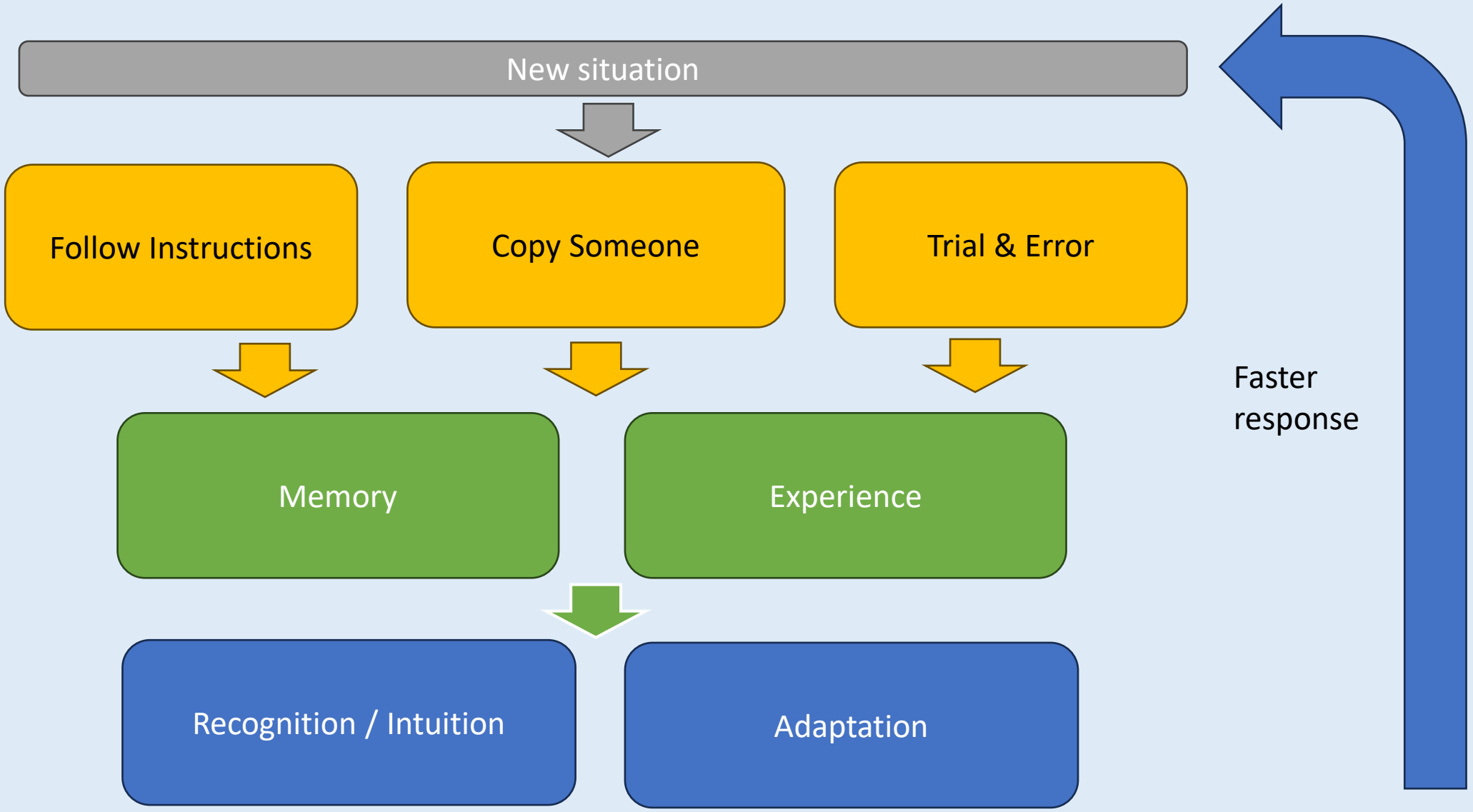
AI and Photography

How do we learn ?



What is AI ?

“Artificial intelligence is a machine that's able to learn, make decisions, and take action—even when it encounters a situation it has never come across before”.

At a basic level, AI is just computer software – a program (code).

Initially, programmers had to provide code for each situation they wanted to address.

Situations outside this had to be ignored, or caused an error.

What is AI ?

Instead of writing more and more code to address many different situations, programmers changed direction.

Software would now try to respond to a new situation based on *similar results it had previously encountered*, just like a toddler learns.

Initially, this involved sharing/loading lots of situations and laboriously labelling each one (good/bad etc). For example, teaching security software to spot potential hazards.

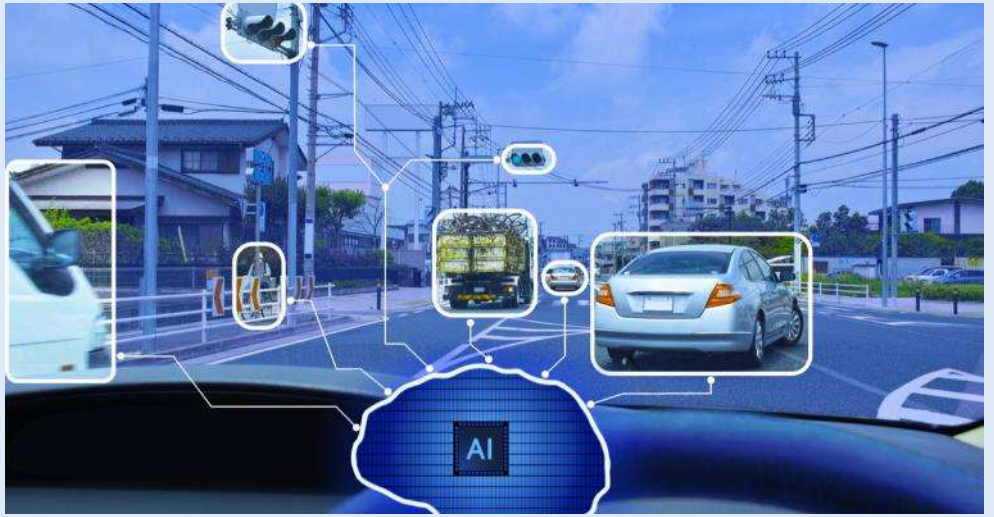
What is AI ?

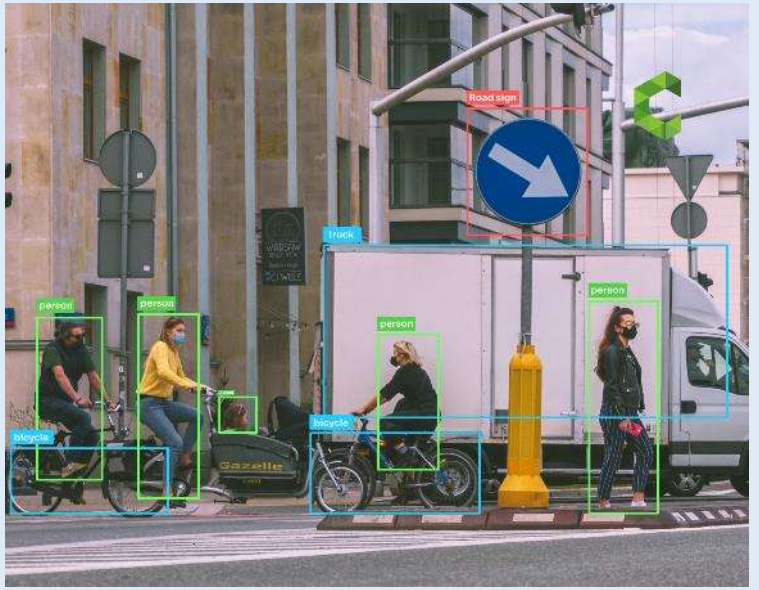
This approach results in large databases of examples.

In the latest developments, software has been programmed to improve its response to new events, without the need for huge databases.

This is achieved by looking for patterns and similarities, sometimes with support from the internet. With this “intuition”, software can manage new situations. For example, this is used in driverless cars.

Software can also share its “knowledge” with other machines, even writing new code for them.





AI and Photography

When we think of AI and photography, we're probably thinking of AI being used to edit, or even create images.

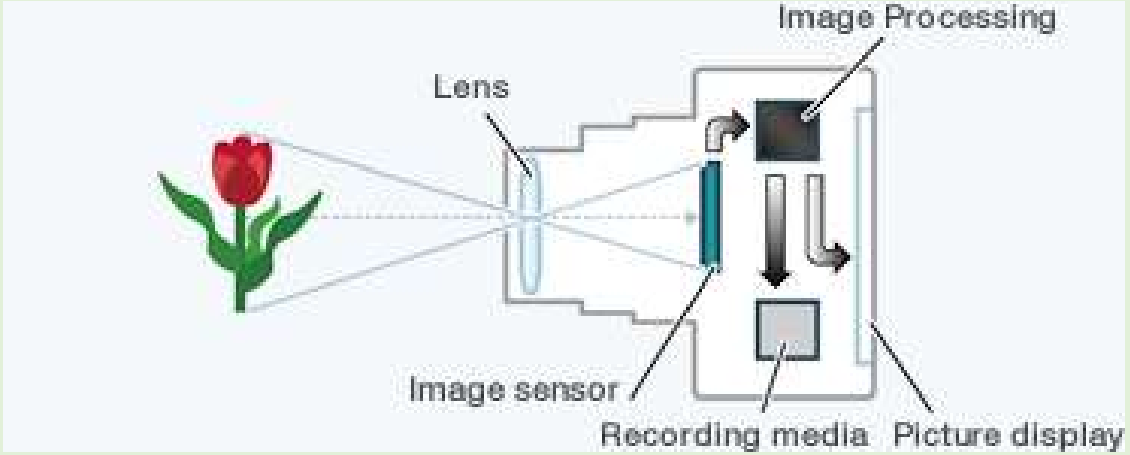
Recently, fake AI-created images have appeared in the press, with lots of negative headlines.

With this is mind, you may have decided not to have anything to do with "AI" in your photography.

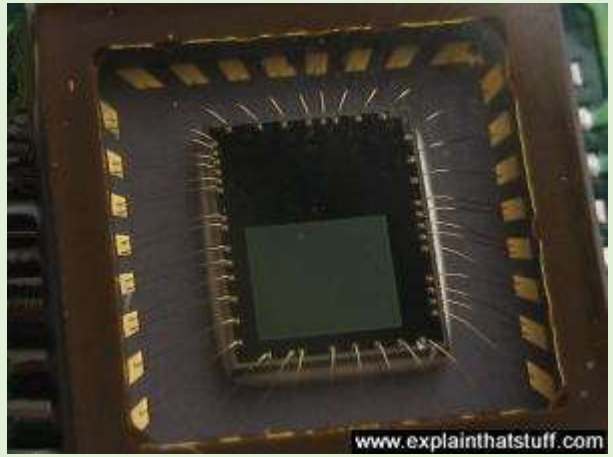
However, "AI", or software, is already present in many aspects of your photography…..

Firstly, consider a Digital camera

In a digital camera, light entering through the lens strikes an image sensor.



The image sensor chip divides the image into millions of pixels. The sensor measures the colour and brightness of each pixel and stores it as a number.



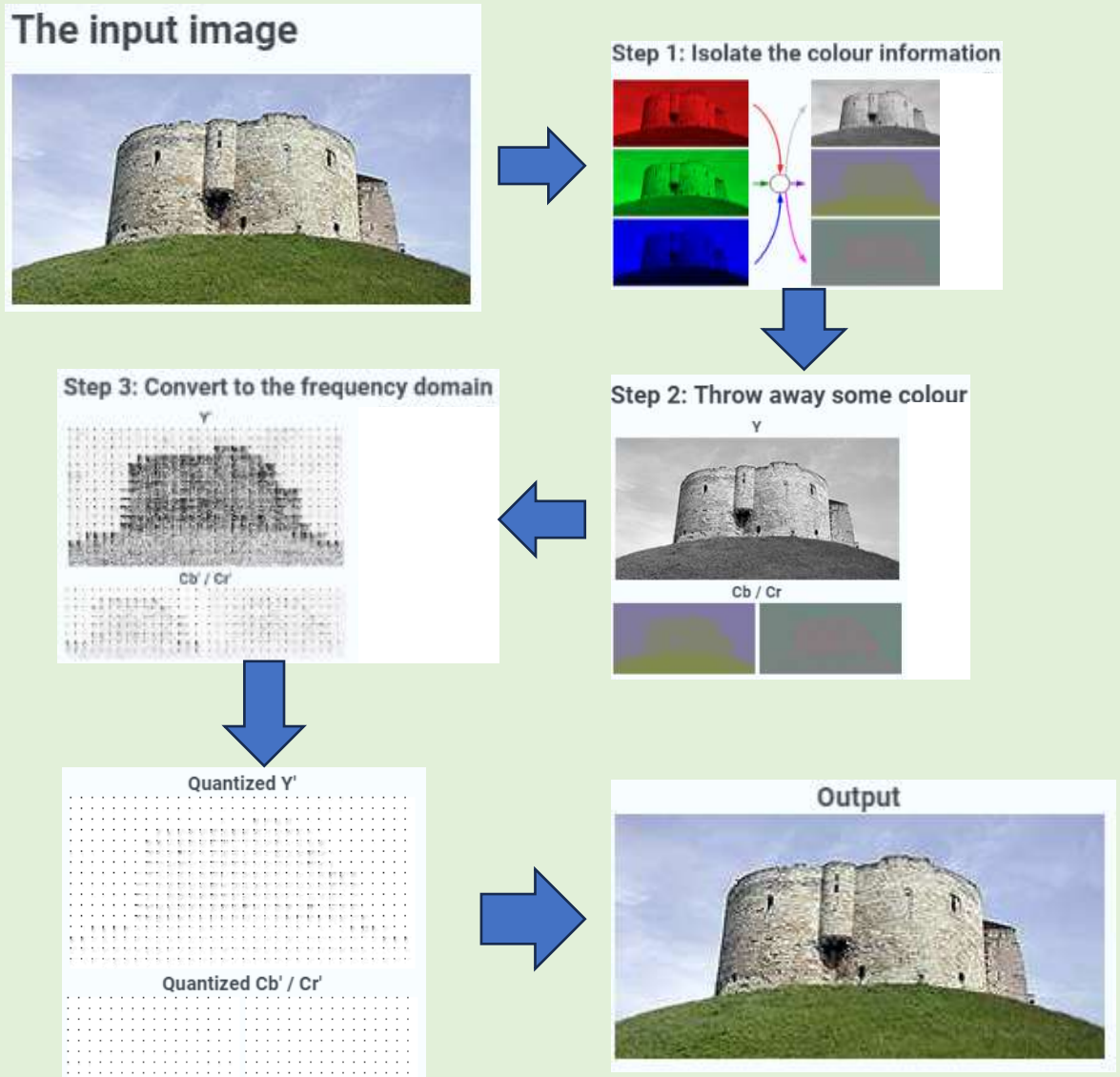
The signal output by the image sensor is processed within the camera (ie software) to create image data, which is stored on the memory card.

Then there's the JPG Engine

If you shoot in JPG's, these files are smaller than the raw digital image. Digital cameras use software (an algorithm) to compress the file size.

The software examines the image for repeated patterns in the data and then replaces those patterns with shorter ones.

It's like using an abbreviation or acronym to stand in for a longer word or phrase.



Auto Mode

In Auto Mode, the camera software chooses the settings which it believes will give the best exposure. In the past, this could only be used to achieve an average amount of brightness in the image. Now, more sophisticated algorithms detect people and adjust so they are correctly exposed, even if the rest of the scene is not.

Autofocus is also used in Auto Mode to get the sharpest possible image (more later).

“Intelligent Auto” software includes code to recognise different types of scene/image and to adjust accordingly. For example, are any faces present - if so, it chooses a shallow depth of field.

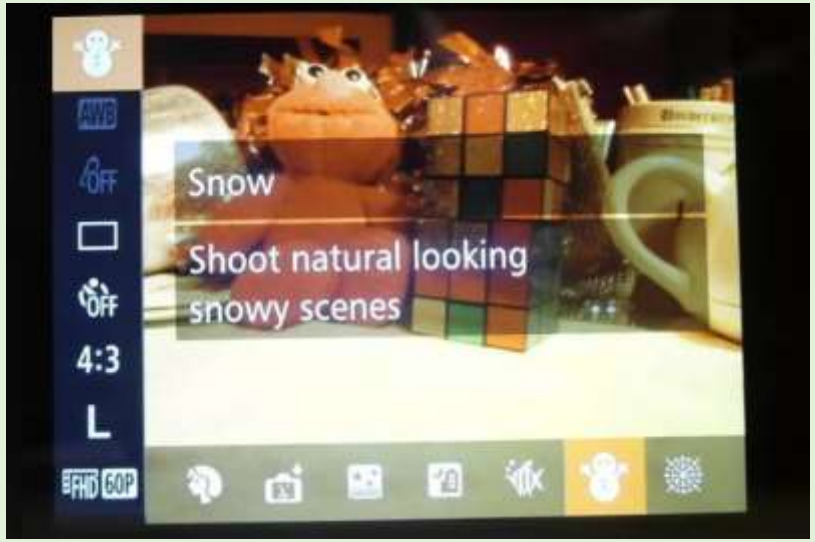
Smartphones now use these algorithms to achieve great results time after time.

And Scene Modes

If you've ever used "Scene" Modes on your camera, or smartphone, these use software to tell the camera what settings to apply.

Usually scene modes just handle exposure settings, but they can also make colours more vivid, as if a filter had been fitted.

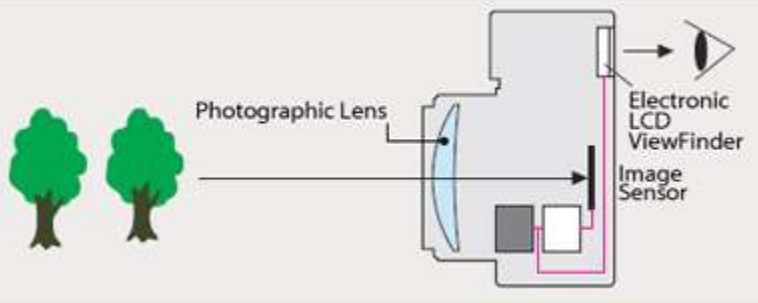
Camera designers simplify the process of matching the scene to a keyword.



Electronic Viewfinders

Some cameras have an optical viewfinder. This is just a glass or plastic window, that you look through to help compose your image.

However, for many digital cameras an electronic viewfinder (EVF) uses the information (i.e. it uses software) from the imaging sensor to display an image on a small LCD or OLED screen.



This means that an EVF shows the image that the sensor outputs, which can be different from the view through the lens.

For example, it can show the effect of exposure changes, use of Scene Modes etc

Tip…
If you can still see through your viewfinder when the camera is switched off, you have an optical viewfinder

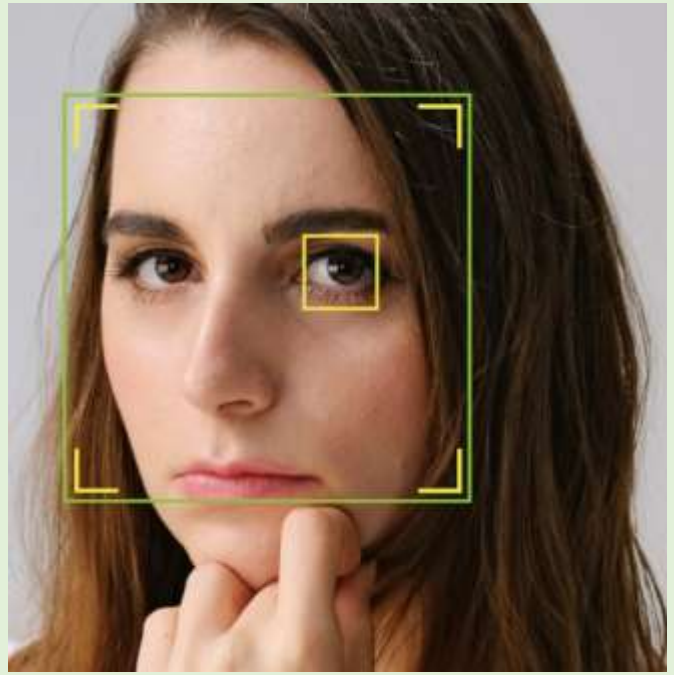
Then there's Autofocus

A typical autofocus (AF) system uses a sensor, a control system (ie software) and a motor to focus on an automatically, or manually, selected point or area.

Leica invented Autofocus in the 1970s, using sensors tuned to find the setting with the highest contrast. They sold the technology to Minolta, who managed to reduce the motor size to fit into an SLR body.

Today's cameras can respond extremely quickly, achieving focus in a fraction of a second. This is true for both still and moving subjects and even in challenging lighting conditions.

Face, eye & shape detection



People are the most common subjects for everyday photography. So camera software has been improved to identify faces and adjust the focus and exposure of a camera to produce well-exposed and in-focus photos.

The AF system analyses the scene, looking for areas that are shaped like human faces, either by identifying parts of the image that contain skin colour, or by scanning for patterns that could represent eyes and eyebrows, nostrils, and mouth.

The latest cameras can also quickly detect other shapes (for example birds, cars, trains).

Not to mention Autoexposure

The first camera with autoexposure, 1938, Kodak

Auto exposure (AE) algorithms (ie software) adjust the image so that the most important regions have an average level of brightness (grey tones).

Auto exposure algorithms involve three processes:

1) Light metering: this is generally accomplished using the camera sensor itself, or an external device as exposure detector.

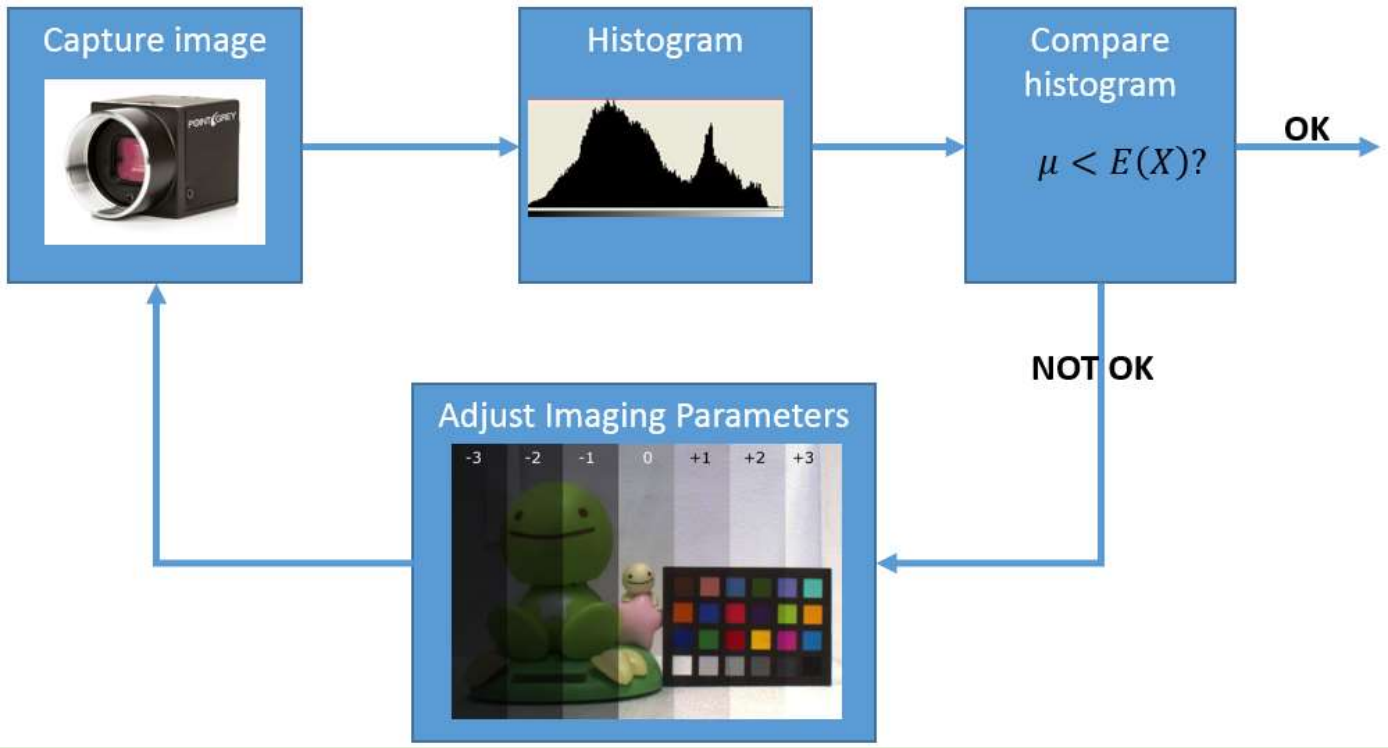
2) Scene analysis: brightness metering methods use an estimation of the scene illumination, according to image metrics. Using the overall illumination value, brightness adjustments are calculated (ie software) to produce the best exposure.

The first SLR with autoexposure, 1973, Canon

Autoexposure

Auto exposure algorithms involve three processes:

3) Image brightness correction: this ensures that the correct amount of light reaches the image sensor by adjusting the illumination and shutter time parameters (i.e. using software).



Now let’s consider Photo Editing

Photo Editing software - Photoshop

When we think of photo editing software, we usually think of Photoshop.

Photoshop was created by brothers John and Thomas Knoll in the late 1980s, on Apple computers.

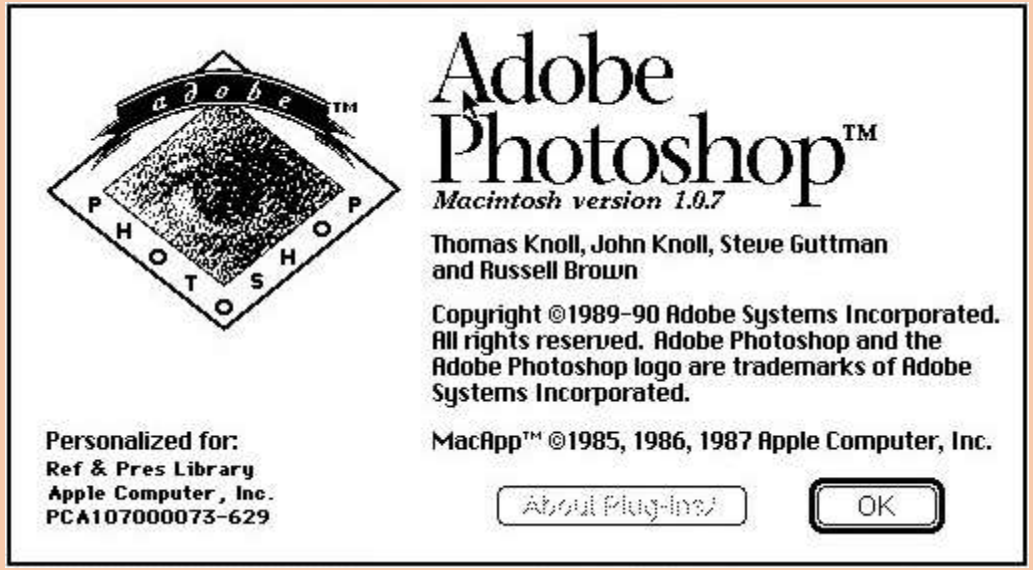
John worked for at Industrial Light and Magic, also known as LucasFilm's special effects department. Thomas was studying for his Ph.D. on image processing at the University of Michigan and had recently purchased an Apple Mac Plus to help him with his thesis.

Disappointed by existing software, Thomas starting writing his own code.

"Jennifer in Paradise.tif" was taken by John Knoll, when he was visiting Tahiti with his then-girlfriend Jennifer. He used this image in presentations about his software and it was even bundled in the first version of Photoshop !

Photo Editing software - Photoshop

After a couple of years of writing and re-writing the software and trying to find commercial backers, it was finally launched as Adobe Photoshop in Feb 1990.



The software was well equipped from the start, with the ability to select areas of the image to be changed, or enhanced.

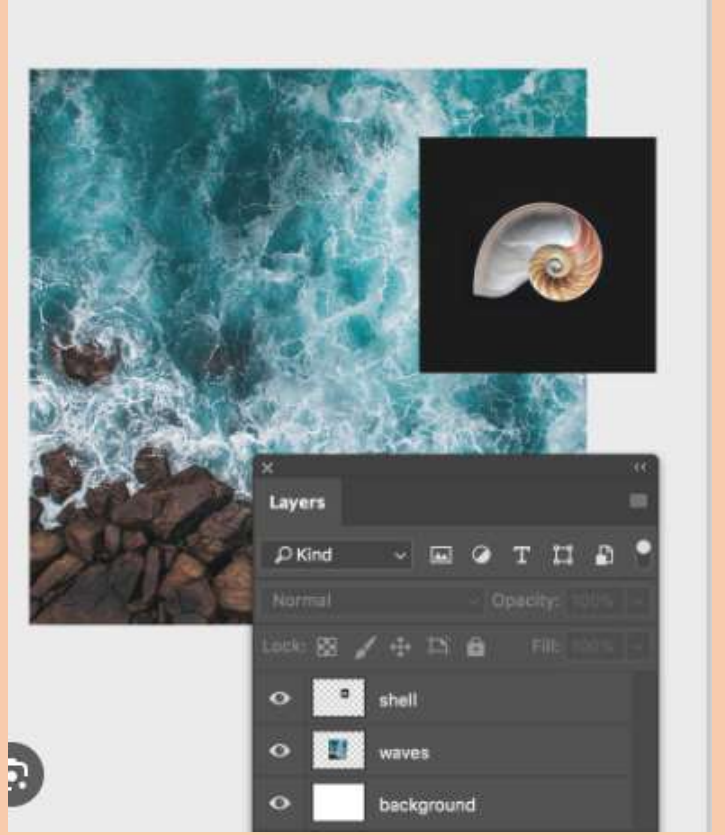
At this stage, the software is limited to changing what is already present on the image, or to “clone” (copy), one part of the image to another.

Photo Editing - Layers

Photoshop took a big step towards modern editing in the mid-1990s with the development of adjustment layers.

Designed initially to provide more precise control over image editing, layers develop into a means of combining more than one source image into a single final image.

Over the next 20 years, the software becomes more adept at selecting and editing areas, assisting the artist to achieve results which look “unedited”. Unfortunately, this gives rise to a demand for perfect-looking people and goods in advertising and the media.



Sky Replacement

Adobe demonstrated replacing skies on Photoshop in 2016, but didn't push this forward, possibly due to poor feedback from the wider Photographic Community.

In 2019, Ukrainian rival, Skylum, launched Sky Replacement in Luminar 4. This gained a lot of attention in the creative industry and stole some of Photoshop's market-share. Easy to use, it is particularly popular with young, "casual", content creators.

Initial response from "serious" photo commentators was quite hostile, claiming such edited images are cheating !

In 2021, Photoshop re-introduces Sky Replacement to Photoshop…..😯

Short Video

Image creation

Key to the success of Sky Replacement is the ability of the software to adjust for the correct amount of light, reflections, sun position etc.

This concept is now being taken even further forward, with entire images being created from scratch.

Originally, this was achieved by using templates and catalogues of images. Now it's possible to use "AI" to search the internet for content from typed words and phrases.

Photoshop is now including "Generative Fill AI" in it's latest version. Other software companies are scrambling to catch up.

Short Video

Midjourney

Midjourney is one of the many AI image generators that have emerged recently. Initially, Midjourney created dream-like arty images, but recent software updates have enabled it to produce photo-like results.

Like Generative Fill, Midjourney asks you to input a worded prompt for an image and in a few seconds, it returns multiple attempts. You can select one to work on, or to further refine your worded prompt.

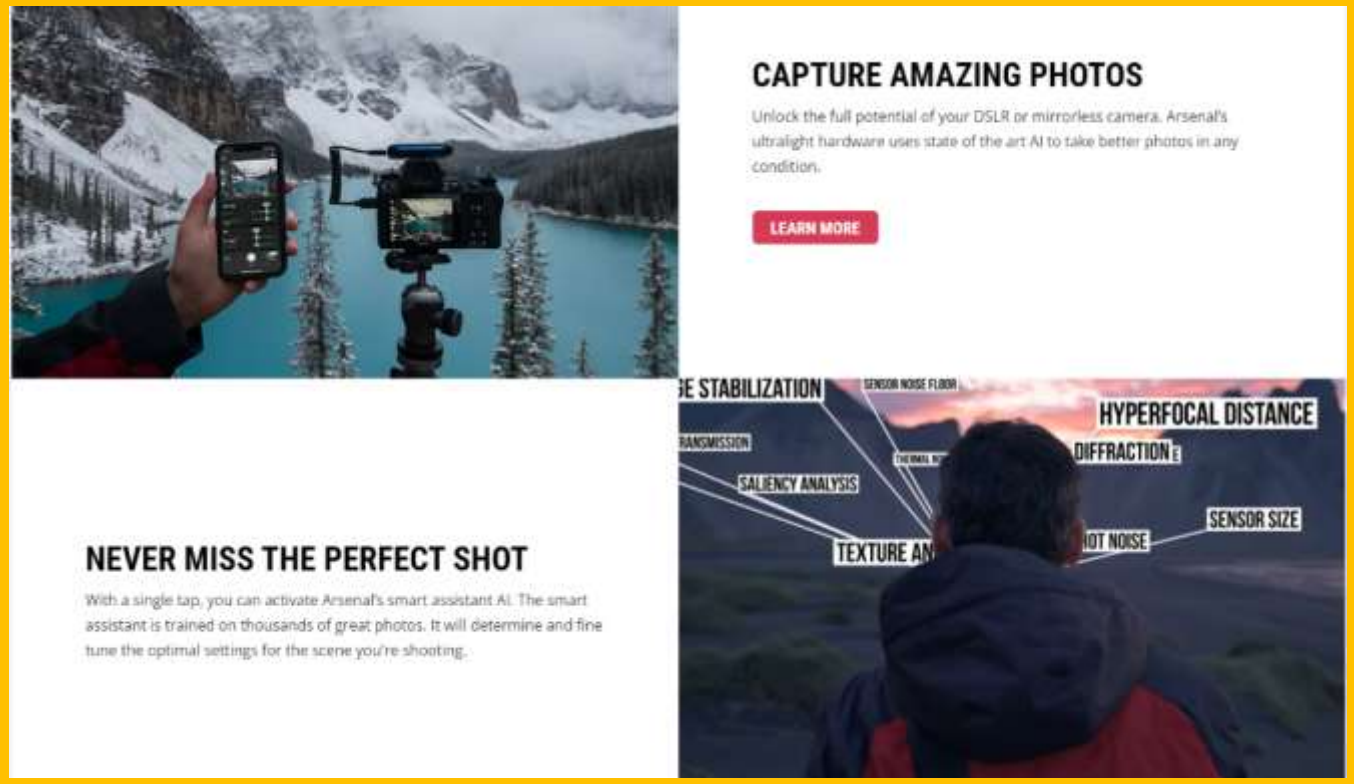
The latest version (v5) has also addressed problems with producing complicated shapes, such as hands, as you can see.

Where are we now ?

- AI generated image wins Sony competition, before winner confesses.
- Mum’s photo wrongly excluded from Charing Cross competition, as judges believe it has been created by AI.
- Photo Awards Industry struggles to find method to reliably detect fake/AI images. Calls for a new “EXIF” format which will describe camera used, date/time etc and which cannot be adjusted afterwards. AI images would lack this.

Where are we now ?

- “Arsenal 2” AI assistant attaches to your camera and picks the perfect shot for you.
- Either, by recommending the settings you should use for the current conditions…
- Or by searching the internet for existing “great” photos near your location and telling you where to stand and where to point your camera !

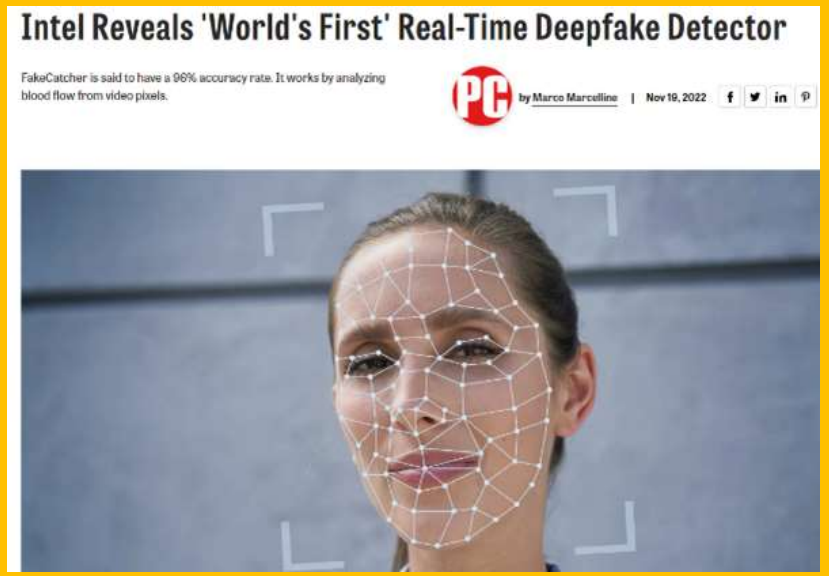


https://witharsenal.com/

Where are we now ?

- Fake images and videos continue to increase
- Companies are now trying to develop tools to detect what is real and what is fake

- Some of the fakes have Geo-political implications……



Where are we now ?

- Charities warn about impact of “enhanced” images on young people’s mental health.
- https://www.nspcc.org.uk/keeping-children-safe/online-safety/inappropriate-explicit-content/edited-filtered-images/

- Almost every image you see has been enhanced, in movies, as well as for still images, on the web, magazines, bill-posters etc

- Artist James Fridman uses the process to make funny images
- https://www.jamesfridman.com/

So where does this leave us ?

What do you think ?

Will there still be a role for professional photographers ?

(If not, who will create the images for AI to find and use ?)

Will we be able to detect AI created (false) images?

Is this the end for big photography competitions ?