AI in photography

Sonia Klug explores the ever-increasing impact of artificial intelligence (AI) on photographic technology

Artificial intelligence (AI) is already changing the world as we know it and photography is no exception – from automatically enhancing smartphone snaps to robot photographers, AI is now influencing almost all areas of photography.

It's already clear that AI has enormous potential to change the way we take photos and manage the increasingly large amounts of images we produce. So, regardless whether you're a purist who prefers to shoot analogue, or if you embrace computational photography already, it's good to know what's in stock, so you can choose how to make photography's AI tools work for you.

What is AI?
AI is already seeping into more and more areas of our lives, from dating to medical diagnosis. Caroline Sinders, an AI expert, compares it to electricity or even mined salt in its potential to transform. She says, 'If we think about it like salt or electricity, we see that it touches so many areas, including product design and policy. We need to think of AI like an important and transformative ingredient.'

Strictly speaking, artificial intelligence can be anything vaguely smart a computer does, but it's usually understood to include a degree of machine learning. Recent technological advances have made it possible to not only collect vast amounts of data, but also process them at high speed, using algorithms.

These codes, describing sets of rules or step-by-step instructions, can be organised in complex artificial neural networks, roughly based on the structure of the brain, which makes it possible for machines to learn. Often training sets, for example, images of 'cats' as well as 'not cats' are fed into such a system, allowing it not only to learn what a cat looks like, but also improve its performance with each new image it processes.

Advanced systems can, mindbogglingly, figure out how to learn by themselves. This is often referred to as 'deep learning', which is exciting as well as troubling and already revolutionising science.

Below: Sony's latest AF systems include real-time AI-based eye tracking for both humans and animals

Below right: Olympus exploited 'deep learning' technology to program the OM-D E-M1X's autofocus

This shot was taken using the E-M1X's Intelligent Subject Detection AF, set for motorsports
Olympus OM-D E-M1X , 300mm f/4 1/160th sec at f/8, ISO 200

Huawei smartphones are able to identify a wide range of subjects, including dogs

Smartphones and AI
In smartphones, the hardware is so limited that software has to bridge the gap, which has led to many innovative AI photography features. Burst photography is often used to make up for small lenses and sensors. Most smartphones use high-definition rendering (HDR) automatically when they detect a high-contrast scene and by combining data from various images, this can significantly improve image quality.

Similarly, Google has developed a pixel-shift technique that uses data from various images, shifted by one pixel to achieve higher resolution and hence greater magnification. Google's Pixel phones also feature a Top Shot function that automatically takes a three-second video and picks the best shot. Night Sight uses four-second exposures and machine learning to render vastly more detail in night-time photos, more than any software could tease out.

However, there is another reason why the big companies such as Apple, Huawei and Google are leading the charge when it comes to AI: unlike traditional camera manufacturers, they have access to vast amounts of data, which make perfect training sets. Huawei used 10 million images to 'teach' its P20 phone to recognise over 500 objects and assign one of 19 scenes to enhance the image optimally. For example, if the camera detects that you are taking an image of the sky, it adjusts saturation and colour to make the sky appear more dramatic and blue.

The latest iPhone carries the A12 chip with a 'Neural Engine', mastering five trillion 8-bit operations per second. It can recognise the scene and apply the best settings, for example, separating a person from the background and blurring the background or changing the lighting.

Finally, AI helps your phone to sort your images by subject or person photographed. You can, for example, ask Siri (Apple's virtual assistant) to find all the images you have taken of anything, from castles to teapots, and do quick edits to remove blemishes or make the images punchier.

AI camera technology
Since 2007, face detection has been used to ensure the AF focuses on faces, which is usually the focal point of an image. While features like Smile Detect (where the camera would only take a photo if the sitter was smiling) didn't prove popular, AI is also behind eye-detection AF, which all major camera manufacturers now offer. For example, Sony just released an improved AF system, including real-time Eye AF that even works on animals. It uses object recognition as well as data about the distance, movement, colour and patterns, to make it one of the fastest AF systems, currently.

Olympus developed Intelligent Subject Detection AF, through deep learning. This means that the OM-D E-M1X recognises eight different types of vehicles, including motorcycles, helicopters and bullet trains and automatically chooses the best point to focus on – for examples the rider's helmet, cockpit or train conductor's seat,

Robot photographer

Polycam Player employs robotic cameras

WHILE computational photography has taken a firm hold over casual photography, the jury is still out on how large a role AI will play in professional photography, but there is undoubtedly some scope. Robotics, for example, has been used for many years to help cover sporting events from inaccessible places, such as the roof of stadiums or the bottom of swimming pools.

To do this, Nikon's subsidiary MRMC has developed robotic supports, such as the Polycam Player, which can automatically follow and photograph an athlete without somebody at the controls.

This motorised camera arm uses face detection and limb recognition to predict athletes' movements, adjusting the zoom and focus while tracking players. It can even hone in on just one or multiple players.
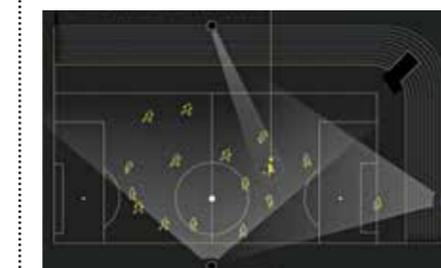
The system is able to keep track of players' movements around the pitch

Original | With Accent AI

Luminar uses articial intelligence in its Skylum software to provide intelligent image enhancement, taking into account human subjects

respectively. It not only works well for motorsport photography but offers a taste of things to come, as this algorithm could be trained on almost any subject. Panasonic's Lumix G cameras also sport an innovative AI feature: the camera can memorise a specific person's face – for example, a bride – and automatically focus on it.

AI in postproduction

Machine learning already plays a significant role in image editing, from quirky Snapchat filters that make people look like animals to sophisticated photo-editing software.

Skylum has been at the forefront of integrating machine learning into their Luminar software by developing workspaces that 'learn' the users preferred genre of photography and settings and suggest enhancements based on this. Dima Sytnik, CTO and Co-founder at Skylum, says, 'We've just released a new version of Accent AI filter. The new "human-aware" technology recognises people in your photos and applies adjustments selectively for more realistic images.'

Adobe Sensei is an innovative AI assistant for all Adobe products. It can do anything, from identifying and tagging images according to the objects they depict, produce masks and even summarise text. Although not very widely used yet, these technologies have the potential to simplify photographers' workflows by managing vast image libraries and speeding up routine adjustments.

What's to come?

Camera manufacturers are now pushing up against the physical limits of how small a lens can be and how much data the sensor can capture. This means that even when it comes to professional photography equipment, most new developments and innovations are expected to come from the software.

But will machines eventually become so good that they will replace human photographers? Google's deep learning lab (Brain Team) has already developed an algorithm that can select images from Google

Luminar's Accent AI does a great job of enhancing images using a single slider

street view, crop and edit them to create images that are more likely to be judged to have been taken by a professional photographer, than landscape photos taken by actual professional photographers. Nvidia software (not released yet) does away with the need to go out in the first place, by enabling

designers to create photorealistic landscapes from roughly sketched outlines in seconds.

And of course, there have been attempts to build creative machines, but no AI system is capable of creating meaning, social commentary or artistic intent...yet.

For now, it looks like photographers will mainly use AI to save time. Dima Sytnik says, 'One of the chief impacts AI will have on photography is simplifying the process of taking and managing photos. AI can help photographers bridge the gap between what our eyes see and what the camera captures. It means cameras and software will become smarter and automate processes – from image stabilisation to auto-tagging and maybe even skipping manual photo editing altogether.'

The choice is yours

Whether you think AI in photography is an overhyped gimmick for casual photographers or the future, one thing is for sure: AI is here to stay, creating more tools for photographers to have at their disposal. Regardless whether we prefer elaborate photography set-ups or are grateful for anything that allows us to just focus on your subject, it's up to us to make AI work for us – whether that's in photography or when it comes to the other changes this technology will bring.

Try this at home

- Arsenal is a device that connects to your camera and equips it with all AI has to offer, from sophisticated remote control to AI-enhanced scene-recognition algorithms that automatically apply optimised settings for a particular scene.
- The Microsoft Pix app uses AI for editing options and takes a burst of images and selects what it thinks is the best one
- The Spectre app uses AI for low-light photography.

The Spectre app for iPhone is a computational shutter for long-exposure photography