

# Camera Phone Update Photography Group



Using Picasa for Photo Animation Mike Hender for U3A - January 2012





#### Collages using Picasa and Turbo Collage

U3A Digital Imaging 20 July 2012

Technology Changes in Photography

Mike Hender U3A Photography 7 June 2013







u3a learn, laugh, live

Full Fat

iPad?

Photoshop on

Photography Group 21 Oct 2016 Mike Hender



Developments in Artificial Intelligence and Machine Learning in Consumer Photography Technology Changes in Photography

Mike Hender U3A Photography 16 March 2018



#### Gates Law

"Most people overestimate what they can achieve in a year and underestimate what they can achieve in ten years."



#### The power of compound interest



But the laws of Physics don't change! – Lenses, Apertures, Sensors

#### The 3 Megatrends in Photography

In the pre-digital age the precision mechanical engineer reigned supreme



| Pre<br>Digital |                       | Мес                      | hanical           | Engine               | ers   |                   |
|----------------|-----------------------|--------------------------|-------------------|----------------------|-------|-------------------|
| Function>      | Lens<br>Focus<br>Zoom | Aperture<br>&<br>Shutter | Film or<br>Sensor | Optical<br>or<br>EVF | Flash | Remote<br>Control |

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#### The 3 Megatrends in Photography

As Digital entered the stage, Electronic Engineers became a key new resource



| Early<br>Digital |                       |                          |                   | Elect                | ronic E | ngineer           | rs                      |                             |                |
|------------------|-----------------------|--------------------------|-------------------|----------------------|---------|-------------------|-------------------------|-----------------------------|----------------|
| Pre<br>Digital   |                       | Мес                      | hanica            | Engine               | ers     |                   |                         |                             |                |
| Function>        | Lens<br>Focus<br>Zoom | Aperture<br>&<br>Shutter | Film or<br>Sensor | Optical<br>or<br>EVF | Flash   | Remote<br>Control | Micro<br>Proces-<br>sor | Image<br>Stabilisa-<br>tion | Memory<br>Card |

#### The 3 Megatrends in Photography

But now we're in the age of the 'Algorithm' and 'App'



Teenager in need of £18m? There's a

Yahoo app for that

A 17-year-old London schoolboy has sold his app company to the

| Current<br>Digital |                       |                          |                   |                      |       | Sof               | ftware l                | Enginee                     | ers            |              |                 | the cong<br>tinsh his      | anys Carlornia headquarters<br>A-levels | just yet because he wants to |  |
|--------------------|-----------------------|--------------------------|-------------------|----------------------|-------|-------------------|-------------------------|-----------------------------|----------------|--------------|-----------------|----------------------------|---|------------------------------|--|
| Early<br>Digital   |                       |                          | 5 <b>0,</b> i     | in 2                 | 013   | wh                | at o                    | did                         | l mi           | ss?          | 1               |                            |   |                              |  |
| Pre<br>Digital     |                       | Мес                      | hanica            | l Engine             | eers  |                   |                         |                             |                |              |                 |                            |   |                              |  |
| Function>          | Lens<br>Focus<br>Zoom | Aperture<br>&<br>Shutter | Film or<br>Sensor | Optical<br>or<br>EVF | Flash | Remote<br>Control | Micro<br>Proces-<br>sor | Image<br>Stabilisa-<br>tion | Memory<br>Card | I/O<br>(USB) | GPS<br>Location | Creative<br>Func-<br>tions | Blue-<br>tooth<br>WiFi                  | Social<br>Media,<br>Cloud    |  |

#### Deep Learning, MI and Computational Photography

#### From object to image



#### Software everywhere – Deep Neural Networks



#### Software everywhere – Deep Neural Networks



#### **Computational Photography**



#### Smart HDR











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#### "Computational Photography Mad Science"





16-core Neural aine

11 trillion operations per second





Industry-leading performance per watt



Secure Enclave

Unified memory architecture



Machine learning accelerators



# 16-core Neural Engine

11 trillion operations per second





#### Software everywhere – Deep Neural Networks



#### Deep Nostalgia – MyHeritage



#### Apps

- MyHeritage
- Ancestry
- Find My Past
- Genes Reunited

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Deep Nostalgia Photography Group

7 May 2021

#### Setting expectations

- Aimed at mass market not semi-pros
- Allows colourising and animation but without user control
- Can be very good, can be very bad
- Complementary to semi-pro tools like Photoshop's Neural Filters
- Photoshop useful for getting a clean version of the original
- Polarises people who see it love/hate

#### Sybil & Alice Pengelly







Geoff Walker: " My mother and her mother outside their home in Woodham Ferrers, Essex"















#### David Bender









#### lan Hutt







#### lan Hutt







#### Sylvia Morris 1





#### Silvia Morris 2





#### Guru







#### John Brewell





## John Harding





## John Harding





#### Comparison to original





#### Comparison to original





#### Pippa Greensmith







#### Pippa Greensmith



Du Toit sisters







# Nigel Dorian







#### Tony Ring







Mother's 21<sup>st</sup> Birthday

# Summary

- The better the input, the better the output
- Clean up the original photo
- It does what it does
- Zero user involvement
- Typical of 'black box' MI/Deep Fusion
- myheritage.com, 14 day free trial





# Deep Fusion etc

## **Deep Fusion**

It shoots nine images, before you press the shutter button it's already shot four short images, four secondary images.

When you press the shutter button it takes one long exposure,

then in just one second, the Neural Engine analyses the fused combination of long and short images picking the best among them, selecting all the pixels, and pixel by pixel, going through 24 million pixels to optimize for detail and low noise



#### Smart HDR

- The phone begins taking buffer photos the instant you open the camera app.
- By the time you actually press the shutter button, it's captured a series of underexposed frames, the photo you want and an overexposed frame.
- Machine learning breaks down a scene into pieces.
- Background, foreground, eyes, lips, hair, skin, clothing, skies etc. are all processed independently.

#### Smart HDR

- Exposure, contrast, and saturation, are adjusted and combined just like a photographer might in post production.
- Machine learning identifies scenes and fine-tunes white balance, contrast, texture, and saturation
- Scene Detection intelligently analyses a scene for the best possible exposure for the shot.

## **SMART HDR**



# **DEEP FUSION**

# **NIGHT MODE**



# Pro Display XDR

- Retina 6K Display
- 32-inch (diagonal) IPS LCD display
- 6016 x 3384 pixels (20.4 million pixels)
- Aspect ratio: 16:9
- XDR (Extreme Dynamic Range)
- 1,000 nits sustained (full screen), 1,600 nits peak
- Contrast ratio: 1,000,000:1
- Colour: P3 wide colour gamut, 10-bit depth for 1.073 billion colours





