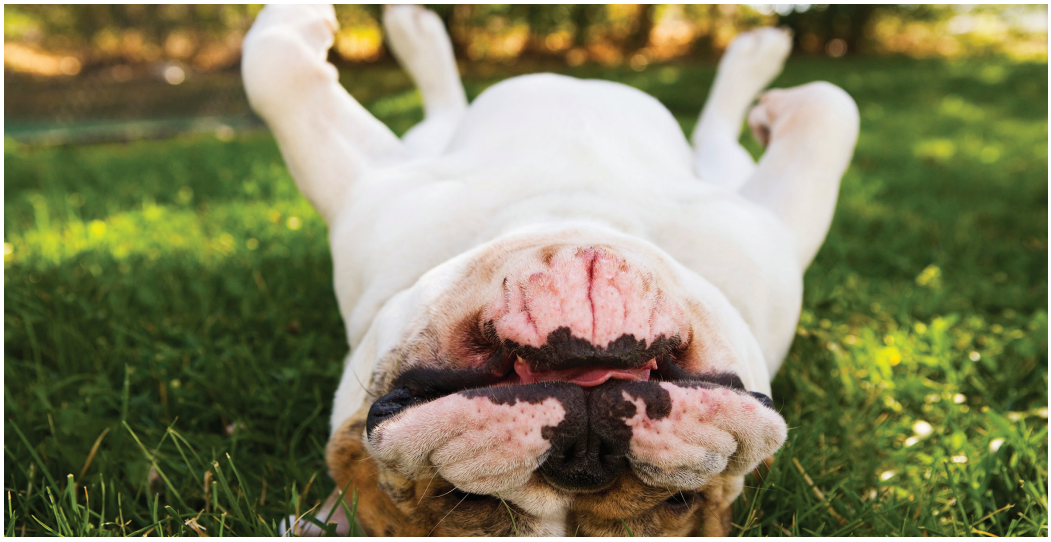

LORI ADAMSKI PEEK/GETTY

AI can't see things from another view

Douglas Heaven

TELLING a yellow taxi and a pair of binoculars apart is so easy most people could do it standing on their head. Not so for an artificial intelligence: flip the cab upside down and it sees binoculars.

This is just one of dozens of examples that show AI is a lot worse at identifying objects by sight than many people realise.

The examples, compiled by Anh Nguyen at Auburn University in Alabama, raise concerns about the real-world ability of image-recognition systems, for example in driverless cars. "It's a huge problem," says Nguyen.

We already know AIs are often flummoxed by doctored pictures that humans can recognise without any problem – such as a turtle with a special shell pattern that an AI misidentifies as a gun.

However, these so-called adversarial images are designed specifically to trip up AIs. They are contrived and unlikely to be a problem in the real world, or so the logic went. Now it seems you barely need to alter an image for AIs to seriously mess up.

Nguyen and his colleagues took images of common objects from ImageNet – a database used to train AIs – and randomly rotated and changed the position of the objects in the pictures. They found this was enough to confuse several state-of-the-art image-recognition systems, including Google's, 97 per cent of the time, averaged across all of the systems.

In one case, a school bus that was correctly identified in the original image was misidentified

"Image-recognition systems aren't as intelligent as we think they are, which raises safety questions"

as a punching bag when shown in close up, and as a snow plough when upside down in the road (arxiv.org/abs/1811.11553).

It shows these systems aren't as intelligent as many people think they are and raises important questions about how safely they can be deployed in certain applications, says Jeff Clune at Uber AI Labs in San Francisco.

When you look at it this way, the world seems odd to an algorithm

Nguyen worries what could happen in chaotic situations such as a battlefield, where you want an image-recognition system to be able to identify objects from lots of different perspectives. Similarly, AI-based airport security scanners need to be able to identify objects in bags from multiple angles.

There are big implications for driverless cars as well. It makes sense for a vehicle to avoid any object it can't recognise. But if a car slams on its brakes because it thinks a Coke can is a fire engine this could be as dangerous as thinking a fire engine is a Coke can and doing nothing. This is one reason why driverless cars will need to have multiple sensors to fall-back on, says Nguyen.

He, Clune and others have been uncovering these problems for the past few years, but nobody knows how to fix them.

The biggest barrier to progress is that when an AI looks at an image, it can't extract rules about the object shown that would help it identify a similar one next time – for example the rule that horses have four legs. "To reach a human level of reasoning, we need a way to extract rules from images," says Nguyen. ■

It will 'snow' on Pluto for a century

EXPECT a sharp frost on Pluto for the next 100 years. That is the forecast from an analysis suggesting the dwarf planet's atmosphere has reached maximum pressure and will begin freezing nitrogen onto the surface.

Pluto's tenuous atmosphere was first spotted in 1985 as astronomers watched the world pass in front of a distant star, an event known as an occultation. Since then, about a dozen occultations have been used to study its gassy layer, which has gradually grown in size over the past 30 years.

The cause of this increase is the slowly changing seasons on Pluto during its elliptical orbit that lasts 248 Earth years. After reaching its closest point to the sun in 1989, its northern hemisphere gradually tilted towards our star. This raised the temperature of Sputnik Planitia, a vast reservoir of nitrogen ice spotted by NASA's New Horizons spacecraft during its 2015 fly-by of Pluto. The ice warmed and turned into gas, increasing the atmospheric pressure.

From 1988 to 2016, the surface pressure increased by a factor of three, from 0.4 to 1.2 pascals. But Sputnik Planitia is now moving into a century-long period of twilight, suggesting the atmosphere will begin to condense and freeze on the surface of Pluto, almost vanishing in the next 100 years (arxiv.org/abs/1903.02315).

"It will not disappear, but more than 95 per cent of the atmosphere will collapse onto the surface," says Bruno Sicardy at Sorbonne University in Paris, who has been tracking the atmosphere as part of the analysis. "It will 'snow', it will freeze on the surface and create a frost."

The results let us get a glimpse of Pluto on a longer timescale than a spacecraft's brief fly-by, says Leslie Young of the New Horizons team. "It really highlights the importance of both ground-based observations and space observations," she says.
Jonathan O'Callaghan ■