AI Smartphones: A Conceptual Review in Generative Arts

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Abstract: The emergence of artificial intelligence (AI) smartphones has created a new form of artistic expression. This paper presents a conceptual review of the potential applications of AI smartphones in generative arts, the impact of such technology on generalizing the creation of art, and the advantages, disadvantages, and prospects of AI smartphones. It also discusses processing power restrictions and authorship issues in the works created with the aid of AI smartphones through generation scenarios. Therefore, this study could serve as a point of reference for researchers, developers, and practitioners to gain insights into the current status of AI smartphones and its potential implications for the creative sector.

1 INTRODUCTION

In late 2022 and early 2023, there was a surge in generative AI using tools such as ChatGPT and advanced search engines. AI features on smartphones are not entirely new; they can be traced through features like voice recognition, facial recognition, predictive text, and personal assistants. Today, AI is deeply embedded in mobile operating systems, enabling more functions such as augmented reality and adaptive performance optimization. Now, by 2024, with generative AI on the rise, AI smartphones such as Samsung Galaxy S24, Google Pixel 8, and Xiaomi 14 Ultra could be the next powerful tools for artistic expression. AI Smartphones are integrated with generative AI features, such as AI-powered image content generation and editing, real-time multilanguage translation, summarizing video and voice memos, and enhanced AI smartphone cameras.

AI smartphones can analyze group selfies and create a perfect photo in which every-one looks happy, even if they are not smiling at the same time. Users can easily manipulate photos, allowing them to erase unwanted objects, change backgrounds, and resize or move specific elements within the image. Furthermore, image searching is possible by highlighting any part of a photo and instantly finding relevant information online. AI smartphones also create textual content or copywriting by suggesting edits to ensure that the message conveys the exact feeling you intend, whether it is a formal email or a casual social media post. These generative AI tools empower users to enhance their creativity, communication, and photo-editing experience on their smartphones.

2 LITERATURE REVIEW

The integration of artificial intelligence (AI) into smartphones has opened up new possibilities in various fields, including generative art. The International Data Corporation (IDC) defines AI smartphones as devices with a system-on-a-chip (SoC) capable of running on-device Generative AI (GenAI) models more quickly and efficiently with 30 tera operations per second (TOPS) or more, leveraging a neural processing unit (NPU) performance using the int-8 data type (Popal, 2024).

Generative art refers to artwork created using algorithms, randomness, and computational processes. It is a fascinating branch of art that uses algorithms and code to create unique pieces. The artist sets the parameters and rules and the computer per-forms the rest, generating surprising and beautiful results. It allows artists to relinquish control over the creative process, resulting in unexpected and novel outcomes (Cetinic, 2022). AI, particularly deep learning models, has revolutionized generative art by

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enabling machines to learn patterns from existing artwork and generate new ones autonomously.

Popular online AI art generators such as Dall-E, Midjourney, and Stable Diffusion can produce generative images based on user prompts (Newton & Dhole, 2023). These advancements extend beyond art creation to applications, such as diabetic retinopathy screening (Natarajan et al., 2019) and road damage detection using smartphone images (Maeda et al., 2018). However, with an AI smartphone, this task can be performed without an Internet connection because the AI features are built-in.

The challenges of AI generative art include public perception. Studies have indicated a public bias against generative artwork because of the perceived lack of effort from users (Gangadharbatla, 2021). Despite this bias, AI has played a significant role in artwork creation. AI even enables users with limited artistic skills to create generative images (Rasrichai et al., 2023).

The use of AI in generative art has raised questions regarding the attribution and valuation of AI-generated artwork (Epstein et al., 2020). Studies have explored biases in generative art, highlighting the importance of understanding and quantifying them (Srinivasan, 2020; Srinivasan, 2021). Additionally, cognitive aspects of audience reception towards artistic style transfer, emphasizing the need to consider critical factors for enhancing humanization in computational aesthetics (Lyu et al., 2022).

Furthermore, the moral implications of interacting with AI-generated art have been investigated, shedding light on how such interactions affect the perceived moral standing of AI creators (Lima et al., 2021).

As AI continues to evolve in the art domain, it is crucial to reflect on the potential and limitations of AI-generated art through case studies and examples (Yusa et al., 2022). Understanding implicit attitudes towards AI art and the cognition of audiences regarding artistic style transfer can provide insights into the reception and acceptance of AI-generated artworks (Zhou, 2023; Lyu et al., 2021).

Generative art utilizes algorithms to create novel artwork. AI-powered smartphone apps make generative art creation accessible to a wider audience. While this democratization of art creation is commendable, there are concerns that AI may stifle artistic originality. Moreover, the integration of AI into creative processes necessitates a deeper exploration of autonomy, authenticity, authorship, and intention in computer-generated art (McCormack et al., 2019).

3 AI SMARPHONE TOOLS

Some of the common features of AI tools in smartphones that are useful for genera-tive arts include the following.

Real-Time Language Translation: This will break all language barriers in communication. To salvage a person from fumbling with translation apps while on call, the AI smartphone has a built-in live interpreter, which lets one chat in several languages. It will allow live phone calls to be translated in real time, both in voice and text, between two different languages. This could possibly make it the easiest and fastest way to break through all those language barriers, be it with whom you are trying to com-municate via call, be it a landline or another smartphone. In addition, it remembers the language of your preference, learning which languages you use the most to make future calls even smoother.

AI-powered photo editing tools: AI smartphones will have a range of AI-powered photo editing tools. For example, “Best Take” can analyze group selfies and swap facial expressions among images. In other words, Google's AI can create a perfect photo in which everyone is smiling, even if that moment has never happened. The camera will take several shots of the group selfies and then edit the favorite facial expressions into a single frame. This is similar to remixing group shots with the best faces from different multiple shots or bursts.

The magic Editor allows the user to tap or circle an object and resize or shift it. The magic Editor also uses generative AI to change the background. With this generative edit tool, users can easily erase or modify the positions of objects in their images. Other tools include features that are similar to desktop photo editing tools, such as eraser to remove unwanted objects and Photo Unblur to sharpen an image.

In-app image searches- Google offer "Circle To Search" on the newest Galaxy smartphones, allowing users to use simple gesture, you can select what you’re curious about in whatever way comes naturally to you like circling, highlighting, scribbling or tapping snippets of text, parts of photos or videos to get instant search results about whatever has been highlighted.

AI smartphones will also enable quick and easy manipulation of the appearance and placement of specific parts of the pictures taken on the camera of the device. It is a feature that could help people refine their photos and videos but could also make it easier to create misleading images. (Othman I , 2023)

Chat Assist: The integrated Chat Assist feature offers invaluable assistance to those seeking to

elevate their written communication. This functionality, seamlessly accessible within conversation or chat, provides real-time support while composing messages, emails, social media posts, and a variety of other text-based communications. The Chat Assist operates by intelligently analyzing your text as you type. It then suggests adjustments to ensure that the tone aligns precisely with the desired message. For instance, when crafting a professional email to a colleague, Chat Assist can trans-form the initial draft into more formal and polished communication. Conversely, if you are composing a social media caption and seeking a concise, attention-grabbing phrase, simply include the hashtag "#social." Chat Assist will then analyze your text and propose a version tailored to the specific social media platform's style and audience.

Table 1 shows a general comparison between AI smartphones and online AI tools. Online AI tools can refer to any popular AI bot, such as ChatGPT, Gemini, and Copilot. AI Smartphones can also use online AI Tools if they are connected to the internet. Therefore, it supports the capabilities of both offline and online AI tools.

Table 1: Comparison of AI Smartphones and Online AI.

Feature	AI Smartphones	Online AI Tools
Accessibility	AI Available offline	Requires internet connection
Performance	Limited by device hardware	Potentially higher performance because run on servers
Customization	Limited customization options	May offer more customization for users
Updates	Dependent on device manufacturer	Updates managed by service provider
Privacy	Data often stays on device, enhancing privacy	Data may be stored on servers / cloud, raising privacy concerns
Response Time	Usually faster due to local processing	Response time may vary based on internet speed
Integration	Integrated with device functions	Integration with various online services
Resource Usage	May consume device resources	Requires server resources

4 APPLICATION OF AI SMARTPHONES IN GENERATIVE ARTS

AI Smartphones can become powerful tools in generative art. Examples of applications include the following.

Generative content creation for personal and even commercial use - There is a boom-ing market for generative art that leverages the processing power and capabilities of AI smartphones. AI smartphones run algorithms to generate visuals, sounds, or even text based on their user's input or data from their environment. This allows artists to break free from conventional norms and to create fresh, unexpected compositions. Whether it is generative pictures, videos, digital sculptures, or music, AI smartphones foster innovation.

Interactive art experiences can be easily implemented. AI Smartphones can bridge the gap between artists and audiences by enabling interactive generative arts. Imagine using your phone to manipulate an on-screen generative artwork in real-time, influencing its form, effect, and animation. The phone's camera is used to capture a scene, and then AI is used to sketch or paint it in different styles. Users can choose a watercolor feel, classic oil painting aesthetic, or futuristic neon look.

Generative music and sound effect composition: With a few voice commands or taps, you can create unique musical pieces based on your mood or chosen genre. AI can generate melodies, rhythms, and harmonies.

Art from data or information art, in which data visualization has become an art form, can be achieved using AI Smartphones. Generative algorithms can be fed with data, whether it is sensor information on position, acceleration, or even sound (Seng, KP et al, 2023) to produce generative artwork.

Data-Driven Art: AI Smartphones are data-collection powerhouses. Artists can utilize this by incorporating data from sensors. Location data, movement data, and even sounds can be used to produce artwork (Li Q, 2018). This creates art that reflects a user's environment or interaction.

Augmented Reality (AR) Integration: AR overlays digital elements onto the real world using a phone camera. This allows artists to create generative art experiences that seamlessly blend the physical world with digital effects. AI makes generative AR easier owing to its capabilities, such as object recognition and face and body tracking.

Accessibility and democratization for everybody. AI Smartphones make generative art creation more accessible than ever before. Anyone with a phone can experiment and create generative art even without an Internet connection, thus lowering the barrier to entry for aspiring generative artists.

AI-powered Art Learning - AI smartphones can analyze generative artworks and explain the techniques and styles used. This could be a valuable learning tool for aspiring generative artists.

Traditional art forms sometimes struggle to captivate the younger generations. AI-generated art, with its futuristic appeal, resonates with technology-savvy audiences. AI smartphones attract young artists and enthusiasts, inspiring them to experiment with and create their own digital masterpieces.

5 LIMITATIONS

There are some limitations and drawbacks to using AI-Powered Smartphones in creating generative art, including homogenization, originality, copyright, plagiarism, declining skills, and the cost of the devices.

Outcome homogenization refers to the tendency of AI models and systems to produce outputs that are overly similar or uniform across various scenarios. Homogenization is also very tangible in text generated by AI, and this concern is similar to homogenizing artistic styles and outcomes in the generative arts.

Generative AI has limited originality because, with readily available AI art generators, artists might fall back on pre-programmed styles and prompts (Galanter,2019). This will lead to the homogenization of the artwork. AI algorithms often rely on existing artwork for training data. This can lead to derivative outputs that lack originality or sometimes lack of tactility and emotional connection as compared to traditional art forms.

Although AI offers exciting possibilities, it is crucial to be aware of these drawbacks. The key lies in finding a balance between utilizing AI as a tool and preserving human elements in generative art. This ensures originality and artistic control, and maintains the value of generative art as a unique form of creative expression.

The ease of AI art generation raises questions about who the true artist is. The person using the app or the AI behind it. The ownership and copyright issues of AI-generated art are complex legal gray areas. Who owns the rights? The user, app developer, or dataset used for training Additionally, the evaluation of AI-generated art compared to human-created art can be challenging (Gangadharbatla H. , 2021), even though most people will be unable to differentiate between them (Lima et al., 2021).

The use of existing artwork in training data could also lead to plagiarism if the AI output derivative works violate copyright. Powerful AI models can mimic artistic styles and blur the line between inspiration and imitation. This raises issues such as unintentional copying: because AI is trained on massive datasets, it might unknowingly replicate copyrighted works, raising copyright infringement issues. AI art generation often involves prompts and parameters; however, the final output can be unpredictable. This limited the artist's control over the final work.

The ability of AI smartphones to manipulate and generate realistic images could be misused to create deepfakes (Kietzmann J ,2021) (Kingra, 2023). Manipulation and misinformation are public fears about generative art. The ease with which AI can generate convincing visuals makes it difficult to distinguish real and fabricated con-tent. Deepfakes can be incredibly convincing even for a trained eye. This can erode trust in legitimate media sources and in public figures. Malicious actors can create deepfakes in politicians making inflammatory statements, potentially swaying public opinion and undermining democratic processes, or it can be used to damage the reputations of businesses and individuals.

Overreliance on AI smartphone tools can lead to a decline in artistic skills such as composition, color theory, technique, photography skills, and videography skills. In other words, using an AI smartphone also causes skill erosion for the user. Research suggests that smartphone addiction is linked to reduced brain activity and weaker connections between brain regions during creative tasks (Li, Q., 2023). The study found that people with a tendency towards smartphone addiction showed lower activity in the prefrontal cortex and temporal regions of the brain than the control group, especially when trying to come up with creative solutions under limitations. This brain activity pattern is linked to a harder time to overcome mental blocks and forming original ideas.

However, another study showed that mobile phone use was positively related to creative ideation among college students (Guan, Jinliang, et al. , 2024). This study found that critical thinking skills acted as mediators. In other words, when mobile phone use stimulates critical thinking, it can lead to creative ideas. This suggests that using phones for activities

that encourage analysis and problem-solving might be beneficial for creative thinking.

Another study suggested that there is no clear negative relationship between smartphone use and creative thinking (Olson et. al, 2023). While some initial studies showed weak negative correlations, they were not replicated in larger and more di-verse samples. Researchers suggest that the impact of smartphone use on creativity might be more nuanced and depend on how the phone is used.

Currently, the price of AI smartphones is considered to be quite high and above the reach of average users. It will take a few months or years before it is considered an average affordable gadget for the public. Analyst firm IDC predicts a surge in next-generation AI smartphones by 2024 (IDC, 2024). The IDC estimated that nearly 170 million units of AI smartphones will be shipped worldwide, representing a significant jump from the 2023's 51 million and capturing almost 15% of the total smartphone market by 2024. This trend is expected to accelerate the use of AI smartphones by consumers.

The lack of transparency in data collection practices can be a major concern among AI smartphone users. One of the biggest hurdles in the development of AI smartphones is the immense amount of user data required to function effectively. These data encompass everything from app usage patterns and browsing history to location tracking, voice recordings, and facial recognition data. Users have the right to know what data are being collected, how they are being used, and with whom they are being shared. Vague privacy policies and hidden data-collection processes can erode user trust. The vast amount of personal data stored on AI smartphones makes them prime targets for hackers. Data breaches can expose sensitive information, leading to identity theft, financial losses, and even physical harm. Secure storage and robust encryption protocols are crucial for safeguarding the user data.

Many AI features of smartphones are still under development and may not be fully functional. Features such as real-time language translation or personalized recommendations may not work flawlessly across all situations, causing user dissatisfaction. Hackers may target the AI algorithms themselves, manipulating them to generate false information, controlling user behavior, or even spreading misinformation. Robust security protocols are crucial to ensure the integrity and reliability of AI functions.

6 CONCLUSION

AI smartphones are expected to revolutionize generative art and offer new methods for creativity and expression. Despite challenges such as biases and perceptions of AI-generated art, AI smartphones will be the preferred device to replace current smartphones in the near future. The ability to generate art directly on a smartphone allows instant creation and experimentation, fostering a more spontaneous and mobile artistic practice. AI can simplify the creation process by automating complex tasks and offering intuitive interfaces, thus making generative art more accessible to users with varying artistic backgrounds.

This paper discussed the advantages and disadvantages of AI smartphones from the perspective of generating art. Further research and exploration in this field are needed to shape the future of art creation and appreciation using AI smartphones. There is a need for more research on the ethical implications of generative art and intellectual property rights, especially in the context of AI smartphones. Real-time collaboration allows multiple users to collaborate on generating art in real time, creating a more social and interactive experience.

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