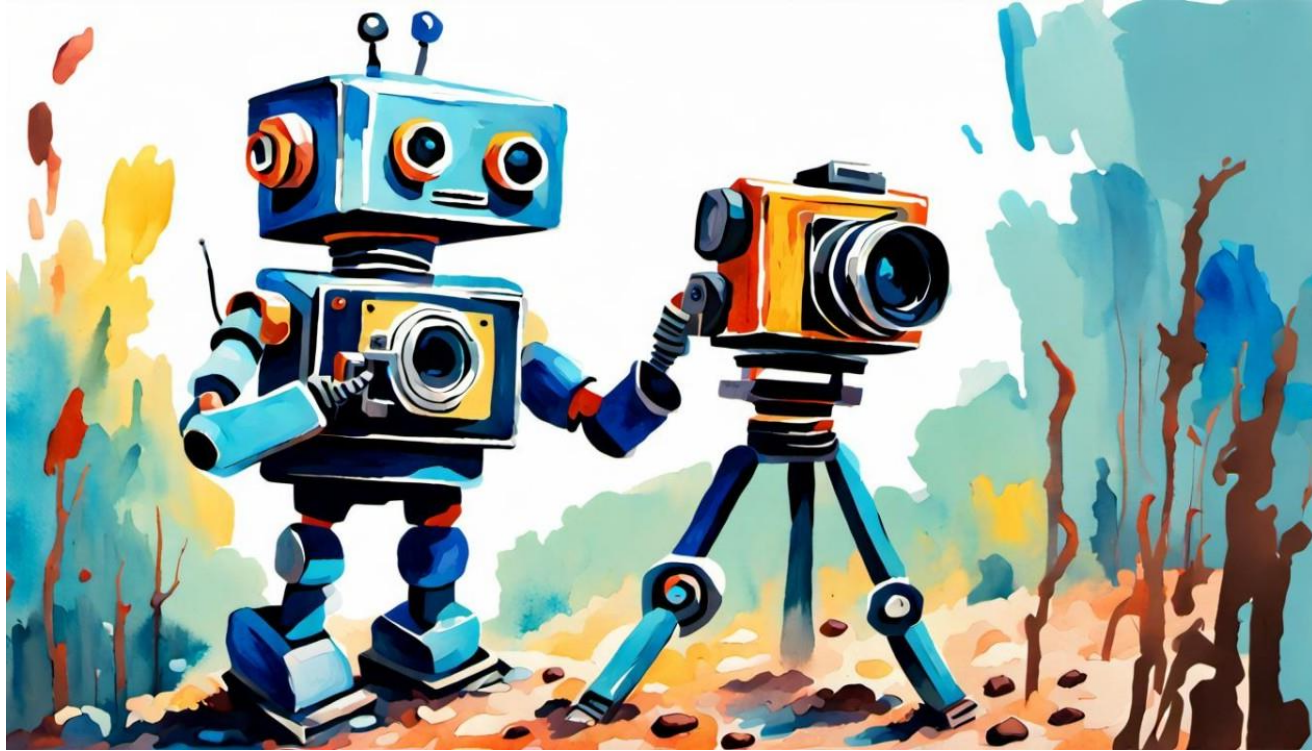


What is Artificial Intelligence (AI) - in Photography?

05-21-2024 David Boomstein



What is AI - in Photography All About?

- **Last year an *AI-Generated* image won a photographic competition in Australia!**
 - Fortunately, the studio that submitted the ‘photo’ confessed straight away and didn’t accept the prize.
 - The image was submitted to test a program they had created.
 - **While it wasn’t a big name or international competition, it demonstrated Artificial Intelligence’s (AI) potential.**

AI has significantly impacted the field of photography, offering both professionals and amateurs innovative tools and capabilities.

- **Artificial Intelligence (or “AI”)**
 - The simulation of human intelligence in machines that are programmed to think and learn like humans. Example: A self-driving car that can navigate and make decisions on its own using AI technology
- **What is AI All About?**

AI is about the ability of computers and systems to perform tasks

- **Generative-AI / AI-Generated**
 - Generation is the ability of a “**Generative Model**” to create *brand new, original content* such as **text, images, audio** or **video** - *from scratch*.
 - **Images & Art - DALL·E 2** - an AI system that can create realistic images and art from a *description* in “*Natural language*”
 - **Voice & Speech Recognition** i.e. call centers, - ChatGPT – based upon sampling huge amounts of data – “*Large Language Models*” (LLM)
 - The latest issue is with Scarlett Johansson’s voice being “copied” to create a new model by OpenAI in ChatGPT (Chat Generative Pre-Trained Transformer Chat Generative Pre-Trained Transformer)

AI is the Current Technology Trend

- **It is being tested or becoming available in almost any product you can think of:**
 - from AI-Powered contact lenses,
 - to the cell phones,
 - cameras & lenses and
 - the application software we use to produce our photos.
- **To be competitive, most technology companies feel they need to have something to show right now and have some type of roadmap outlining grand promises for the future.**
 - The larger hardware and software companies; Canon, Nikon, Sony, Olympus, Samsung, Google, Microsoft, Adobe, as well as some of the smaller software companies; Topaz Labs, etc. have been developing offerings for a number of years. Some are fairly along in their initial offerings of AI technology.
 - Many of these early AI implementations are beta offerings, rather basic and in some cases operationally iritic!
 - Expect lots of incremental updates to both fix problems and roll in promised capabilities, i.e. feature creep!

What are its Capabilities? Some Terms you'll hear

- **Generative-AI**

- Identifies the patterns and structures within existing image data to generate matching, new and original content
- Generative-AI is evaluated based upon
 - Quality,
 - Diversity – ability to capture the minority modes in its data distribution without sacrificing generation quality
 - and Speed

- **Image Recognition & Classification**

- Scene Detection
- Object Recognition
- Facial Recognition – individuals, groups & from different angles & partial views
 - Has the ability to Auto-Generating Standardized Key Words for Catalog Consistency, as in Lightroom
- AI Image Recognition on Managing Large Photo Collections / Catalogs

- **Game-changing capabilities for the all photographers**

- A new “Program Mode” paradigm
- Intelligent in-camera filters

- **Impact On Specific Photography Areas**

- Scene Detection - Object Recognition
- Smart Composition and Framing
- Portrait Mode / Bokeh
- Night Photography / Night Sight
- Action Photography
- Astrophotography

Where are we seeing AI - Initial implementations? - Part 1

- **Smartphones**
 - Simplest due to advanced planning of architecture
 - Its being incorporated, with limitations, in current phones
 - There are issues due to limitations of chipset's processing power - operations/second, phone RAM/memory & addressing and base storage capabilities
- **Digital / Mirrorless Still and Video Cameras and Lenses**
 - Will provide Real Color Tone - AI adjusted color balance, skin tone / complexion correction in-camera
 - Video Boost - intelligent / in-camera Correction of color, lighting, image stabilization, noise / graininess
 - Enhanced video with "Audio Magic Eraser" to *identify* and *eliminate* background audio distractions, ex: sounds from cars, construction and general ambience.
- **Image Processing Applications**
 - Adobe - Lightroom, Photoshop, Firefly, Premiere Pro.
 - Topaz Labs - Topaz Photo AI
 - Apple – Picsart
 - Google, Samsung, etc.
- **Photo Printing - Both Consumer & Commercial**

Some Basics of AI & Image Processing

- **Works best on RAW files**
 - RAW files contain uncompressed and unprocessed image data, allowing photographers to capture practically every detail they see
 - RAW file format stores the largest amount of detail out of any raster file type, which photographers can then edit, compress, and convert into other formats.
 - RAW files are the direct output from a digital camera's sensor before they are processed.
- **When NOT to use RAW files / When to Avoid / Issues with**
 - **Scalability** - Raw images are resolution-dependent - they can only be scaled down, not up, without losing quality: it will become *blurry* and *pixelated*.
 - **Compatibility** - RAW - not all software programs support raw files.
 - Even among programs that do support raw files, there can be compatibility issues depending on the camera model and the software version.
 - **RAW image files are not standardized**, and **each camera manufacturer has its own unique format!**
 - **File size** – Being “*uncompressed*” RAW image files are typically much larger than other file formats - they contain all of the data captured by the camera's sensor.
 - **Data includes** not only *the RGB color information for each pixel*, but also details such as *exposure, white balance, and sharpness*.

The Social, Legal, Ethical and Policy Landscape Around AI

- Questions...
 - *Is Artificial Intelligence harming photography?*
 - Are AI-generated (or AI-supplemented) photos really “photos”?
 - Societal Impacts of AI
 - How can viewers tell if it’s real or fake?
- Legal Issues - Current
 - Developers sampling internet & copywritten materials
 - Do we agree with the view that the US legal system is taking right now - not allowing people to copyright AI images?
 - *Who owns AI Images?*
 - *Today these images can’t be copyrighted!@*
- Regulation of AI - International
 - US, EU & British Regulation of AI
- Ethical Considerations and The Responsible Use Of AI
 - Image Manipulation and Misinformation
 - Privacy Concerns with Facial Recognition
 - Algorithmic Bias in Editing Tools