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Artificial intelligence used to combat poaching

The research builds on the idea of green security games - the application of game theory to wildlife protection. Game theory uses models of conflict and cooperation between rational decision-makers to predict the behaviour of adversaries and plan optimal approaches for containment.

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LOS ANGELES: Scientists, including one of Indian origin, are using artificial intelligence to solve the problems of poaching and illegal logging, in order to protect endangered animals, especially in large national parks.

"In most parks, ranger patrols are poorly planned, reactive rather than pro-active, and habitual," according to Fei Fang, a PhD candidate at the University of Southern California (USC).

The research builds on the idea of green security games - the application of game theory to wildlife protection.

Game theory uses mathematical and computer models of conflict and cooperation between rational decision-makers to predict the behaviour of adversaries and plan optimal approaches for containment.

"This research is a step in demonstrating that artificial intelligence (AI) can have a really significant positive impact on society and allow us to assist humanity in solving some of the major challenges we face," said Milind Tambe, professor at USC.

The researchers first created an AI-driven application called PAWS (Protection Assistant for Wildlife Security) in 2013 and tested the application in Uganda and Malaysia in 2014. Pilot implementations of PAWS showed some limitations, but also

led to significant improvements.

PAWS uses data on past patrols and evidence of poaching. As it receives more data, the system "learns" and improves its patrol planning.

Already, the system has led to more observations of poacher activities per kilometre.

Its key technical advance lies in its ability to incorporate complex terrain information, including the topography of protected areas.

That results in practical patrol routes that minimise elevation changes, saving time and energy.

Moreover, the system can also take into account the natural transit paths that have the most animal traffic - and thus the most poaching - creating a "street map" for patrols.

"We need to provide actual patrol routes that can be practically followed," Fang said.

"These routes need to go back to a base camp and the patrols can't be too long. We list all possible patrol routes and then determine which is most effective," Fang said.

The application also randomises patrols to avoid falling into predictable patterns.

"If the poachers observe that patrols go to some areas more often than others, then the poachers place their snares elsewhere," Fang said.

The team recently combined PAWS with a new tool called CAPTURE (Comprehensive Anti-Poaching Tool with Temporal and Observation Uncertainty Reasoning) that predicts attacking probability even more accurately.

In addition to helping patrols find poachers, the tools may assist them with intercepting trafficked wildlife products and other high-risk cargo, adding another layer to wildlife protection.

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