From Human Hands to Machine Algorithms The Evolution of Byzantine Iconography in the Age of Artificial Intelligence

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Abstract. Byzantine icons are sacred art forms that connect with the divine through meticulous techniques and deep symbolic types. Today, Artificial Intelligence (AI) introduces a new dimension to iconography, challenging traditional iconography. This presentation will explore the evolution from hand-painted icons, especially from the region of Selinon (Chania, Crete), to machine-generated interpretations. It will also discuss the philosophical implications of AI-generated Christian icons, questioning whether algorithms can capture the divine inspiration of human creators and their impact on religious societies. Furthermore, it will focus on the tradition of Orthodox iconography and its social importance in preserving it. This exploration highlights AI's potential to preserve and reimagine Byzantine iconography.

1 Introduction

What is the primary purpose in our era when it comes to iconography? To create the perfect icon or to link the depicted face with the sacred through art? We certainly know that the second one was the main point of Byzantine iconographers. However, today marks an era that approaches the "perfect" result, and New Technologies play an essential role in this. Of course, the new Artificial Intelligence creates the perfect consequence, missing failed details that a human hand can make.

The article's methodology is intentionally interdisciplinary, combining qualitative art-historical analysis with digital and computational approaches. First, the research is grounded in established iconographic and iconological methods, drawing on canonical Byzantine visual theory, stylistic comparison, and theological symbolism to define the parameters within which AI-generated or AI-assisted imagery is evaluated. This ensures that computational outputs are not treated as autonomous artifacts but are critically assessed against historically and theologically informed criteria.

Second, the study employs experimental engagement with AI image-generation and analysis systems, using them as heuristic tools rather than authoritative agents. By prompting, modifying, and analyzing AI-generated visual outputs inspired by Byzantine iconographic conventions, the article examines how algorithmic processes interpret formal structures such as hieratic composition, symbolic abstraction, and stylistic

continuity. This practice-based methodology allows for the identification of both the capabilities and limitations of AI when confronted with a visual tradition governed by strict canonical rules.

Third, the article adopts a comparative methodological framework, juxtaposing human-crafted icons with machine-assisted or machine-generated images. This comparison is not quantitative but critical and interpretive, focusing on visual coherence, theological legibility, and the role of intentionality. Through this approach, the article highlights methodological tensions between embodied artistic knowledge and data-driven pattern recognition.

Finally, the methodology incorporates critical theory and ethics of technology, addressing questions of authorship, authenticity, and agency. By situating AI within broader debates in digital humanities and visual culture studies, the article proposes a reflective methodological model for responsibly integrating AI into the study of sacred and historically embedded art forms.

Through this multi-layered methodology, the article aims not only to analyze AI's application to Byzantine iconography but also to contribute a transferable methodological framework for future research at the intersection of art history, theology, and artificial intelligence.

Byzantine icons, central to the liturgical and devotional practices of the Orthodox Christian tradition, are revered not only for their aesthetic qualities but also as a link to the divine. Traditionally created through meticulous manual craftsmanship guided by canonical guidelines, these works encapsulate a fusion of art, theology, and cultural (local or not) history. However, the digital revolution—especially the rise of AI—has introduced new methodologies to engage with this historical and cultural heritage.

Artificial intelligence offers unique tools to analyze iconographic patterns, automate restoration techniques, and create original artworks representing traditional styles[1]. Yet, these advancements provoke critical questions: Can machine-generated icons hold spiritual or cultural significance? What does it mean for an icon to be "authentic" in an age where algorithms play a role in its creation? This paper addresses these questions, focusing on the implications of AI for Byzantine iconography.

2 The History of Icons

But let's look at the icons' historical background for a while: The Christian icons result from pagan art. The transition from pagan art to Orthodox iconography is a multidimensional phenomenon, controversial until the Second Ecumenical Council in 787 (seven hundred & eighty-seven) when the rejection of pagan attributions to Orthodox icons was established[2]. One could argue that the element of Ancient Hellenism contributed to this confusion: In Greek and Roman Pagan Antiquity, there was a belief that

[1]See Guo, Yanming, et al. "Deep learning for visual understanding: A review." Neurocomputing 187 (2016): 27-48; Voulodimos, Athanasios, et al. "Deep learning for computer vision: A brief review." Computational intelligence and neuroscience 2018.1 (2018): 7068349

[2]See *The Orthodox Church*, Bishop Kallistos (Ware) of Diokleia, Penguin Books, 1993

idols embodied divine powers and were considered supernatural[3]. The advent of Christianity, however, while retaining the depiction of divinity, rejected the worship and priesthood of the material issue. The icon in Orthodoxy and the early Christian centuries was used as a passage to the Christian faith by simply depicting the divine. Christian iconography began from symbols and figures shown in catacombs during the first three Christian centuries. These elements contributed to sending a message of faith to humanity rather than their worship while also constituting an aid to prayer. Then, in the following centuries, Fathers of the Church, such as John of Damascus, put forward the theory that since God was incarnated in the form of Christ, his human representation was permitted. The icon is not venerated as a material thing but constitutes a means of linking communion and man with God. Over the centuries, the controversy between the faithful and the Church about the idolatrous nature of icons has been refuted, as the view has been expressed that the relationship between the faithful and the icons is merely an aid to communication with God -and later with the Saints as well[4].

3 The Byzantine Icons of the Region of Selinon

Today, we will focus on the icons and frescoes from the Temples of Selinon (Chania, Crete), and we will all notice the concepts and details of each picture presented together. Most of these images are dated to the 14th-15th centuries. We will see and focus on the painting techniques, the colors, the items depicted in the icon, and the relevant text. Here, I'm placing a typical icon of Christ Pantocrator that depicts all the techniques of the Cretan school, and we assume that it belongs to the 15th-century iconographer Angelos Akotantos[5]:

[3]Leora Batnitzky (2009). *Idolatry and Representation: The Philosophy of Franz Rosenzweig Reconsidered*. Princeton University Press. pp. 147–156
[4]Sharot, Stephen (1976). Judaism: A Sociology. New York: Holmes & Meier Publishers. p. 42; *Images, Veneration of*, Elwell, Walter A., ed. (2001). *Evangelical Dictionary of Theology. Baker Academic.* p. 594
[5]Varalis Yannis (2013-2014), The painter Angelos Akotantos in Constantinople? Answers from the Pantokrator Icon at the State Pushkin Museum, Moscow, In Vassilaki Maria (ed.), *Μελέτες για το ζωγράφο Άγγελο, την εποχή του και την Κρητική Ζωγραφική*, Benaki Museum, 13-14

Fig 1. Christ Pantokrator by Angelos Akotantos, 15th century

Christ Pantokrator (15th Century): This is an icon painted by the iconographer Angelos Akotantos. The Christ is presented according to the Cretan iconography school, wearing bold colors and holding the Gospel. His right hand makes the blessing gesture.

Fig 2. St. Stephen, Plemiana, Crete (13th-15th century)

St Stephen: This image shows a weathered Byzantine or post-Byzantine fresco, likely from the late 13th–15th century and part of a larger church wall painting program. The figure—identified as a saint by the ochre halo and accompanying Greek or Church Slavonic inscription—is rendered in a style typical of the Balkan and Greek Palaeologan tradition: elongated facial features, expressive eyes, soft modeling, and earth-tone pigments. The white tunic with red edging and the linear contouring of the face further support this attribution. The fresco's deteriorated surface, with flaking plaster and pigment loss, suggests long-term exposure to moisture or insufficient conservation.

Fig 3. St George, Late 13th-15 century, Anydri, Chania, Crete

St George: This image also appears to be a Byzantine or post-Byzantine fresco, likely from the same broader artistic tradition and era—roughly the late 13th to 15th century. It shows a saint or angel, indicated by the golden halo and the stylized, idealized facial features typical of Byzantine sacred art: large almond-shaped eyes, elongated nose, and softly shaded skin tones. The tightly curled hair, red tunic, and traces of wing-like patterns suggest an angelic figure, consistent with iconographic conventions in Balkan and Greek church murals of that period. The surface shows significant wear, with abrasion and pigment loss characteristic of aged frescoes exposed to moisture or partial deterioration in situ. Overall, it reflects the refined linearity and expressive spirituality of the Palaeologan artistic revival.

Fig 4. The crucifixion, Kakodiki, Crete, 15th Century

This fresco depicts the Crucifixion in a distinctly Byzantine style, characterized by elongated, solemn figures, gold halos, and symbolic rather than realistic space. Christ's slender, curved body and the emotional gestures of the Virgin Mary and John reflect the heightened pathos typical of the 15th century Byzantine art. The warm ochres, strong outlines, and stylized architecture suggest a Balkan or Greek Orthodox monastic

setting, where such murals served liturgical and devotional purposes as part of a larger Passion cycle.

Fig 5. Detail of the Punishment, Voutas, Crete 14th century

This fresco fragment appears to depict three bound figures, likely Old Testament or mythic personifications, shown with serpentine coils wrapped around their bodies. The style and the surviving Greek inscriptions suggest a Byzantine or post-Byzantine context, but the imagery is unusual for standard biblical narrative scenes. Instead, it resembles the iconographic tradition of allegorical or moralizing figures commonly painted on narthex walls or monastic refectories between the 14th and 18th centuries. The looping snakes or ropes imply themes of spiritual bondage, sin, or temptation. Byzantine and later Orthodox art frequently personified vices—such as Lust, Anger, Gluttony, or Idolatry—as human figures restrained or tormented, sometimes labeled with explanatory inscriptions. The partially legible names above the figures (likely corrupted or regional Greek spellings) reinforce the idea that these are named allegorical characters rather than historical individuals.

4 AI's "Icons"

Now, let's look at what artificial intelligence has created. AI has been asked to make some Byzantine-style icons, and the result was surprisingly negative! The program used for this is a paid subscription one (Canva), and it is considered one of the most effective online graphic design programs.

This AI-generated icon contains several clear deviations from authentic Byzantine iconography: the inscriptions are incorrect or nonsensical — most notably "BYZANTIA" above the Cross instead of the proper INBI or "King of Glory," and the labels for Mary and John are garbled rather than the standard MP ΘY and "Saint John." The style also breaks iconographic canons by using smooth digital gradients, naturalistic anatomy, and Western-style drapery instead of the abstract, symbolic modeling of real icons. Important theological elements like Adam's skull, proper proportional relationships, and canonical color rhythms are missing or misrendered, and Christ's cross-halo is inaccurately formed. Overall, the image resembles Byzantine art superficially but ignores its strict symbolic, technical, and theological rules.

Fig.6. The Crucifixion

Fig.7. Archangel Michael

This AI-generated image departs from authentic Byzantine iconography in several key ways: it uses English inscriptions and modern fonts instead of the traditional Greek title for Archangel Michael; its smooth digital shading, glossy textures, and naturalistic anatomy contradict the abstract, symbolic modeling of true icons; the garments and wings are rendered with decorative, fantasy-style details rather than canonically restrained forms; the halo is designed as a modern ornamental circle instead of a simple gilded disc; and the overall color palette relies on artificial, digital hues unlike the mineral pigments of traditional icon painting. Altogether, it imitates the look of an icon superficially but breaks the theological and stylistic rules that define genuine Byzantine iconography.

Fig.8. Virgin Mary

This image shows several features that reveal it is AI-generated rather than a genuine Byzantine icon: the face is modeled with soft, naturalistic shading and photographic skin tones instead of the abstract "light-over-dark" geometry that defines traditional icon flesh; the drapery folds are rendered with modern digital gradients and fabric-like textures instead of the angular, symbolic highlights of Byzantine garments; the gold detailing on the robe is ornate and decorative in a way that reflects contemporary illustration rather than liturgical symbolism; the halo is overly smooth, perfectly airbrushed, and missing the simple incised lines typical of real gilding; and the background architecture, though vaguely medieval, lacks the stylized proportional distortions used in authentic icon design. Overall, the image imitates the aesthetics of an icon but breaks key theological and technical conventions, resulting in something closer to a polished digital painting than true iconography.

5 Conclusion

The interplay between Byzantine iconography and artificial intelligence reveals both opportunities and challenges. While AI enhances our ability to analyze, preserve, and reinterpret this artistic tradition, it also prompts critical reflection on the nature of creativity, authenticity, and sacred art. Traditional human art creates the benefit of dialogue between artists and allows art to gather and exchange opinions. Furthermore, the human feeling when making the icon is irreplaceable, and the affections a human technique receives (such as the Cretan school of art, Minoan civilization, Egyptian Fayum portraits, etc) cannot be adapted to AI. However, by creating a dialogue between technologists, art historians, theologians, and artists, we can navigate these complexities and ensure that the integration of AI respects and completes the legacy of Byzantine icons. However, the question still remains: Can AI replace human art after all? In my

opinion, the short answer is no -at least until this day. Although AI can assist in many iconography challenges (such as restoration, preservation, and completion of the icon), several parameters must be considered to create a complete "authentic" and historically accurate icon. There is the history of clothing, the application of specific colors on each figure, the matter of the Gospel-holding, the blessing gesture, and the characteristic shadows (lighting and contrast) on the face that define the Cretan School[6] and need to be at the center of each Byzantine-type icon. We cannot predict the technological future, but when it comes to the present, Artificial Intelligence has a lot to learn from the Byzantine iconographers!

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[6]On the topic see Manolis Chatzidakis, in *From Byzantium to El Greco*, esp. p.42, Athens 1987, Byzantine Museum of Arts; Vasilaki Maria (ed.), 2010, *Χειρ Αγγέλου, ένας ζωγράφος εικόνων στη βενετοκρατούμενη Κρήτη*, Benaki Museum, Athens