AI.HAMBURG    PHOTOPIA HAMBURG

# Preface

**Artificial intelligence is part of PHOTOPIA**

"This year, you can feel a special anticipation for PHOTOPIA everywhere, because it is the forum for the relevant trends and topics of the industry. We span a range from traditional analogue photography to nature photography, street and documentary photography, drone photography and current practical issues around AI image generation. We are currently experiencing an AI revolution that is fundamentally changing photography and video. How profound this transformation is, is not only evident in the production process, but also in the social debate about how to deal with AI-generated images. All these developments are the subject of PHOTOPIA. In the AI CENTER, in cooperation with AI.HAMBURG, we will present forward-looking AI solutions for the entire industry."

*Bernd Aufderheide, Vorsitzender der Geschäftsführung Hamburg Messe und Congress*

**Don't miss opportunities – use artificial intelligence**

"AI is the most important technology of our time. Because of it , we will be able to better solve big problems such as sustainability, health, nutrition and productivity for the economy in the future. This means we are in the most promising decade in human history.

AI is already being used in almost all areas of photography and videography. The cooperation with PHOTOPIA for the AI CENTER and this white paper has shown us once again: Operations are becoming more innovative, efficient and sustainable. Since the end of 2022, AI has also reached consumers with ChatGPT & Co. There are around 6,000 AI companies in Europe and just under 800 in Germany, of which around 80% offer standard AI software. This makes AI companies an important innovation driver for Germany and Europe as a business location. This must be supported and promoted. The possibilities of application as software-as-a-service (Saas) have greatly reduced investment costs and risks. We should not miss this opportunities, we must use AI. And the time to invest in AI is NOW!"

*Petra Vorsteher and Ragnar Kruse, AI.HAMBURG*

# 1. Photography and videography are innovative and creative like never before

With ever new innovations, photography and videography are shaping the way we represent the world and how we see it. With digitalisation, this process has accelerated once again. Never before have so many people had a camera at hand at all times.

## 2 Trillion photos a year

The number of photos in the world is estimated at 12 trillion. Currently, almost 2 trillion photos are created in a year, almost 60,000 every second, 5 billion every day. In the past decade the number has almost tripled. People are taking more and more photos and there is still no end in sight to this trend. Average users will have 2,100 photos on their smartphone in 2023. In the USA, over 20 photos are taken individually per day, in Europe "only" almost 5.[1] The first mobile phone with a built-in camera was the J-SH04 from Sharp in 2000 and had a camera with a resolution of 0.11 megapixels.[2] As early as 2003, more cell phones with cameras were sold worldwide than digital cameras.[3] For 2023, the production of 1.2 billion smartphones[4] and "only" 5.85 million digital cameras[5] is expected. The result: almost 93% of all photos come from smartphones, only 7% from "pure" cameras.[6]

## Artificial Intelligence is part of photography and videography

Anyone who picks up a smartphone camera or a special digital camera is also working with artificial intelligence (AI). There are many examples of this. High Dynamic Range (HDR) technology uses Artificial Intelligence to give images the dynamic range that we see with our eyes. With AI, the autofocus becomes faster, with AI, a night shot becomes more precise, noise is reduced and, in general, image processing in the camera can be accelerated.[7]. Modern photography is unthinkable without AI.

Artificial intelligence is of course part of digital progress not only in photography, but everywhere. This is especially true today. But as recently as mid-2022, things looked different. The year seemed to become one of cooled enthusiasm for Artificial Intelligence. There was talk -

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[1] Photutorial 2023, rounded, number of annual photos estimated at 1.72-1.91 trillion for 2023, almost 2 trillion for 2025 and approximately 2.3 trillion for 2030
[2] Mobile Phone Museum
[3] Forbes 2003
[4] Trendforce 2023
[5] DPR Review 2023
[6] Photutorial 2023
[7] Photocult Shop 2023

until the release of ChatGPT - of performance saturation and only marginal progress[8]. In 2022, global private investment in AI fell for the first time in a decade, and it fell significantly by 26.7%.[9] Today we know: 2022 was a year in which many expectations of artificial intelligence were ultimately exceeded and in which AI finally came into the awareness of the general public. This was mainly due to the innovative service ChatGPT from OpenAI, with which millions of users had a completely new, concrete and positively surprising experience with AI.

## Generative AI offers new and surprising possibilities

ChatGPT is not just the technological innovation that, like no other before, has gained millions of users worldwide within just a few weeks. The service has brought Generative AI, which generates texts, images and videos, into the spotlight. In addition to large language models (LLM) such as GPT, Generative AI also includes image generators such as those from Stable Diffusion or Midjourney.

Generative AI has opened up completely new perspectives on the possibilities of using AI. The technologies are often easy to use and can be used to efficiently generate texts and images. Generative AI also makes it possible to make interfaces simpler and more functional. This applies not least to interfaces between digital products and the people who use them - right through to AI-supported programming of software. Digital and AI products can be combined more simply, easily and creatively to create innovative solutions, products and services. The expectations are therefore very high. As of June 2023, McKinsey estimates Generative AI's direct annual contribution to global economic value creation at a massive 2.6 to 4.4 trillion $.[10]

> **"AI is the most important technology of our time. Because of it, we will be able to better solve the big problems such as sustainability, health, nutrition and productivity for the economy in the future. This means we are in the most promising decade in human history."**
>
> Petra Vorsteher and Ragnar Kruse

The expected economic value creation through Generative AI is mainly due to two effects: more innovation and increased efficiency of economic processes. With Generative AI, photography is also facing a change that was not anticipated so quickly. In short, many images and videos that were previously photographed or recorded on video in some form can now already be generated with AI. Today's photography and videography is evolving and new business models are emerging.

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[8] Artificial Intelligence Index Report 2023, Stanford University, S. 3
[9] Artificial Intelligence Index Report 2023, Stanford University, S. 4
[10] The economic potential of generative AI, McKinsey, 2023

# AI in the form of apps and software-as-a-service becomes a tool for everyone

Until recently, artificial intelligence was understood by many as an aloof and complicated technology. That has fundamentally changed. AI is a technology for everyone. AI products are offered as apps and software-as-a-service (Saas). They help to decide faster, to be more innovative and to work more efficiently. Digital software and AI products are particularly successful where stable digital standards for products and interfaces exist and large amounts of data want to be processed. Photography and videography are therefore predestined for AI: for managing terabytes of family and holiday pictures as well as for the professional photos of product catalogues, for high-resolution video productions or detailed and precise image editing.

> **"Oder wir fahren halt als Touristen hin**
> **Mit unsern Kameras (Kameras)**
> **Und hab'n so viel Spaß (so viel Spaß).**
> **Und hinterher abertausend Terrabytes ungesehener Urlaubsbilder**
> **Das find ich so deprimierend."**

(Translation:
"Or we just go there as tourists
With our Cameras (Cameras)
And have so much fun (so much fun).
And afterwards thousands upon thousands of Terabytes of unseen holiday pictures.
I find that so depressing." )

Dota Kehr, "Rennrad", 2015[11]

Thousands and thousands of terabytes of unseen holiday pictures no longer have to be depressing. Pattern recognition is one of AI's favourite disciplines. Image recognition and image processing are logical applications in which AI excels. Image and video collections are automatically tagged and catalogued. Images and image details can be processed automatically. The sky becomes bluer, the grass becomes greener, the holiday becomes more beautiful. The digital photo album of the most beautiful experiences is created almost "by itself" thanks to AI. Thanks to the help of large language models, the operation of AI products becomes an intuitive experience that makes the previously often necessary expert knowledge for the complicated operation of deeply staggered menu structures a thing of the past.

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[11] Dota Kehr, song "Rennrad", album "No Danger" 2015

# The generative revolution for Imaging

The sky is getting bluer, the grass is getting greener, the holiday is getting more beautiful. That's what colouring was for 100 years ago. 40 years ago, filters were mounted for this and special film brands were bought or creative work was done in the lab. For a little more than a decade, almost everyone has been using the familiar software filter functions for digital photos as fast image processing. Generative AI brings a whole new dimension to the world of image generation. The crowded beach on holiday becomes a deserted dream beach. The other tourists are simply removed from the image, the empty spaces are filled in by Generative AI. This has now also reached the next stage. We use Generative AI to create entire images that look like photos. They are created in dialogue with trained algorithms. Generating such a deceptively real "image" no longer requires many hours of work by creative expert hands with expensive software, but rather precise "prompting" in dialogue with the machine. The image is created "ex machina". This is a revolution. A revolution in efficiency in commercial image production for advertising and communication as well as a revolution in the perception of photos in the media and in private life in general.

> **"Artificial intelligence is here. Many photographers and other creative professionals will not like this, but it is irreversible. So there is no alternative to thinking openly about the possible uses of AI in professional photography or to identify niches in which image design using AI will only play a limited role. Let's be honest: there won't be many of those.**
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> **This makes it all the more important to create ethical and legal guard rails. We have to make sure that creators continue to be paid fairly and that creative work is valued. It is important to recognise and avoid discriminatory tendencies, such as those currently present in many tools. We also need to create the necessary media literacy to be able to distinguish AI-generated images from photographs or at least to question them.**
>
> **Only if we get it right will classical photography continue to play an important role in our lives in the future - supported by AI tools."**
>
> Hendrik Lüders, Photographer, member of the Arbeitskreis KI des Berufsverband Freie Fotografen und Filmgestalter e.V. (BFF) (AI working group of the Professional Association of Free Photographers and Film Designers e.V. (BFF)

The changing value creation of future professional image production for advertising and stylised content is not only an abstract challenge, but also a professional one. It attacks existing professions and careers as well as personal biographies. The means for "photo-realistic creativity" will naturally lead to an erosion of the authority of a photo for depicting a "reality". This is nothing new for advertising, but journalism will have to deal even more with the

perception of photos as an idealized reality. In photography and videography, this discussion is taking place with different positions. Perhaps it will become more widely understood, that (almost) every depiction of reality involves a creative act.

**"Generative AI is understood by creatives primarily as an innovative conceptual tool - it enables previsualisations that would never have been conceivable before. And it expands creative work, especially when it does tasks that previously seemed unsolvable. However, we also need to set limits to it, for example where it infringes the rights of creators whose works have so far been used unauthorised to train AI databases.**

**And at the same time, we need to clarify one issue: Generative AI is not artistic. Real creative work is characterised by human creative will and goes beyond machine combination and variation. It exhibits a different level of creation. Real creative work, with its deliberate composition, authenticity and detail design, is a product of human expression in interpersonal interaction. Example: High quality images are not created by any AI without specific source content, but increasingly AI is used as a tool in the process. In a world of new glittering AI products, it is therefore even more important to communicate: If self-produced creative work - as the engine of our culture - is still to have a place in our society in the future, then its status and monetary value must be recognised and respected. Otherwise we will be exchanging gold for glass beads.**

**The opportunities in the creative use of AI arise when we use it as a tool and not misunderstand it as a substitute for creative practitioners."**

Ilan Hamra, Photographer and 3D-Artist, Head of the Arbeitskreis KI des Berufsverband Freie Fotografen und Filmgestalter e.V. (BFF) (AI working group of the Professional Association of Free Photographers and Film Designers e.V. (BFF)

## AI expands the palette of creativity

Photography and videography have never been solely depictive arts, they are always creative as well. The range of creative work has been constantly expanded with new ideas and tools. Artificial intelligence adds another chapter to this story. The whole creative process is in motion, the motif search, the shooting, the image editing and of course the image processing. Last but not least, the linking of the image with further information takes on a whole new meaning: through automated cataloging and keywording, professional storytellers or even the collective memory of a family receive more substance and creative impetus. The work of all photo and video artists benefits from the AI-supported possibilities of visual storytelling. One's own images, visual materials and ideas can be mixed and matched with quotes and collective memory in a way never seen before. This brings with it questions of data protection and copyright that urgently need to be answered. In fact, there are partly AI-supported answers to these questions as well, for example for the anonymisation of depicted persons.

# 2. The AI CENTER shows possibilities and productivity tools with AI

In the AI CENTER at PHOTOPIA, AI.HAMBURG presents productivity tools, possibilities and innovations that Artificial Intelligence brings to the world of imaging, as well as the companies and start-ups that offer them. The AI CENTER is the place where everyone who is working on the future and the creative possibilities of imaging, in the sense of photography and videography, meets. In concrete terms, the AI CENTER start-ups offer solutions to questions that interest all photo and video creators, including new creative expression, image management and data protection.

## Deep Art AI offers innovative creative AI tools for professionals and amateurs to easily create photos and videos

"We develop cutting-edge creative tools for easy photo and video editing using artificial intelligence."[12]

Using artificial intelligence and deep learning algorithms, Deep Art AI has developed easy-to-use software products for AI image editing and AI image generation. With Deep Art Effects, a simple image can be transformed into an incomparable impressionist masterpiece, a Monet-style landscape or an exciting comic strip in the blink of an eye. The result: impressive, inspiring - simply unmistakably different.

With the AI image generator Deep Art Creator, fantastic images are created from text prompts. A great image idea described in words is turned into a fascinating and unique work of art by means of AI. The artificial intelligence interprets the text input and generates individual images based on it.

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[12] Deep Art AI, 2023

# Excire brings order to every photo collection with AI

Excire offers powerful AI apps for perfect photo management. Many intelligent functions support keeping order and finding exactly the photos you are looking for or need. Excire Photo is a powerful software for organising photo archives thanks to its innovative AI functions. It has been recommended many times by experts and trade magazines. The automatic image analysis and numerous intelligent search functions simplify the organisation and searching of the photo inventory and ensure that valuable photo memories are no longer lost and duplicates are quickly identified. Excire Analytics is an innovative extension for Excire Photo that gives you deeper insights into your photo habits. With Excire Analytics' many features and settings, anyone who takes photos can gain deeper insights into their photo habits. This helps to improve photography skills and make better purchasing decisions for future photography equipment.

For all Adobe Lightroom Classic users, Excire Search offers a powerful solution for searching any Lightroom catalogue. The clever Lightroom plug-in automatically analyses and indexes photos and extends Lightroom with powerful AI search functions. With just a few clicks and in seconds, Excire Search finds exactly the photos you are looking for. This makes image management fun again and hours of searching for images are a thing of the past.

"The Pattern Recognition Company started 2005 as a spin-off of the University of Lübeck and develops AI products and applications for automated image analysis. Our expertise relies on many years of experience in Machine Learning, Neural Networks, and Computer Vision.  Based on our expertise and excellent contacts to leading research institutions, we have brought the latest technologies, such as Deep Learning, to the market. One example is the Excire technology: Excire recognizes image content using AI and has already become a useful tool for many photographers."[13]

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[13] Pattern Recognition, 2023

# Imagen accelerates image editing with AI

"Imagen is the first step to evolve your modern workflow. Their mission is to help photographers spend their time, talent and energy doing more of what they love by providing cutting-edge AI-based solutions for the post-production workflow."[14]

Imagen leverages AI to simplify the culling phase of a photographer's workflow. Culling removes duplicate images, blinks, blurry results, or photos with poor composition. These are all set aside automatically so Imagen can work on images worthy of editing.

Imagen allows to automatically trim or cut a photo to enhance its composition and to bring a particular subject or element into focus. It allows also to automatically rotate every photo according to its horizon.

It is also possible to automatically select the subject in every photo and apply local adjustments to effortlessly give your subjects that extra pop.

In addition to learning each individual photographer's personal style, users can also select from handpicked TalentAI—photographers who have shared their distinct styles.

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[14] Image, 2023

# Neurapix applies AI to reduce your editing time in Lightroom by 80%

"Neurapix is a German start-up based in Goettingen that was founded in 2021. The company has developed artificial intelligence that is able to learn a photographer's image editing style and apply it within Adobe Lightroom Classic. This allows photographers to have large numbers of photos edited in their style, resulting in significant time savings."[15]

Neurapix is a kind of digital editing assistant that knows your editing style like you do and is available around the clock. Unlike a normal preset, a SmartPreset is based on artificial intelligence. It understands different editing styles by looking at past edits.

This way, the artificial intelligence also understands a personal style and can adaptively apply it to photos in Lightroom. Tedious adjustments of photos to different lighting situations and locations are now a thing of the past.



Examples of Neurapix for adjustments of photos to different lighting situations

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[15] Neurapix, 2023

# PiktID uses AI to change or even replace faces in photos

"PiktID is at the forefront of innovation in the image industry, harnessing the power of generative AI solutions to transform the way we perceive and interact with visual content. Our mission is to empower businesses and individuals with AI-driven tools that enhance images while respecting the privacy and security of individuals. Whether you're a photographer looking to perfect your shots, a marketing agency seeking to engage your audience, or a brand striving to maintain ethical image usage, PiktID has the solution for you."[16]

Some PiktID solutions are:

AI face anonymizer: Replace faces instead of blurring or pixelating. Keep the image aesthetics while protecting privacy. Comply with the data protection laws.

For Enterprises: Expand your portfolio and add diversity. Unique high-resolution face replacement and editing. Enhanced variety for stock photos. No model release needed for commercial use.

In Marketing: Customize models and fit them to any market. Adapt models for targeted campaigns worldwide. Use photos without model release for commercial purposes. Retarget advertising photos for specific groups.

For Graphic Designers: Enhance your creativity with AI-generated faces. Easy face retouching. Unique faces and expressions. Speed up work.

For photograhers: Edit models with the help of AI. Diversify the portfolio. Adapt faces to customers' needs.

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[16] PictID, 2023

# Photomyne uses AI to digitize and enliven old photos from the past

"Photomyne is a pioneering photo scanning and preservation solutions provider that helps individuals and families bring their old photos and treasured memories into the digital age. The company offers an easy-to-use mobile app that leverages AI technology and allows users to quickly and easily scan, archive and share their printed photos using their smartphone or tablet."[17]

Photomyne iPhone & Android apps can transform photos, slides and negatives into digital gems of our memories. The app Photomyne uses artificial intelligence to transform the photographic and memories of the family into a library that spans generations. In addition to the scanning function, it offers options for image optimisation and archiving.

The app Colorize breathes new colour and life into old pictures. The app Slidescan is a special AI solution for digitising slides, and the app Filmbox can be used to digitise negatives.



Examples for the use of photomyne: scanning, colorizing, analyzing.

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# With Yokai and AI, every person can create great images of themselves

"AI portraits for professionals: create stunning photos of yourself that perfectly capture your inner charisma and unique charm with the power of generative AI."[18]

All you have to do is upload a few of your own photos and select one of the 50 aesthetic styles to create new profile photos. The templates range from timeless and contemporary styles to those inspired by the most famous photographers and directors of our time.

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# AI.MAG - Be at the forefront of AI!

"AI.Mag reports on current developments in the field of AI."[19]

AI MAG is Germany's first cultural magazine for artificial intelligence and is inspired by years of industry experience and the latest developments.

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[18] Yokai, 2023
[19] AI Mag, 2023

# 3. AI is part of the future of imaging

There has never been as much photography and videography as there is today. There have never been more opportunities for creative work. Artificial intelligence helps to expand the boundaries of artistic and documentary creation as well as professional and private creation in yet unimagined ways. Artificial intelligence also offers ways to analyze, sort and archive these images, photos and videos. Working with images therefore also becomes more efficient. Images are optimized and generated with Generative AI. The entire creative process is experiencing new possibilities with Artificial Intelligence. Of course, this challenges the entire industry and all aficionados of photography. Many ethical questions and legal issues are being discussed and many a traditional consensus is being challenged. Last but not least, photos are losing even more of their authority to depict reality.

We are heading for exciting and interesting times and many intense discussions. The new technical possibilities challenge us all to critically decide what we hope, what we want and what we are not prepared to accept. These discussions and conflicts are inevitable and important, because imaging influences not only our view of the world in many ways, but also our opinions and actions about it. It is unquestionable that AI is part of the future of imaging and that it will help us to expand the boundaries of imaging with new possibilities and thus also enrich our images of the world we live in.

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**About AI.HAMBURG**

AI.HAMBURG (AI for Hamburg GmbH) promotes the application of artificial intelligence and machine learning. The initiative connects AI users and innovators in business, science and politics. It cooperates with national and international AI actors, especially from the USA, and was founded by Petra Vorsteher and Ragnar Kruse.  This comprehensive expertise around AI is used to raise awareness of its potential and to promote its adoption. To this end, various formats such as events, workshops, training and networking events etc. are offered, including the international annually AI.SUMMIT and AI.AWARD. AI.HAMBURG is the not-for-profit initiative of AI.GROUP, which also includes the AI.FUND, which invests in the growth of some of the best European AI start-ups. AI.HAMBURG is also part of the sponsoring consortium of the AI.STARTUP.HUB. The network also includes the Transatlantic AI eXchange and AI4Germany, in which nine German AI state initiatives work together.

# AI CENTER

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