INTER|FACE EXPERIMENTS: FACEAPP AS EVERYDAY AI

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"FaceApp presents itself as a second-order experimental arrangement in which the pleasurable practice of experimenting with one's own appearance, so invitingly provided by the user interface, is used to further develop the underlying surveillance technology."

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Since the proliferation of mobile digital cameras and especially smartphones, the variability of the photographic image has become the rule rather than the exception.[1] Popular image editing programs and apps have made the rapid modification of digital images an everyday standard. Their user interfaces provide editing functions to everyday users that were previously only accessible to experts. Specifically for editing facial images, apps such as Snapchat, WhatsApp, Instagram, Facetune, TikTok, and many more offer a whole range of functions that make this variability of the digital image available at the touch of a finger, ranging from humorous masking to photo-realistic facial edits. A new impetus within this culture of everyday photo editing is currently coming from applications that increasingly offer AI-based editing functions for experts as well as non-experts: Apps and programs like Luminar AI, Prisma, Leawo PhotoIns, Lunacy, Topaz, Quik.ai, Claid.ai, or autoRetouch promise AI-based functions such as automatically removing objects in the background, altering the appearance of body parts and faces or applying other major changes that formerly took many editing steps in programs like Photoshop. Another example in this row is FaceApp, an app that attracted a lot of attention shortly after its release in 2017. It will serve as the main example here because it demonstrates how AI-based image and video editing functions are implemented into everyday 'consumer software,' making machine learning technologies available for non-expert users within the specific framework of what Pold and Andersen call a "controlled consumption culture."[2] FaceApp's success was accompanied by a broader privacy controversy that points to the general entanglement of everyday interface culture and the current popularization of AI technologies, which allows us to critically discuss app user interfaces as experimental arrangements between everyday life and "surveillance capitalism."[3]

More than filters: FaceApp as "predictive technology"

Released in 2017 by the Russian startup Wireless Lab (now renamed FaceApp Technology Limited), the image and vid-

1 Shanks and Svabo for instance describe this development as a shift from the single image to photography as a mode of engagement, see Michael Shanks and Connie Svabo, Mobile-Media Photography: New Modes of Engagement, in: *Digital Snaps: The New Face of Photography*, ed. Jonas Larsen and Mette Sandbye (London 2014), pp. 229–231. Martin Hand highlights variability (as well as manipulation and ephemerality) as central categories of the materiality of digital images and the practices connected to them, see Martin Hand, *Ubiquitous Photography* (Cambridge, MA 2012), p. 59.

2 Søren Bro Pold and Christian Ulrik Andersen, Controlled Consumption Culture: When Digital Culture Becomes Software Business, in: *The Imaginary App*, ed. Paul D. Miller and Svitlana Matviyenko (Cambridge, MA 2014), pp. 17–33.

3 See Shoshana Zuboff, *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power* (New York 2019).

eo editing app FaceApp allows users to perform a range of elaborate photo and video edits such as aging or rejuvenating faces, morphing two faces together, adding complex facial expressions such as smiles, or applying the controversial "gender swap" feature. In journalistic reviews FaceApp features were mainly celebrated for their supposedly realistic results – an aesthetic also referred to as a "somewhat creepy level of realism."[4] With 16.8 million downloads in the Google Play Store (Android) and 7.3 million downloads via the Apple App Store (iOS), the app experienced a second major download wave in July 2019, which at times made FaceApp number one in the app download charts.[5] FaceApp presents itself as an everyday AI product that offers elaborate computer vision and machine learning technologies to everyday users and is designed to deliver fast but high-quality results: „No more hours spent on photoshop"[6] – as the developer website advertises.

After installing FaceApp on a smartphone, the user has the option to upload photos from the phone's photo library, take selfies directly with the app, use images from the Internet (e.g., of public figures) or selected demo images as templates to test and play with the available image editing functions. Most of the features offered are related to specific and small-scale modifications of the face's appearance (such as changes to eyes, nose, lips, cheeks, face shape, hairstyle, hair colors, skin shades, etc.) or applying different makeup styles. Similar to other popular photo editing apps, a whole range of manually controllable photo edits (regarding brightness, contrast, saturation, etc.) or features like changing the background, adding certain effects, and image cropping options are also offered alongside. While the first mentioned functions mostly focus on smaller changes to the facial image, the editing functions FaceApp became famous for cause more fundamental transformations of the source image: These include the "old" and "young" edits, the "gender swap" function, or the morphings offered under the "face swap" label which superimposes the image information of two faces and uses transitions to merge them into a new face (see fig. 1).

Although the user interface suggests similar functionality to popular photo filters or filter presets by making editing available quickly and easily at the tap of a finger, the FaceApp features apply deep AI-based modifications to the photographic source image. Therefore, the term filter no longer seems appropriate here.[7] As Yaroslav Goncharov, founder and CEO of FaceApp Technology Limited, told TechCrunch.com in 2017, Face-

4 Devin Pickell, What Is FaceApp? The Technology Behind this AI-Enabled Mobile App. *G2 Learn Hub* (July 17, 2019), https://learn.g2.com/faceapp, access: September 3, 2022.

5 See Matthias Brandt, FaceApp trendet wieder. *Statista* (22.07.2019), https://de.statista.com/infografik/18734/downloads-der-faceapp-weltweit/, access: October 3, 2022.

6 FaceApp, https://www.faceapp.com/, access: August 25, 2022, 10:00am.

7 See Ulrike Bergermann, Shirley and Frida. Filters, Racism, and Artificial Intelligence, in: *Filters + Frames: Developing Meaning in Photography and Beyond*, ed. Katja Böhlau and Elisabeth Pichler (Weimar 2019), pp. 47–63, here p. 56.

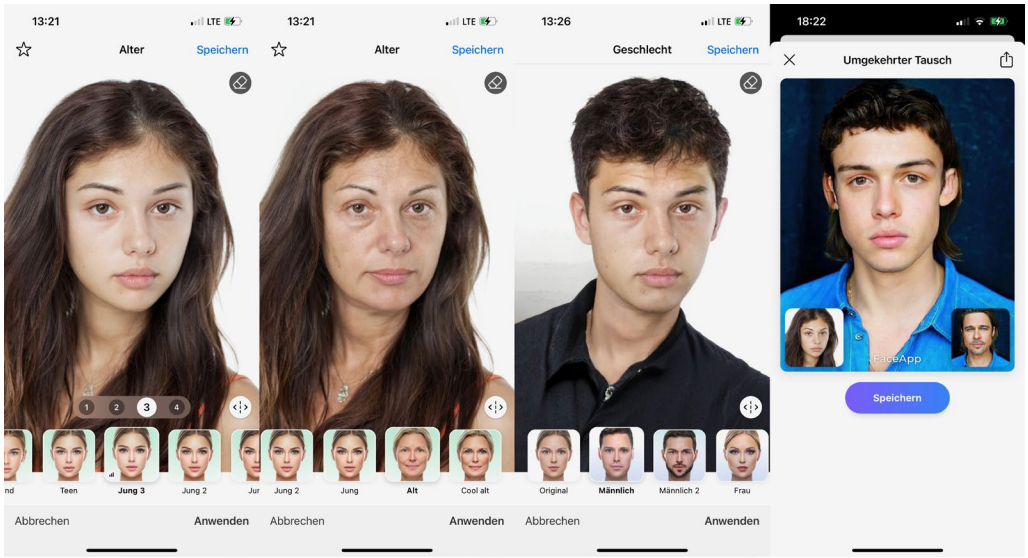

Fig. 1: Fig. 1: FaceApp features "young," "old," "male," and "face swap/morphing" applied to a demo image offered in the app user interface. Source: FaceApp, Version 10.4.4 (40730) installed on iPhone 13/iOS 15.4. Screenshots by S.W., August 5, 2022

App uses machine learning techniques, more specifically "deep generative convolutional neural networks,"[8] to process users' selfies and portrait images. Although the functionality of FaceApp is not fully disclosed by the developers, based on Goncharov's statements, some aspects of the machine learning methods used for the functionality of FaceApp can be highlighted. As Andreas Sudman summarizes, the term Machine Learning (ML) is used as an umbrella term for various algorithms that extract statistical patterns from complex data to predict a result y for an input x without being explicitly programmed for this task.[9] Deep Learning is a subfield of ML in which Artificial Neural Networks (ANNs) are often (but not exclusively) used and which process information through a network structure of interconnected artificial neurons that are organized in various layers. This architecture allows the ANN to achieve a defined learning goal quasi automatically by successively optimizing itself with the help of a learning algorithm called "backpropagation."[10] Convolutional Neural Networks (CNNs), which FaceApp uses according to Goncharov, are specialized ANNs targeted at data with a grid-like topology like image data

8 Natasha Lomas, FaceApp Uses Neural Networks for Photorealistic Selfie Tweaks. *TechCrunch* (February 8, 2017), https://techcrunch.com/2017/02/08/faceapp-uses-neural-networks-for-photorealistic-selfie-tweaks/, access: August 5, 2022.

9 See Andreas Sudmann, The Democratization of Artificial Intelligence. Net Politics in the Era of Learning Algorithms, in: *The Democratization of Artificial Intelligence: Net Politics in the Era of Learning Algorithms*, ed. Andreas Sudmann (Bielefeld 2020), p. 12.

10 Ibid.

processed as a 2D grid of pixels.[11] CNNs prove to be particularly efficient in extracting crucial image features and are therefore able to significantly reduce the memory requirements for the model.[12] To understand in basic terms how CNNs work and how they deal with images, the main steps of the learning process should be briefly highlighted:

> *A labeled input, an image, for instance, is passed through the interconnected layers of the network, until it reaches an output layer where a prediction regarding the input image is made, depending on the task set for the system. Such a task could be to classify an image according to certain categories, find the boundaries of an object in an image, or other problems from computer vision. An evaluation function (called 'loss function' in machine learning) then measures how far off the prediction of the system is. This information 'flows back' through the network, and all its internal connections are adjusted accordingly.*[13]

In this sense, FaceApp's image processing functions are much more than image filters that merely modify pixel values. Each image is translated into a multidimensional vector in the first step and potentially becomes the basis of an adaptation – a redistribution of weights of the different neurons within the network.[14] When applying the FaceApp image processing functions, the CNN transfers specific features to the respective portrait image or selfie that have previously been extracted from the training data set. The applied image recognition methods enable an exact application of the automated feature modifications, which in the result achieve the already mentioned photo-realistic effects. This way, FaceApp manages to retain certain individuality markers of the respective face, although the image is otherwise fundamentally changed.[15] For users, this creates the illusion of an aged or rejuvenated version of their personal faces.

FaceApp participates in the general promise of AI technologies to make things predictable.[16] Prognostics forms a central element of ANNs, since it is always a matter of predicting an outcome for a newly inserted value – one that is not already part of the training dataset. In the form of "predictive analysis," AI technologies currently present themselves in many areas of professional and private life as a future medium or medium of the future, in that they present the future as a computational and techno-economic

11 See Ian Goodfellow, Yoshua Bengio, and Aaron Courville, *Deep Learning* (Cambridge, MA 2016), p. 317. In 2012, the Large Scale Visual Recognition Challenge (ILSVRC), organized annually by the image database project ImageNet, was won for the first time by a CNN, which was able to reduce the previous error rate from 26.1 to 15.3 percentage points. Since then, CNNs have become 'state of the art' in the field of AI-based image recognition. See ibid., pp. 23–24.

12 Ibid, p. 322.

13 Fabian Offert and Peter Bell, Perceptual Bias and Technical Metapictures: Critical Machine Vision as a Humanities Challenge. *AI & Society* 36 (2021): 1133–1144, here pp. 1134–1135.

14 See ibid., p. 1135.

15 See Debojyoti Chakraborty, In Depth of Faceapp. *Medium* (April 16, 2020), https://medium.com/analytics-vidhya/in-depth-of-face-app-a08be9fe86f6, access: August 5, 2022.

16 See Andreas Sudmann, On the Media-Political Dimension of Artificial Intelligence: Deep Learning as a Black Box and OpenAI. *Digital Culture & Society* 4/1 (2018): 181–200, here p. 193.

regime.[17] FaceApp's so-called "aging"-feature can be read as a popularized condensation of this prognostic promise. In fact, it can be said that all of FaceApp's AI-based image processing functions adhere to this prognostic paradigm by generating potential facial images that are aesthetically possible or acceptable in certain respects (e.g., by satisfying the requirement of photo-realism). Through the resulting image, these AI-based predictions receive a materialization, which in turn can become a template for further image or body practices.

On second glance, the fundamental future-orientedness of ML methods reveals a paradoxical constellation: The potential facial images produced by FaceApp are based on the CNN's prior evaluation of large training datasets in which it extrapolates what "old," "young," "male," "female," or "smiling faces" are most likely to look like. In doing so, CNNs do not learn exact patterns but rather the statistical distribution of these patterns.[18] Image generation using FaceApp functions therefore involves a complex interweaving of different temporal levels: the past acquisition of the faces of the training dataset according to probability values, the instantaneity of image creation and editing "with just one tap," and the future-oriented optimization logic of the ANN, in which each newly injected case can potentially contribute to an adaptation of the decision-making process (learning phase) or can subsequently become data material for the future expansion of training datasets.

Everyday AI: Popular user interfaces as experimental arrangements

FaceApp can serve as an example of how everyday interface cultures are currently being intertwined with AI technologies. The app provides a user interface that ensures easy access to ML-based image processing and encourages playful interaction. It links ML-based methods with everyday practices and at the same time becomes a nexus for comprehensive data practices. The intertwining of "intimate interface[s]"[19] and extremely regulatory mechanisms that turn personal data into currencies can be singled out as a typical feature of the current "controlled consumption culture,"[20] according to Pold and Andersen. One can easily ask if FaceApp also follows the goal "to turn cultural software into the perfect consumer object and use it as bait for increasing control and surveillance."[21] So

17 Christoph Ernst and Jens Schröter, *Zukünftige Medien. Eine Einführung* (Wiesbaden 2020), p. 89.

18 See Matteo Pasquinelli and Vladan Joler, The Nooscope Manifested: AI as Instrument of Knowledge Extractivism. *AI & Society* 36 (2021): 1263–1280, here p.1268.

19 Pold and Andersen, Controlled Consumption Culture, p. 31.

20 Ibid.

21 Ibid.

what is the price for the easy availability of 'smart' photo editing? Not long after the second major download wave in 2019, privacy concerns about FaceApp were raised. As Forbes Magazine reports, there was even an official warning from the US Federal Bureau of Investigation (FBI) regarding the app which was assessed as a potential spying tool.[22] On the one hand, it was suspected that the facial images are not processed on the end-user devices due to the required computing power of the AI features, but rather copied and uploaded to the cloud of the provider without users being explicitly informed about it. Concerns were also raised that the iOS app would access the smartphone's photo library even if users had not enabled access and that it could access other images unnoticed. It was also feared that the algorithmically captured facial images and the associated personal data would be transferred to Russian servers, but founder Yaroslav Goncharov denied this in an interview.[23] These privacy issues could be discussed just as much with regard to other platforms like Instagram or Facebook. In the case of FaceApp, these questions took on a particularly explosive nature because, first, it is a Russian provider and, second, it involves facial images that are captured biometrically *en masse* and fed into databases and artificial neural networks. Moreover, it is reasonable to assume that the images processed by FaceApp are most likely used to further train the underlying ANNs or to expand training databases. Thus, FaceApp presents itself as a second-order experimental arrangement in which the pleasurable practice of experimenting with one's own appearance, so invitingly provided by the user interface, is used to further develop the underlying surveillance technology.

As the FaceApp example illustrates, the automated recognition and processing of faces or facial images is not only used on a large scale in the context of surveillance and security technologies. ML methods and computer vision also play an increasingly significant role in commercial software applications. Automated face and object recognition or facial expression analysis are already implemented by default in many social media platforms such as Facebook, TikTok, Instagram, Snapchat, Tinder or in photo sharing, photo organizing, and photo editing applications of popular operating systems for smartphones, tablets, or laptops.[24] Machine learning and especially deep learning are proving to be enormously profitable for companies such as Google, Microsoft, Meta, IBM, Baidu, Apple, Adobe, Netflix, NVIDIA, and NEC, which manage large amounts of data and whose business model is based

22 See Kate O'Flaherty, The FBI Investigated FaceApp. Here's What It Found. *Forbes* (December 3, 2019), https://www.forbes.com/sites/kateoflahertyuk/2019/12/03/fbi-faceapp-investigation-confirms-threat-from-apps-developed-in-russia/#36a8671745bc, access: August 5, 2022.

23 See Natasha Lomas, FaceApp Responds to Privacy Concerns. *TechCrunch* (July 17, 2017), https://techcrunch.com/2019/07/17/faceapp-responds-to-privacy-concerns/, access: August 5, 2022.

24 See Taina Bucher, Facing AI: Conceptualizing 'FAIce Communication' as the Modus Operandi of Facial Recognition Systems. *Media, Culture & Society* 44/4 (2022): 638–654, here p. 643.

on predicting user behavior and preferences.[25] This most recent stage in the development of digital media cultures is defined by the automated computer-based analysis of all online content and has been referred to with terms such as big data, information retrieval, data science, data mining, data extractivism – or more general: media analytics.[26] In addition to data collection and analysis, identification and authentication, ML-based technologies are increasingly taking over aesthetic decisions in the age of media analytics, as Lev Manovich highlights:

> *AI plays a crucial role in this new global cultural ecosystem, suggesting to people whom to follow and what to see, helping them edit media they create, making aesthetic decisions for them, determining how many people will see their content, deciding which ads will be shown to them, etc.*[27]

This raises the prospect of a future media environment in which texts, images, video or audio content, as well as social interactions such as comments, chats, likes, or re-posts are increasingly (co-) generated by non-human generative processes. App and platform economies, exemplified here by FaceApp, intertwine media analytics and data extractivsm with the generative dimension of ML processes. Their user interfaces thereby function as popular media within which these different forms of agency are entangled without being fully transparent about their scope and aim. The playful affordance of trying things out (like applying FaceApp editing functions to one's selfie) constitutes an everyday experimental arrangement in which the effective variability of the digital image (and its practices) can be celebrated. Drawing on the idea of mobile photography as "a mode of engagement,"[28] the user interface can be understood as the audio-visual formation that triggers this engagement. Together with this first order experimental arrangement a second order experimental arrangement comes into play: Everyday user interfaces such as FaceApp become the gateway for higher-level data practices – such as the project of automated capture and readability of human faces[29] or the further development of ML algorithms. Within the history of visual media and especially photography this shift towards automation marks a decisive turning point and has been addressed with terms such as "ubiquitous photography,"[30] "smart pho-

25 See Goodfellow, Bengio, and Courville, *Deep Learning*, p. 25.

26 See Lev Manovich, Media Analytics & Gegenwartskultur, in: *Machine Learning: Medien, Infrastrukturen und Technologien der Künstlichen Intelligenz*, ed. Christoph Engemann and Andreas Sudmann (Bielefeld 2018), pp. 269–288, here p. 269.

27 Lev Manovich, *AI Aesthetics* (Moscow 2019), p. 37.

28 Shanks and Svabo, Mobile-Media Photography, p. 236.

29 The project of making human faces automatically readable refers to a long continuity in media history. The first attempts to generalize image capture and reading, to standardize image formats and, in particular, to evaluate facial images *en masse* can be identified as early as the end of the 18th century; see Roland Meyer, *Operative Porträts. Eine Bildgeschichte der Identifizierbarkeit von Lavater bis Facebook* (Konstanz 2019), p. 33 and pp. 39–41.

30 Hand, *Ubiquitous Photography*; as well as Arild Fetveit, The Ubiquity of Photography, in: *Throughout. Art and Culture Emerging with Ubiquitous Computing*, ed. Ulrik Ekman (Cambridge, MA 2013), pp. 89–102.

tography,"[31] or "computational photography."[32] As scholars like Sarah Kember have highlighted, it is especially within vernacular culture that it becomes evident that the current history of photography is rewritten by „technoscience industries."[33]

Conclusion

As the short discussion of FaceApp as "everyday AI" has shown, popular smartphone applications and their user interfaces can be seen as experimental arrangements in more than one way. For contemporary visual culture, the commercialization of AI technologies and their entanglement with pleasurable interface practices opens a new historical stage in which ML processes are used not only to evaluate but increasingly to generate content, thus taking on autonomous aesthetic and curatorial agency. Apps like FaceApp are by no means free spaces of play and pleasure. The seemingly joyful practice of using FaceApp functions to manipulate selfies and portraits is always connected to excessive data practices that remain opaque for most users. In this respect, FaceApp's interface can be described in Galloway's sense as thresholds that make certain functionalities accessible and trigger material transformations, but at the same time are always an effect of superordinate power contexts that directs their functioning.[34] By creating "predictive images" that seek to deliver on the prognostic promise of ML applications, FaceApp simultaneously participates in the economic regime of "knowledge extractivism."[35] In recent years, it has become increasingly clear that algorithms and machine learning methods are not neutral or supposedly 'objective' technologies (if there is any such thing to start with), but can lead to serious errors and biases that have social and political implications.[36] It therefore remains to be asked what normative impact apps like FaceApp have in digital image cultures and how their readymade editing functions yield an algorithmized aesthetics that gives new scope to various forms of discrimination.

31 Sarah Kember, Face Recognition and the Emergence of Smart Photography. *Journal of Visual Culture* 13/2 (2014): 182–199.

32 Sy Taffel, Google's Lens: Computational Photography and Platform Capitalism. *Media, Culture & Society* 43/2 (2020): 237–255.

33 Kember, Face Recognition and the Emergence of Smart Photography, p. 184.

34 See Alexander R. Galloway, *The Interface Effect* (Cambridge 2012), p. vii.

35 Pasquinelli and Joler, The Nooscope Manifested, p. 1266.

36 See ibid., p. 1264. For the justified demand for an ethics of artificial intelligence see Rainer Mühlhoff, Automatisierte Ungleichheit: Ethik der Künstlichen Intelligenz in der biopolitischen Wende des Digitalen Kapitalismus. *Deutsche Zeitschrift für Philosophie* 68/6 (2020): 867–890.

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