



Research Article

Computational aesthetics in dystopian visualization: an integrated approach using python programming and adobe photoshop's generative features

Ozan Bebek^{1*}, Kevser Kübra Kırboğa², and Mehmet Coşar³

Department of Ceramics and Glass, Faculty of Fine Arts and Design, Bilecik Şeyh Edebali University, Bilecik, Türkiye

Article Info

Received: 5 June 2025
Accepted: 17 August 2025
Available online: 30 Sept 2025

Keywords

Algorithmic design
Digital visualization
Dystopian aesthetics
Generative art
Python programming

Abstract

This study aims to investigate how fundamental geometric shapes and digital tools can be integrated to create visually compelling representations of dystopian and post-apocalyptic themes, focusing on expanding the boundaries of digital art by combining traditional artistic practices with algorithmic design methods. Using Python programming and Adobe Photoshop's "Generative Image" feature (Beta version 25.11), five fundamental geometric shapes were generated and transformed into thematic visualizations through a two-phase methodological approach. Initially, the shapes were designed using Python's Matplotlib and NumPy libraries and programmed with algorithms containing random variables, establishing the foundation of structured randomness and algorithmic patterns controlled by the artist. Subsequently, these base shapes were enhanced and restructured through Photoshop's advanced generative tools, guided by specific thematic keywords such as "dystopian pattern," "post-apocalyptic scenario," and "hopelessness," resulting in a total of fifteen visuals comprising three variations for each geometric shape. The findings highlight the effective integration of basic design principles with advanced generative technologies, resulting in visually striking artworks that encapsulate dystopian aesthetics while effectively reflecting themes of isolation, decay, and technological domination through elements such as chaotic urban landscapes, fragmented architectures, and alien world terrains. This research contributes to existing work in algorithmic design and digital visualization while being associated with theoretical frameworks such as Jean Baudrillard's concept of hyperreality, Donna Haraway's union of human-machine-nature, and Walter Benjamin's critiques of modern urban life, demonstrating that generative art functions not only as an aesthetic tool but also as a platform for social and philosophical criticism, illustrating how art evolves into new narrative forms in the digital age and suggesting its capacity to expand artistic boundaries and redefine modes of expression.

2717-8870 © 2025 The JIAE.
Published by Genc Bilge (Young Wise)
Pub. Ltd. This is an open access article
under the CC BY-NC-ND license



To cite this article

Bebek, O., Kırboğa, K.K., and Coşar, M. (2025). Computational aesthetics in dystopian visualization: an integrated approach using python programming and adobe photoshop's generative features. *Journal for the Interdisciplinary Art and Education*, 6(3), 211-224. DOI: <https://doi.org/10.5281/zenodo.15971532>

Introduction

Generative art represents an innovative artistic movement that facilitates the automatic creation of art through the use of computer algorithms and software. This approach allows artists to integrate digital technologies into their creative processes, offering opportunities to produce unique works that transcend traditional art production methods. The

¹ Corresponding author: Res.Asst., Bilecik Şeyh Edebali University, Faculty of Fine Arts and Design, Department of Ceramics and Glass, Bilecik, Türkiye. E-mail: oznbk@gmail.com ORCID: 0000-0003-3292-4403

² Res.Asst., Bilecik Şeyh Edebali University, Faculty of Engineering, Bioengineering Department, 11100, Bilecik, Türkiye. E-mail: kubra.kirboga@yahoo.com ORCID: 0000-0002-2917-8860

³ Asst.Prof.Dr., Çanakkale Onsekiz Mart University, Faculty of Fine Arts, Department of Ceramics and Glass, 17100, Çanakkale, Türkiye. E-mail: mehmetcosars@gmail.com ORCID: 0000-0003-1931-845X

origins of generative art date back to the 1960s, evolving alongside the adoption of computers in artistic creation (McCormack et al., 2019; Ren & Du, 2024). Today, the rapid advancements in digital art and sophisticated software tools have further enhanced the potential and significance of generative art (Galanter, 2003).

Theoretical Framework

In recent years, the widespread use of digital art tools and the evolution of algorithmic design techniques have enabled artists to redefine their creativity and modes of expression. These developments have allowed artists to focus on data in new media art, using it both as a subject and a material (Whitelaw, 2004). Generative art offers artists the ability to create complex and aesthetically rich visual structures by incorporating innovative elements such as randomness and algorithmic composition. This process minimizes human intervention in the creation of artworks, positioning computer algorithms as key determinants and enabling artists to explore new and uncharted avenues in their artistic expressions (Boden & Edmonds, 2009). This study moves beyond a mere descriptive association with critical theory by operationalizing key concepts as analytical lenses. Specifically, Jean Baudrillard's theory of hyperreality is used to analyze the simulated, often placeless nature of the generated dystopian environments (Baudrillard, 1994). Walter Benjamin's critiques of mechanical reproduction and the modern city inform the analysis of the artworks' digital origins and their thematic content (Benjamin, 1968; Benjamin, 1999). Finally, Donna Haraway's (1991) concept of the human-machine union provides a framework for understanding the creative process itself as a cyborgian practice, where artistic intent and algorithmic processes merge. This approach ensures that the theoretical framework is not merely a backdrop but an integrated tool for analysis.

Literature Review

Key Technologies and Applications in AI-Based Art

Chauhan et al. (2023) discussed the current applications of generative art, highlighting the innovative possibilities offered by these techniques in the fields of media, design, and entertainment. The study comprehensively examined various methods used in the field of generative art. Among these methods, tools such as Generative Adversarial Networks (GANs), DALL-E, Stable Diffusion, Multi-Diffusion, DIFF EDIT, SEMSTYLE, LAFITE, and Mirror GAN stand out. The research focuses specifically on the functioning and design principles of DALL-E, Stable Diffusion, and GANs, emphasizing that these three techniques form the basis of AI-based artistic production (Chauhan et al., 2023).

A key development in this area is the Creative Adversarial Network (CAN), proposed by Elgammal et al. (2017). This system, built on the principles of GANs, can produce creative artworks by maximizing deviation from established art styles while minimizing deviation from the general art distribution. The rise of these technologies also impacts traditional art institutions. A report by Christie's (2018) highlights the emergence of artificial intelligence (AI) and generative art as a new medium in the art world, raising new questions regarding the production, distribution, and perception of art.

Conceptual and Philosophical Frameworks

Beyond the technical aspects, significant studies have explored the conceptual dimensions of generative art. Philip Galanter's (2003) foundational work, for instance, frames generative art within the context of complexity theory, providing a critical vocabulary to discuss how complex, seemingly intelligent behavior can emerge from simple, deterministic rules. This perspective is crucial for understanding how our own simple geometric shapes can evolve into intricate visual worlds. Building on these philosophical questions, McCormack et al. (2019) challenge traditional notions of autonomy, authenticity, and authorship, questioning the roles of the artist and the machine in the creative process. These theoretical discussions are complemented by other seminal works from the early 2000s (GA2003(Generative Art 2003)) that explored diverse facets of the field, such as those by Soban (2003) focused on self-representing generative programs, Viscardi (2003) investigated architecture envisioned through material imagination, Freeman (2003) explored the interaction between generative art and music through the MetaMix project, and Romero et al. (2003) delved into the development of artificial art critics.

Technical Quality of Article

The Python programming language plays a pivotal role in the development of generative art (Joseph & Raghav, 2021). Its flexible and robust structure, combined with extensive library support, provides artists with powerful tools for realizing creative projects (Simon et al., 2018). Libraries such as Matplotlib are frequently employed to produce visual arts in Python. Moreover, Python's integration capabilities with other software and tools enable artists to develop versatile and comprehensive projects, facilitating more efficient and effective management of creative processes (Van Rossum & Drake, 2009).

Importance of Study

Dystopian and post-apocalyptic themes have long held a significant place in literature, cinema, and the arts. These themes often depict potential dark and collapsing futures, exploring societal and political critiques as well as the darker facets of human nature (Maclaran & Brown, 2010; Youvan, 2024). Post-apocalyptic scenarios, in particular, address humanity's struggles for survival and the quest for new order, offering profound and thought-provoking opportunities for artistic exploration (Galanter, 2019; Williams, 2005; Wojcik, 1999). Such themes provide artists with a vast creative landscape to produce works that captivate and challenge audiences (Kermode, 1967).

Aim of the Study

This study focuses on visualizing five distinct fundamental geometric shapes to reflect dystopian and post-apocalyptic scenarios, utilizing Python programming and the "Generative Image" feature of Adobe Photoshop (Beta version 25.11). Unlike previous approaches that often simulate human creativity, this research adopts a methodology grounded in fundamental design principles and digital production techniques. The primary aim is to explore how these principles can be systematically integrated into creative visual arts to present dystopian themes in an aesthetically compelling manner.

- How can basic geometric shapes generated with Python be effectively transformed into visual representations of dystopian and post-apocalyptic themes?
- What role does the integration of algorithmic design and generative software tools play in creating aesthetically compelling dystopian visualizations?
- How might the synthesis of structured design principles and digital technology expand the boundaries of artistic expression in the digital age?

By emphasizing the role of structured design over mimicking human artistic behavior, the study highlights the importance of generative art as a tool for digital art innovation. Furthermore, it underscores Python's potential in automating and enhancing creative processes. Ultimately, this research demonstrates how the synergy between art and technology can foster the development of innovative and transformative art forms, pushing the boundaries of digital creativity.

Method

This study employs a systematic approach to generate and transform geometric shapes into dystopian-themed visual art using computational techniques and digital tools. The research methodology combines algorithmic design with creative digital transformation, allowing for the exploration of how fundamental design principles can be integrated into the representation of dystopian and post-apocalyptic themes.

Research Model

The research adopts an experimental design model focused on the creative application of computational tools for artistic expression. This model involves a two-phase process: (1) the algorithmic generation of fundamental geometric shapes using Python programming, and (2) the creative transformation of these shapes using Adobe Photoshop's generative tools. The approach combines structured programming with creative digital manipulation, enabling the systematic exploration of how basic geometric forms can evolve into complex visual narratives that reflect dystopian themes.

Process

The creation process consisted of two main stages:

Phase 1: Generation of Reference Shapes Using Python Programming

Five fundamental geometric shapes were programmatically generated using Python, with an emphasis on incorporating fundamental design principles:

- **Random Rectangles Composition:** Using Python's Matplotlib pyplot module and NumPy library, 15 random rectangles were generated within a 10×7 canvas. Each rectangle was assigned random attributes including position coordinates, dimensions, and rotation angles between 0-360 degrees. The rectangles featured black edges without fill color, creating a minimalist aesthetic.
- **Fractal Spiral Pattern:** A recursive geometry method was implemented to create intricate fractal structures. A base function drew spirals around specified central points, with angle and radius calculations determining the spiral curves. The patterns were generated with random central points, radii, and colors, with parameters controlling recursion depth and color schemes. Random lines were superimposed to add an organic, hand-drawn quality.
- **Geometric Intersections:** Created using Matplotlib's pyplot and patches modules with NumPy, this pattern featured a primary rectangle as the central element, complemented by iteratively added lines that created dynamic intersections. Black-filled polygons and parallel lines added visual contrast, depth, and layering effects.

Phase 2: Creative Transformation Using Adobe Photoshop

The base shapes generated in Python were then processed and transformed using Adobe Photoshop's "Generative Image" feature (Beta version 25.11):

- Each geometric shape was subjected to thematic transformation using specific keywords related to dystopian and post-apocalyptic scenarios.
- For each of the five base shapes, three distinct visual variations were created, resulting in a total of fifteen outputs.
- The transformation process integrated the foundational geometric structures with Photoshop's advanced generative capabilities, converting abstract forms into intricate representations of dystopian themes.

Analysis

The analysis of the generated visuals focused on:

- The visual transformation from basic geometric forms to complex dystopian representations.
- The effectiveness of the integration between programmatically generated shapes and Photoshop's generative tools.
- The aesthetic qualities and thematic resonance of the final visuals.
- The relationship between specific keywords and the resulting visual characteristics

The analysis examined how fundamental design principles manifested in the final visual outputs and how effectively the dystopian themes were conveyed through the transformed geometric shapes.

Analytical Framework

The visual outputs were analyzed through both aesthetic and theoretical lenses (Table 1). The aesthetic analysis focused on compositional integrity, thematic alignment with dystopian concepts, and visual complexity. The theoretical analysis was guided by the operationalized concepts from the theoretical framework:

Baudrillard's Hyperreality: This concept was used to assess the degree to which the visuals created a self-referential, simulated reality detached from an original, paying attention to elements of artificiality and placelessness.

Benjamin's Aura: The concept of the "aura" was used to discuss the nature of the digital artworks as infinitely replicable objects lacking a unique physical original, and how this impacts their perception. His urban critiques were used to analyze representations of architectural alienation.

Haraway's Human-Machine Union: This framework was applied to the creative process itself, analyzing the workflow as a tangible example of human-machine collaboration where artistic intent and algorithmic agency merge.

Table 1. Conceptual mapping of theoretical lenses to visual outcomes

Theoretical Lens	Manifestation in Visuals	Relevant Visuals
Hyperreality (Jean Baudrillard)	Creation of simulated, self-referential worlds that lack a real-world original. Use of artificial textures and placeless but convincing environments.	Figures 1, 2, 3
Loss of "Aura" & Urban Critique (Walter Benjamin)	Images as infinitely replicable digital artifacts lacking a unique original. Representation of fragmented, chaotic, and oppressive architectural forms reflecting urban alienation.	All Figures (for aura); Figures 1 & 5 (for urban themes)
Human-Machine Union (Donna Haraway)	The creative process itself as a hybrid of human intent (prompts), algorithmic logic (Python), and AI interpretation (Photoshop), resulting in visuals that neither human nor machine could create alone.	The entire creative process; Figure 4 (visual representation)

Evaluation Framework

To move beyond subjective interpretation and to formally evaluate the visual outputs, a qualitative evaluation framework was developed. Each generated visual was systematically assessed based on four key criteria derived from the study's objectives:

Compositional Integrity: The degree to which the final visual retains the structural essence of the initial Python-generated geometric shape.

Thematic Alignment: The effectiveness of the visual in conveying core dystopian themes such as decay, oppression, isolation, or technological overreach.

Visual Complexity: The level of detail, texture, and aesthetic richness in the final artwork, reflecting the successful integration of generative processes.

Narrative Potential: The ability of the image to evoke a story, a specific scenario, or a sense of a larger world, enhancing its function as a piece of art.

This framework provides a structured basis for the analysis presented in the Results and Discussion sections.

Materials

The research utilized the following software tools and libraries:

- Python programming language (3.9)
- Python libraries: Matplotlib (Hunter, 2007) and NumPy (Harris et al., 2020)
- Adobe Photoshop (Beta version 25.11) with the "Generative Image" feature
- Thematic keywords for transformation as specified in Table 2.

Table 2. Keywords Used for Generative Process by Shape.

Shape	Keywords
Random Rectangles Composition	dystopian pattern
Fractal Spiral Pattern	post-apocalyptic scenario, dystopian
Wavy Surface	dystopian pattern hopelessness, dystopian pattern
Chaotic Lines	dystopian pattern
Geometric Intersections	post-apocalyptic scenario pattern, post-apocalyptic scenario

The integration of these computational tools and design principles facilitated the systematic exploration of dystopian visual aesthetics through a structured yet creative methodological approach.

Results

Figure 1 shows the transformation of the "Random Rectangles Composition." Applying the evaluation framework introduced in the Method section, these outputs demonstrate high thematic alignment with dystopian aesthetics. This is achieved through the deliberate interplay of sharp, rigid architectural forms and dynamic, often oppressive, lighting effects that capture a futuristic and alienating atmosphere. The compositional integrity is successfully maintained, as the foundational structure of the initial Python-generated rectangles is clearly visible within the complex cityscapes, providing a coherent visual transformation. Furthermore, the visual complexity is significantly enhanced through the generative process, which adds intricate textures and details that were absent in the minimalist base shape. The narrative potential of the images is also strong; each variation suggests a different dystopian scenario, from a cold, corporate-controlled metropolis to a city experiencing technological decay. This transformation process, which creates convincing realities without a real-world original, also serves as a clear example of Baudrillard's (1994) concept of hyperreality, where the generated visuals are not copies of a real-world dystopia but simulations that create their own self-referential, convincing reality .

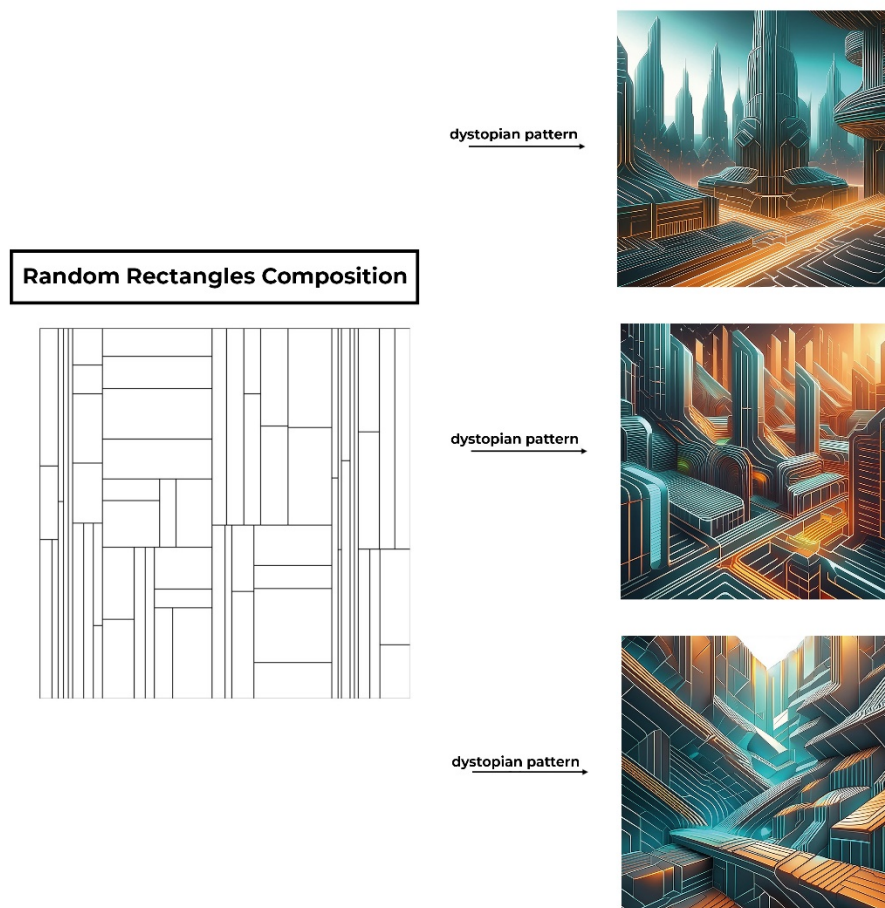


Figure 1. Transformation of Random Rectangles into Dystopian Environments

The transformation of the "Fractal Spiral Pattern" is presented in *Figure 2*. From an analytical perspective, these outputs demonstrate a high degree of thematic alignment, as the "post-apocalyptic" and "dystopian" prompts effectively guided the AI to produce immersive environments defined by structural decay and architectural monumentality. The visual complexity is dramatically increased from the simple base shape, with the AI generating intricate textures, dense scaffolding-like structures, and a strong sense of atmospheric depth. Compositional integrity is also strong; the underlying hexagonal and spiraling forms of the original pattern are visibly echoed in the arrangement of the generated buildings and cityscapes, providing a clear structural lineage. This results in significant narrative potential, where each variation suggests a different facet of a post-human world from organized decay to isolated, monumental futurism.

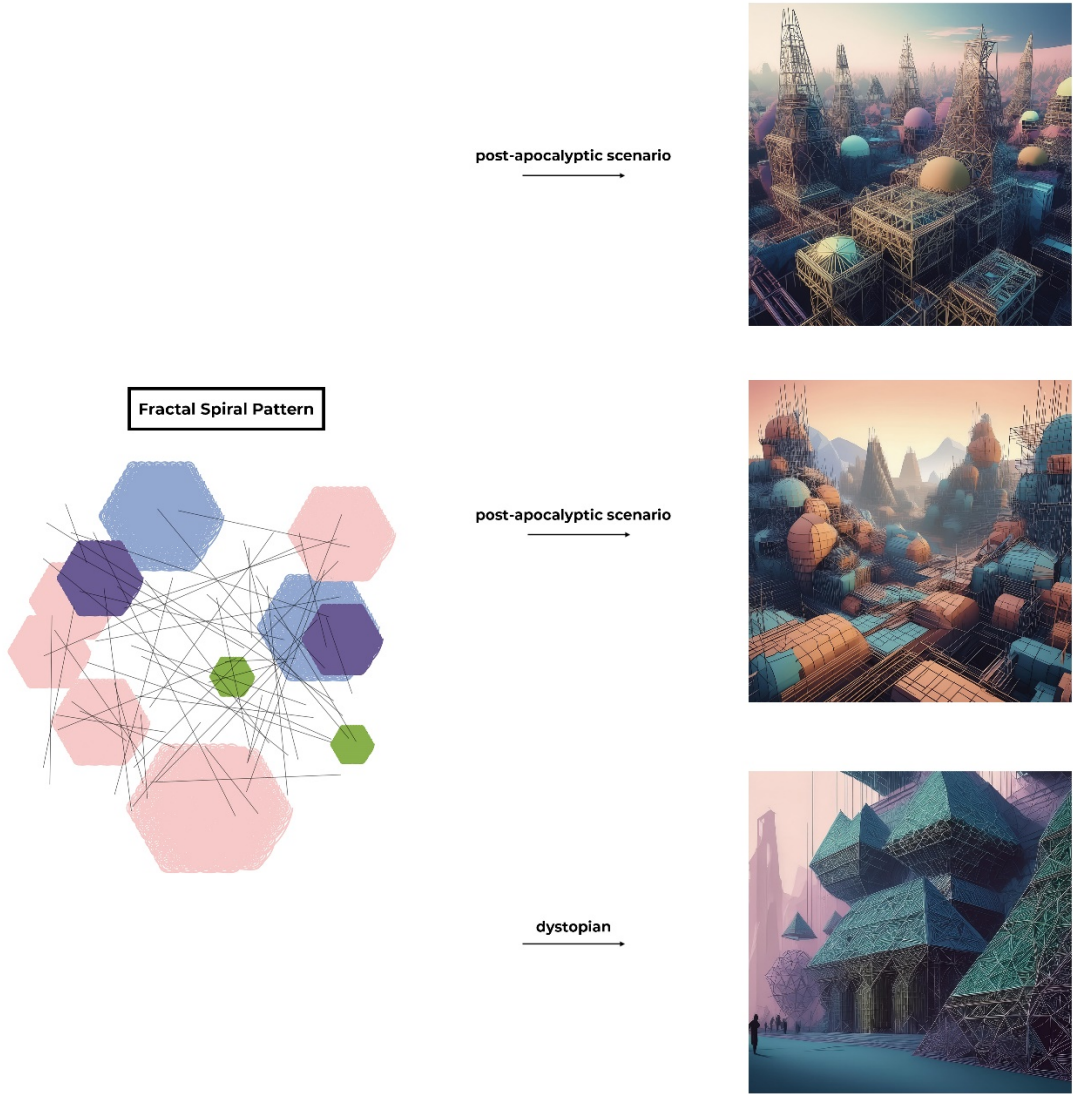


Figure 2. Transformation of Fractal Spiral into Post-Apocalyptic and Dystopian Environments

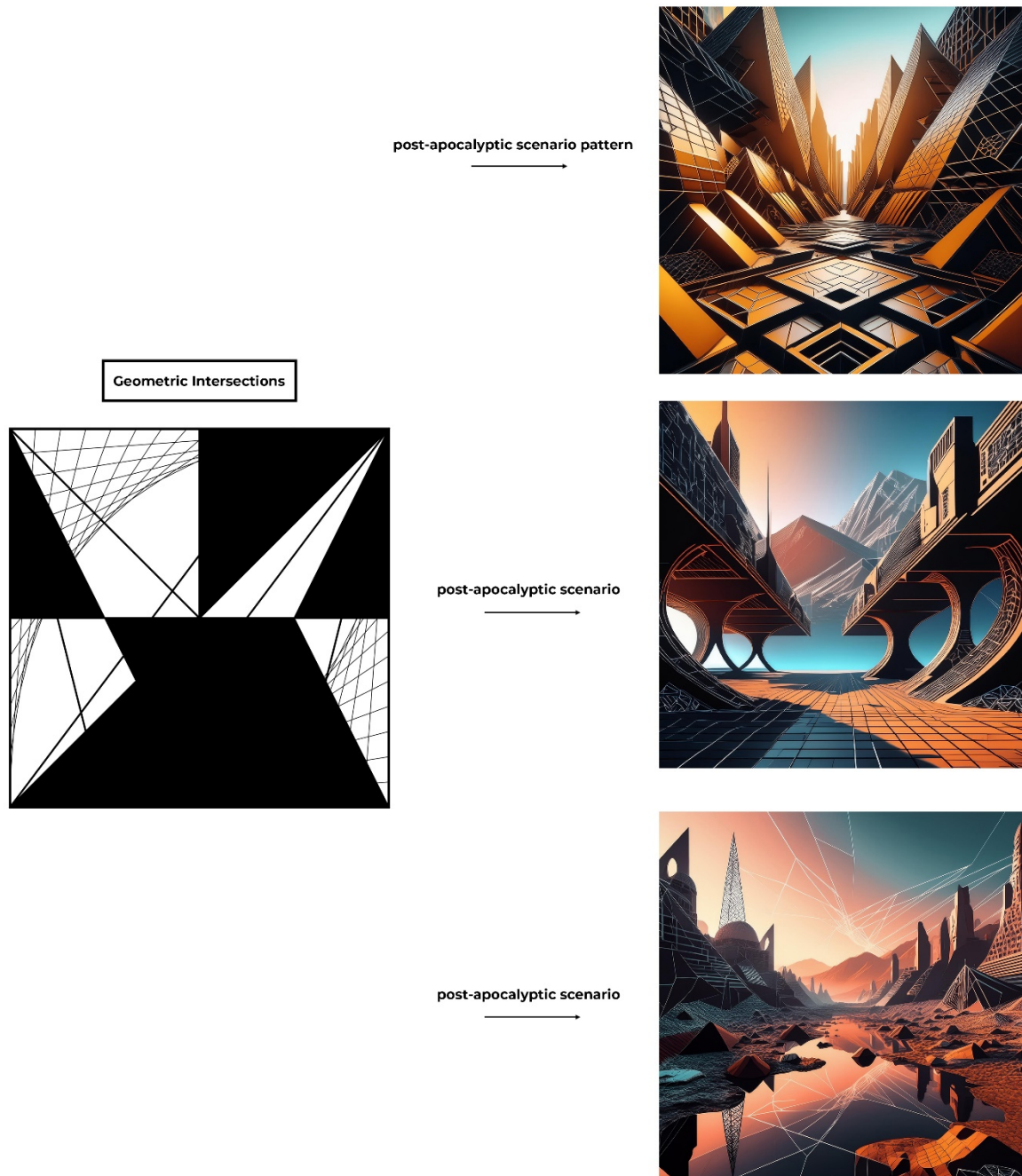


Figure 3. Geometric Intersections Transformed into Post-Apocalyptic Scenarios

The transformation of the "Geometric Intersections" base design into three distinct interpretations is shown in *Figure 3*. These outputs are strong examples of thematic alignment, where the "post-apocalyptic scenario" prompt guided the generation of evocative visuals. Each variation displays strong narrative potential: the first suggests a dense, decaying cityscape; the second, a surreal world of structural ambiguity; and the third, a desolate landscape symbolizing isolation. The visual complexity is significantly elevated from the high-contrast 2D base image, with the AI introducing rich textures, atmospheric lighting, and a sense of vast scale. This is achieved while maintaining compositional integrity, as the sharp angles and intersecting lines of the original design are clearly reinterpreted as architectural edges and landscape features in the final visuals.

The "Wavy Surface" (*Figure 4*) provides a compelling case study in thematic alignment, where specific keywords radically altered the visual narrative. The "dystopian pattern hopelessness" prompt, for instance, generated a dark, cavernous environment that directly translates an abstract emotion into an oppressive architectural form, evoking isolation and despair. The other variations demonstrate diverse narrative potential, one exploring a monumental, alien-

like structure and the other a dense, organic-mechanical labyrinth that visually embodies a biotech dystopia. In all outcomes, the visual complexity is exceptionally high, transforming a smooth computational model into richly detailed worlds. Compositional integrity is maintained through an interpretive approach, where the 3D curvature of the base shape is re-imagined as interior spaces or complex cityscapes rather than a literal outline.

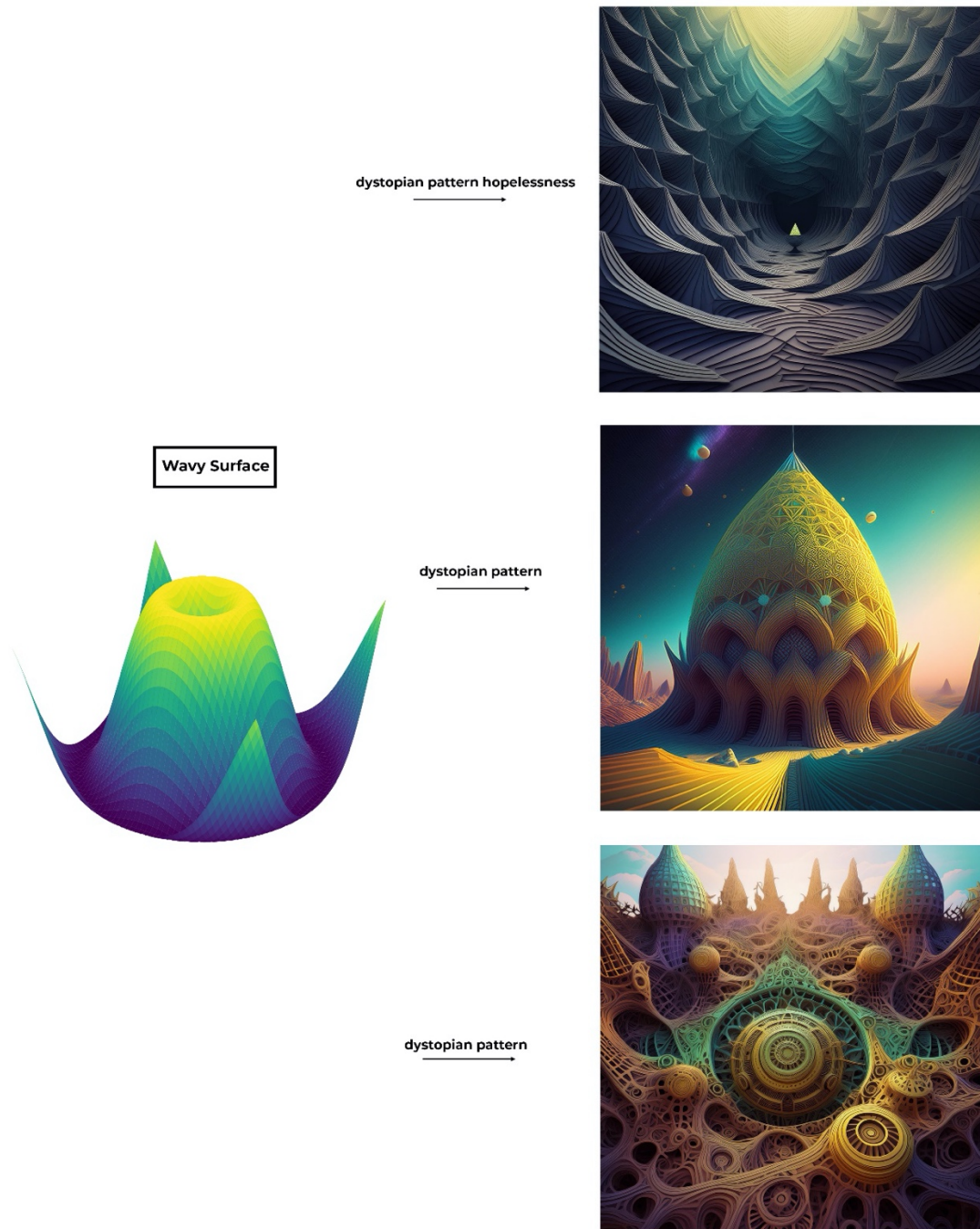


Figure 4. Reimagining Wavy Surface as Dystopian Landscapes

Figure 5 illustrates how a "Chaotic Lines" base shape can be transformed to explore the interplay between randomness and order. Analytically, these outputs excel in thematic alignment, as the "dystopian pattern" prompt channels the abstract concept of chaos into varied dystopian visions. The narrative potential is high, with each output offering a distinct scenario: a claustrophobic, oppressive interior; a desolate, grid-like industrial landscape; and an otherworldly, bio-digital environment. A significant increase in visual complexity is achieved by adding depth, color, and atmospheric effects to the flat base image. The compositional integrity is cleverly maintained not by preserving the exact form, but by reinterpreting the dense, chaotic texture of the original lines into new, structured systems, such as the intricate patterns of the interior or the grid-like formations of the landscape.

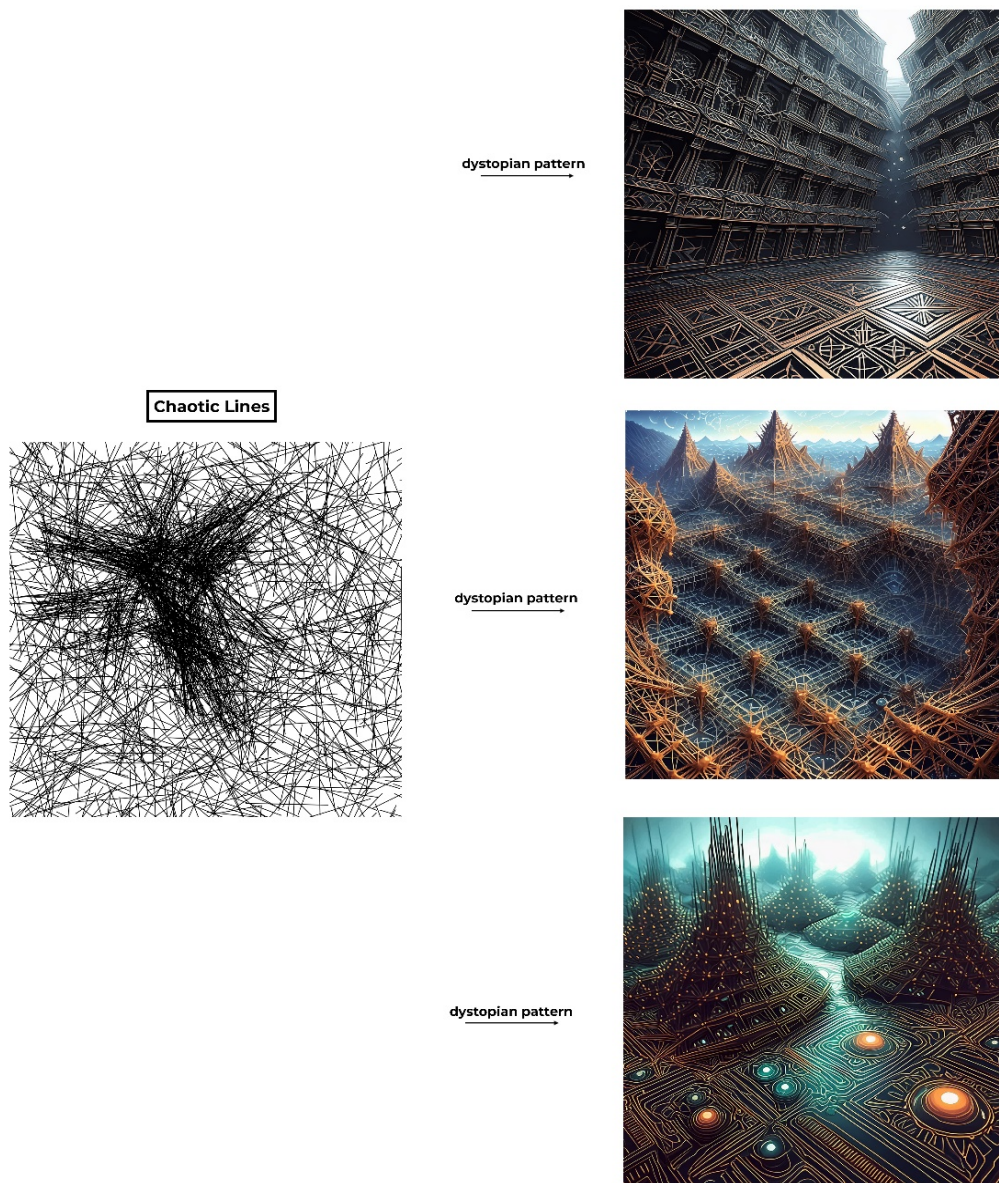


Figure 5. Chaotic Lines into Dystopian Structures

A comparative analysis of the outcomes reveals that the foundational geometric shapes significantly influenced the specific nature of the generated dystopian aesthetics. For instance, the sharp, disjointed nature of the "Chaotic Lines" (Figure 5) proved highly effective at evoking themes of urban decay and technological oppression. Its inherent randomness was readily interpreted by the AI as fragmented architecture or complex, oppressive systems. In contrast, the smooth, volumetric form of the "Wavy Surface" (Figure 4) yielded more organic or psychological dystopias; its curves were transformed into vast, alien structures or cavernous, labyrinthine interiors that suggest psychological entrapment rather than societal collapse. This demonstrates that while a chaotic base effectively produces imagery of structural failure, an organic base is more suited to exploring themes of biological or existential unease. This highlights that the initial algorithmic choice is not merely a starting point but a crucial directorial input that guides the AI toward distinct sub-genres of dystopian expression.

Conclusion and Discussion

The main purpose of this study was to investigate how dystopian and post-apocalyptic themes can be visually expressed through the integration of digital tools and algorithmic design methods. Basic geometric shapes generated using the Python programming language were processed using the advanced generative tools of Adobe Photoshop, creating structural compositions that considered elements of randomness and order simultaneously. These geometric abstractions were enriched with thematic keywords using Photoshop's "Generative Image" feature and transformed into

immersive dystopian scenes. The resulting visuals effectively addressed the relationship between chaos, order, and randomness, strongly reflecting dystopian themes through dramatic perspectives, isolated structures, and dark atmospheres. For example, compositions initially designed with chaotic lines transformed into dense cityscapes or barren post-apocalyptic landscapes, while fractal spiral patterns portrayed post-apocalyptic scenarios through complex structural geometries. These transformations demonstrate the capacity of computational tools to enhance creative processes and produce thematically compelling artworks. Beyond visual outputs, this study demonstrates a deep engagement with critical theory, using it to analyze both the process and the product. The transformation of simple geometric shapes into complex, self-contained worlds directly engages with Jean Baudrillard's (1994) concept of hyperreality. The generated images are not mere representations of a possible dystopia; they are simulations that establish their own logic, becoming convincing realities without an original. This process highlights how generative AI creates "the real for the real's sake." Furthermore, the methodological reliance on algorithmic reproduction resonates with Walter Benjamin's analysis of art in the age of mechanical reproduction (Benjamin, 1968). The digital artworks, infinitely replicable and algorithmically derived, inherently lack a traditional "aura," a quality Benjamin associated with unique, original artworks. The chaotic yet structured cityscapes visually echo his critiques of the alienating, fragmented nature of modern urban life. Finally, the entire creative workflow embodies Donna Haraway's (1991) vision of a human-machine union. The artist's initial guidance, the Python script's execution, and Photoshop's AI interpretation form a cybernetic loop a collaborative entity where human creativity and non-human algorithmic agency are inseparable. This integrated process does not just produce dystopian images; it performs a dystopian (or post-human) reality, validating generative art as a powerful medium for philosophical inquiry.

The algorithmic and generative methods used in the study offer an aesthetic perspective that brings together Benjamin's observations on the complexity of modernity with Galanter's theory of artistic randomness and order. Parallel to similar studies in the literature, these images combine the randomness features of algorithms with artistic aesthetics, presenting work that offers both artistic and technical depth. The study has shown that the boundaries of traditional art practices can be expanded through the integration of generative art and digital tools, providing a new perspective on how dystopian and post-apocalyptic themes can be artistically expressed with algorithmic methods. Python's flexibility in geometric abstraction and Adobe Photoshop's generative capabilities provided a foundation for combining randomness and order within a cohesive thematic framework. While Python played a significant role in creating structured randomness and algorithmic patterns, Adobe Photoshop transformed these visuals into rich narrative forms. The generated visuals effectively reflected dystopian themes such as isolation, decay, and technological domination with elements such as chaotic urban landscapes, fragmented architectures, and alien world terrains. This study highlights the transformative potential of generative art as a tool that combines technology with creativity. It has been demonstrated that creative processes can be managed more thematically, aesthetically, and efficiently by using Python's flexibility and Photoshop's generative tools together. The resulting images function not only as aesthetic tools but also as platforms for social and philosophical criticism, showing how art has evolved into new narrative forms in the digital age. The work has not only contributed to discussions on dystopian aesthetics but has also opened up new avenues for exploring artistic expression in the digital age. By advancing the integration of computational tools with artistic vision, future work in this area has the potential to redefine the boundaries of visual storytelling and conceptual art.

Recommendations

Recommendations for Researchers

Future research should explore a broader range of algorithmic approaches beyond geometric patterns, including cellular automata, L-systems, and particle systems to create more diverse dystopian visualizations, while developing deeper theoretical connections between generative art practices and philosophical perspectives on dystopia. Researchers would benefit from conducting comparative analyses between AI-generated and human-created dystopian artwork to understand perceptual differences between computational and traditional approaches, as well as incorporating audience

reception studies to gather data on how viewers interpret algorithmically generated dystopian imagery. Additionally, examining how dystopian themes manifest across different cultural contexts through generative art could reveal important variations in visual language and thematic emphasis, while developing systematic methodological frameworks for evaluating the aesthetic and narrative qualities of generative dystopian art would establish more rigorous standards for analysis in this emerging field.

Recommendations for Applicants

Practitioners in generative art should enhance their creative practices by integrating multiple software environments beyond Python and Photoshop, such as Processing, TouchDesigner, or Blender, while establishing systematic documentation practices for algorithmic parameters and transformation processes to ensure reproducibility and refinement of their projects. Artists would benefit from exploring interactive implementations that allow viewers to manipulate parameters in real-time, developing custom tools or plugins specifically designed for dystopian aesthetic exploration, and incorporating multisensory elements, including sound and haptic feedback, to create more comprehensive dystopian experiences. Furthermore, forming collaborative networks between programmers, visual artists, and theorists could facilitate more sophisticated implementations that leverage diverse expertise, while thoughtfully engaging with the ethical dimensions of creating dystopian imagery in an era of significant social and environmental challenges, using this artistic medium to foster constructive dialogue about contemporary issues.

Limitations of Study

This research exhibits several methodological and technical constraints that warrant acknowledgment within the academic discourse on generative art and dystopian visualization. The study's deliberate limitation to five fundamental geometric shapes potentially restricted the diversity of visual outcomes and thematic expression, while the reliance on specific dystopian-related keywords within Adobe Photoshop's generative process may have inadvertently channeled the visual results toward particular aesthetic interpretations, potentially obscuring alternative dystopian narratives that might emerge from different linguistic prompts. Technical parameters, including the use of Adobe Photoshop's "Generative Image" feature in its Beta version (25.11), render the results contingent upon the capabilities of an evolving software tool, while the two-dimensional focus of the methodology precluded exploration of potentially valuable three-dimensional or time-based expressions of dystopian themes. While this study introduces a formal qualitative framework to guide the analysis, the application of this framework still relies on the researchers' interpretation, which introduces a degree of subjectivity. This is further compounded by the lack of audience reception studies to validate these interpretations beyond the research context. Despite efforts to control variables through fixed random seeds, the inherent stochasticity in generative processes, combined with subjective human intervention in keyword selection and parameter adjustment, presents challenges for scientific reproducibility and limits the generalizability of findings, illustrating the complex tension between artistic creation and methodological rigor in this emerging interdisciplinary field. A further limitation lies in the study's primary focus on the technical and aesthetic aspects of creation, with less emphasis on the ethical considerations of generating dystopian imagery with AI. The use of AI to create powerful and realistic dystopian visuals raises important questions about their potential to influence public perception of technology and the future. There is a responsibility for creators to consider how these narratives might contribute to a climate of fear or hopelessness, rather than fostering constructive dialogue. The psychological impact on viewers and the new ethical questions surrounding human-AI collaboration in producing such culturally potent images are significant areas that warrant deeper investigation. While a full exploration of these ethical dimensions was beyond the scope of this technically-focused paper, we acknowledge their critical importance for future research in the field of generative art.

Acknowledgment

This research does not require ethical committee approval. There is no conflict of interest in the study. No funding support was received. All authors have contributed equally to the preparation and writing of this article.

Biodata of Authors



Res.Asst. **Ozan Bebek** was born in 1989 in Konak (İzmir). His academic journey began at Ege University Vocational School's Ceramics-Glass-Tile Program in 2011, followed by his graduation from Mersin University Faculty of Fine Arts, Department of Ceramics in 2016. He completed his master's degree at Çanakkale Onsekiz Mart University Graduate School of Education, Department of Ceramics in 2017, with his thesis titled "Polygon Expressions in Ceramic Art." In 2024, he earned his Proficiency in Art from Hacettepe University Institute of Fine Arts, Department of Ceramics, with his dissertation "Interpretation of Post-Apocalyptic Scenarios Based on the Concept of Dystopia with Ceramic Forms." His work explores the intersection between traditional ceramic techniques and digital technologies, with a particular focus on algorithmic design and generative art approaches that inform his three-dimensional creations. Bebek has participated in numerous national and international group exhibitions and was awarded the "Architectural Ceramic Art Workshop Special Prize" at the 12th Muammer Çakı International Student Ceramic Competition organized by Anadolu University Faculty of Fine Arts in 2024. Since 2018, he has been working as a Research Assistant at Bilecik Şeyh Edebali University, Faculty of Fine Arts and Design, Department of Ceramics and Glass, where he continues to develop innovative approaches combining traditional craft with computational design methods. ORCID: 0000-0003-3292-4403

Personel website: <https://avesis.bilecik.edu.tr/ozan.bebek> and <https://www.ozanbebek.com>

ResearchGate: <https://www.researchgate.net/profile/Ozan-Bebek-2>

AcademiaEdu: <https://bilecikedu.academia.edu/OzanBebek>

Google Scholar: <https://scholar.google.com.tr/citations?user=HFVNcI8AAAAJ>



Res.Asst. **Kevser Kübra Kırboğa** completed her undergraduate studies in Molecular Biology and Genetics at Muğla Sıtkı Koçman University, Turkey, in 2018. She pursued her postgraduate education in Biotechnology at İzmir Institute of Technology, Turkey, from 2019 to 2020, and later obtained her M.Sc. degree in Bioengineering from Süleyman Demirel University, Turkey, in 2022. Since 2022, she has been serving as a Research Assistant at Bilecik Şeyh Edebali University, Faculty of Engineering, Department of Bioengineering. Her research interests include bioengineering, computational biology, explainable artificial intelligence, and genetic diseases. She possesses strong programming skills, particularly in Python and R, which she utilizes for data analysis, machine learning applications, and generative art projects. Her computational expertise extends to bioinformatics tools, statistical modeling, and visualization libraries including NumPy, Pandas, Matplotlib, and SciPy. Kırboğa has a substantial number of publications in the field of bioinformatics and has authored several articles published in internationally recognized journals indexed by SCI, SCIE. ORCID: 0000-0002-2917-8860

Personel website: www.tissueandcells.com / <https://avesis.bilecik.edu.tr/kubra.kirboga>

ResearchGate: <https://www.researchgate.net/profile/Kevser-Kirboga>

AcademiaEdu: <https://bilecikedu.academia.edu/KubraKirboga>

Google Scholar: <https://scholar.google.com.tr/citations?user=LU0UujUAAAAJ&hl=tr&oi=ao>



Asst. Prof. Dr. **Mehmet Coşar** graduated from Çanakkale Onsekiz Mart University, Faculty of Fine Arts, Department of Ceramics in 2005, and completed his master's degree at the same university in 2008 with his thesis titled "Whistling Ceramics and New Propositions." He furthered his academic credentials by earning his Proficiency in Art from Dokuz Eylül University, Institute of Fine Arts, Department of Ceramic and Glass Design in 2021, with his research titled "Application of the Stylistic Features of Troy Period Ceramics in Contemporary Tile Designs." Throughout his career, Coşar has actively participated in numerous national and international symposiums and group exhibitions, earning three distinguished awards for his artistic contributions. His work explores the intersection of traditional ceramic techniques with contemporary digital and generative design approaches, bridging historical craft traditions with modern technological applications. Currently, he serves as a lecturer at Çanakkale Onsekiz Mart University, Faculty of Fine Arts, Department of Ceramics and Glass, where he continues to integrate innovative approaches to art and design in his teaching and research. ORCID: 0000-0003-1931-845X

Personel website: <https://avesis.comu.edu.tr/mehmetcosar>

ResearchGate: <https://www.researchgate.net/profile/Mehmet-Cosar-4>

AcademiaEdu: <https://comu.academia.edu/MehmetCo%C5%9Far>

Google Scholar: <https://scholar.google.com.tr/citations?user=0g91tMcAAAAJ>

References

- Baudrillard, J. (1994). *Simulacra and simulation*. University of Michigan Press.
- Benjamin, W. (1968). The work of art in the age of mechanical reproduction. In H. Arendt (Ed.), *Illuminations: Essays and reflections* (pp. 217–251).
- Benjamin, W. (1999). *The arcades project*. Harvard University Press.
- Boden, M., & Edmonds, E. (2009). What is generative art? *Digital Creativity*, 20(1), 21–46. <https://doi.org/10.1080/14626260902867915>
- Chauhan, A., Chauhan, R., Nainwal, A., Arora, A., & Bhatt, C. (2023, September 14–16). Image multidiffusion algorithms for AI generative art. *2023 6th International Conference on Contemporary Computing and Informatics (IC3I)*.
- Christie's. (2018). *The AI art at Christie's: How one painting generated more than \$432,500*. <https://www.christies.com/en/stories/a-collaboration-between-two-artists-one-human-one-a-machine-0cd01f4e232f4279a525a446d60d4cd1>
- Elgammal, A. (2017). CAN: Creative adversarial networks, generating “art” by learning about styles and deviating from style norms. *arXiv Preprint*, arXiv:1706.07068. <https://arxiv.org/abs/1706.07068>
- Freeman, J. (2003). MetaMix: A symbiosis of familiar content with generative form [Conference presentation]. *Generative Art Conference*, Milan, Italy.
- Galanter, P. (2003). What is generative art? Complexity theory as a context for art theory. *Generative Art Conference*, Milan, Italy.
- Galanter, P. (2019). Artificial intelligence and problems in generative art theory. *Electronic Visualisation and the Arts (EVA 2019)*. <https://doi.org/10.14236/ewic/EVA2019.22>
- Haraway, D. J. (1991). A cyborg manifesto: Science, technology, and socialist-feminism in the late twentieth century. In *Simians, cyborgs, and women: The reinvention of nature* (pp. 149–181). Routledge.
- Harris, C. R., Millman, K. J., van der Walt, S. J., Gommers, R., Virtanen, P., Cournapeau, D., ... & Oliphant, T. E. (2020). Array programming with NumPy. *Nature*, 585(7825), 357–362. <https://doi.org/10.1038/s41586-020-2649-2>
- Hunter, J. D. (2007). Matplotlib: A 2D graphics environment. *Computing in Science & Engineering*, 9(3), 90–95. <https://doi.org/10.1109/MCSE.2007.55>
- Hutchings, J. M. T. G. P. (2019). Autonomy, authenticity, authorship and intention in computer generated art. In *EvoMUSART 2019: 8th International Conference on Computational Intelligence in Music, Sound, Art and Design*, Leipzig, Germany. <https://dx.doi.org/10.48550/arxiv.1903.02166>
- Joseph, B., & Raghav, B. (2021). *Generative AI with Python and TensorFlow 2: Create images, text, and music with VAEs, GANs, LSTMs, Transformer models*. Packt Publishing.
- Kermode, F. (1967). *The sense of an ending: Studies in the theory of fiction*. Oxford University Press.
- Maclaran, P., & Brown, S. (2010). The future perfect declined: Utopian studies and consumer research. *Journal of Marketing Management*, 17. <https://doi.org/10.1362/0267257012652069>
- McCormack, J., Gifford, T., & Hutchings, P. (2019). Autonomy, authenticity, authorship and intention in computer generated art. *International Conference on Computational Intelligence in Music, Sound, Art and Design (part of EvoStar)*.
- Ren, L., & Du, M. (2024). From canvas to code: The evolution of generative art in the AI era. <https://doi.org/10.4108/eai.15-9-2023.2340877>
- Romero, J., Machado, P., & Santos Ares, M. L. (2003). Artificial music critics [Conference presentation]. *Generative Art Conference 2003*, Milan, Italy.
- Simon, A. L.-R., Albluwi, I., Becker, B. A., Giannakos, M., Kumar, A. N., Ott, L., ... & Szabo, C. (2018). Introductory programming: A systematic literature review. *Proceedings Companion of the 23rd Annual ACM Conference on Innovation and Technology in Computer Science Education*, Larnaca, Cyprus. <https://doi.org/10.1145/3293881.3295779>
- Soban, B. (2003, December 15–17). Methodological approaches in the development of programs for generating images [Conference presentation]. *Generative Art Conference*, Florence, Italy.
- Van Rossum, G., & Drake, F. L. (2009). *Python 3 reference manual* (Python Documentation Manual Part 2). CreateSpace Independent Publishing Platform.
- Viscardi, A. (2003). Imagined architecture via material imagination: A matter of transformation [Conference presentation]. *Generative Art Conference*, Milan, Italy.
- Whitelaw, M. (2004). *Metacreation: Art and artificial life*. MIT Press.
- Williams, P. (2005). Beyond Mad Max III: Race, empire, and heroism on post-apocalyptic terrain. *Science-Fiction Studies*, 32, 301–315.
- Wojcik, D. (1999). *The end of the world as we know it: Faith, fatalism, and apocalypse in America*. NYU Press.
- Youvan, D. (2024). Exploring common themes in dystopian fiction. <https://doi.org/10.13140/RG.2.2.23807.21922>