

USC

Artificial intelligence helps wildlife rangers combat poaching

A group of AI researchers at USC hopes their software can help wildlife defenders protect their parks.

By: Jesse Ryan

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Algorithms are a new tool in the fight against the trade of black market ivory tusks, pangolin scales and tiger skins. A group of researchers at the University of Southern California is working on technology to help rangers stay a step ahead of poachers.

The Teamcore lab at USC's Center for Artificial Intelligence in Society is working on an AI-driven application called PAWS, short for Protection Assistant for Wildlife Security, which aims to equip wildlife defenders with optimized patrol routes.

The illegal wildlife trade is considered the fourth most profitable criminal enterprise in the world, after drugs, weapons and human trafficking, U.K. Foreign Secretary Jeremy Hunt announced at the 2018 Wildlife Illegal Trade Conference in mid-October. Poaching continues to threaten the survival of species around the globe.

PAWS consists of both a predictive and prescriptive component. A machine learning algorithm uses information from past poaching events and publicly-accessible topographical data to make risk calculations about where future poaching attacks may occur. A game theory framework, utilizing a branch of mathematics focused on the interaction between two or more participants, generates a sequence of GPS locations for the rangers to patrol.

Similar to a game of chess, PAWS anticipates the actions and reactions of the poachers and rangers. Wildlife defenders using the software receive recommended patrol routes based on the probability of attacks and predicted poacher behavior. The routes are randomized so that the poachers can not predict which regions of protected areas will be patrolled.

A preliminary field test in Uganda in April 2014 demonstrated that the software was effective in identifying infrequently patrolled areas with active poachers. By following the patrol routes that PAWS suggested, rangers found a poached elephant with its tusks cut off. Even though they arrived too late to save the elephant, the rangers were able to find and collect other snares.

"This was very rewarding in terms of seeing AI in action and hopefully saving some lives of animals," said Milind Tambe, a USC Professor of Engineering and Computer Science and the founding co-director of the USC Center for AI in Society.

Advancements in PAWS coincide with recent concerns from the conservation community about an increase in demand for endangered species products.

On Monday, China reversed its 25-year ban on the use of tiger bones and rhino horns in research and medicine. Even though the ban only extends to animals in captivity, environmentalists are worried that the move may fuel illegal poaching because it's difficult to determine whether animal parts are sourced from captive or wild animals.

"Not only could this lead to the risk of legal trade providing cover to illegal trade, this policy will also stimulate demand that had otherwise declined since the ban was put in place," Margaret Kinnaird, Global Wildlife Practice Leader at the World Wildlife Fund said through a press release.

The Teamcore lab has since field tested PAWS in other countries and is refining the software in hopes of releasing it worldwide next summer. PAWS will be integrated into a free management tool called SMART. Short for Spatial Monitoring and Reporting Tool, it was developed by nine leading conservation organizations. SMART helps rangers in over 600 protected areas around the world better monitor and evaluate their sites.

Once widely available, Tambe hopes that PAWS can help complement wildlife rangers' knowledge and intuition in their anti-poaching efforts.

"There is a lot of research in AI that benefits other sectors of society but often there is not much attention paid to the use of AI for societal benefits for low-resource communities. In that sense it's important for us as AI researchers to fill this gap," Tambe said.

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