shakarian found was a correlation between Syrian air strikes and mass arrests by ISIS in their territory.

"We thought about it a lot, and we thought it's not occurring when the coalition does an air strike," he said. "Who's in the coalition? Countries like the U.S., Great Britain, Jordan—countries with access to technical intelligence such as satellite imagery, the NSA and so forth."

The Syrian government doesn't have access to resources like that, Shakarian said. The intelligence they use for air strikes comes from human sources. ISIS responds by rounding up the usual suspects in order to find those sources. They don't do it when there are American air strikes because they know the U.S. is getting its information from satellite imagery, not people on the ground. (ISIS can tell the difference between the two for a number of reasons. Both Syrian and coalition forces announce air strikes after they're conducted. Syrians use Russian aircraft, and coalition forces use American or European aircraft. Islamic

State fighters can look up and tell the difference.)

"They're very savvy in switching from conventional to terrorist to insurgent tactics and back again," Shakarian said. "This shows a high level of coordination between theaters. It's quite interesting how they've evolved this way."

He does not think this makes ISIS invincible.

"Far from it," he said. "I think the more we can do stuff like this and understand what they're doing, the better moving forward we can have strategies that take advantage of the fact that they're doing activity A; B is on the horizon; maybe we can pre-empt that."

Currently Shakarian has been in talks with the Department of Defense to do software demos. That would require a richer data set that's more current.

However, what Shakarian has done has immediate value to analysts because the data he used was real-world data.

"It would be enormously helpful," Rothenberg said. "There has been a shift in strategy and tactics in that the information is being used in ways it wasn't being used before."

Provided by Arizona State University

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