AI computer vision breakthrough IDs poachers in less than half a second

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Thousands of animals including elephants, tigers, rhinos, and gorillas are poached each year. Researchers at the USC Center for Artificial Intelligence in Society have long been applying AI to protect wildlife. Initially, computer scientists were using AI and game theory to anticipate the poachers' haunts, and now they have applied artificial intelligence and deep learning to spot poachers in near real-time.

Poachers are normally active at night. While tools such as infrared cameras are used to monitor living organisms, since poachers and animals they are hunting both give off heat, it is time-consuming and challenging to monitor infrared video streams for poachers all night. Thus a team of computer scientists led by USC Viterbi School of Engineering PhD student Elizabeth Bondi in Professor Milind Tambe's lab, labeled 180,000 humans and animals in infrared videos using a labeling tool they developed to expedite the process. The researchers used these labeled images and leveraged an existing deep learning algorithm known as Faster RCNN that they modified, to teach a computer to automatically distinguish infrared images of humans from those infrared images of animals.

The challenge then was to deploy this algorithm to spot poachers in near real time using the laptop computers at base stations in the field, where footage is streamed from the drones that are being used to patrol national parks in Zimbabwe and Malawi. The algorithm, while functioning with accuracy, was taking 10 seconds to process each image —which is too long for the moving vehicles. The goal was then to further modify the

algorithm so it could be used by a regular laptop. The researchers then changed the algorithm to work with Microsoft Azure—-leveraging the power of the cloud to build a virtual computer that could do faster processing. The researchers also developed an alternative solution for spotty interconnectivity in rural areas so the software could work off of a laptop. The algorithm now works to detect poachers and animals in just over three-tenths of a second.

This algorithm, now named "SPOT" or Systematic POacher deTector, will be deployed on a large scale across Botswana.

"SPOT will ease the burden on those using drones for anti-poaching by automatically detecting people and animals in infrared imagery, and by providing detections in near real time," says lead author Elizabeth Bondi, a PhD candidate in computer science at USC.

More information: "SPOT Poachers in Action: Augmenting Conservation Drones with Automatic Detection in Near Real Time," teamcore.usc.edu/papers/2018/spot-camera-ready.pdf

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