

# Traditional and Modern Methods for Art Authentication

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## Abstract

In this article, we address the concept of art forgery as a major current challenge within the art world for collectors, art investors, auction houses and others. Within this context, we discuss art authentication as well as a few innovations in modern technology (such as artificial intelligence (AI), X-ray scanning and pigment analysis) that are increasingly available to authenticate artworks, primarily paintings.

Thanks to new technologies based on extremely efficient algorithms and extensive databases, the digital authentication process is now relatively simple for the collector: to take a photo of a particular painting, to send this to an emerging AI-analysis expert. Thus, it is no longer necessary to physically arrange for expensive and complicated transport of the given painting which can involve elaborate packing, custom declaration forms, insurance, etc..

The AI art expert shall then be able to compare the stroke patterns in the painting in the photograph against their database, paint thickness, brush type, etc.. This database is a bit like a “library” of what the provider may have already uploaded directly, photographed, or obtained from other sources and already have available, known to contain pieces that are authentic, typically coming from well-researched art collections of well-known museums.

The key to accepting and using new technology in authentication is to use

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it in conjunction with traditional methods— not as a replacement. Technology based authentication solutions are collaborative and compatible with others and are not meant to replace them. Thus, collectors may adhere to a solid due diligence relying on a combination of human expert assessment, historical provenance research, chemical analysis and AI based authentication.

Authenticity is of course the factor that dictates the purchasing price for any piece of art. And, equally so, it dictates the pattern of accrual in value that might be expected. Testing for authenticity is, in other words, critically important when it comes to investing in art.

**Keywords:** Art Authentication, Traditional and Modern Methods, Concept of art forgery, Art investors, authenticate artworks,



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## Introduction

Art authentication determines whether a particular piece of art is real or fake, both in order to determine the value of the artwork at a given point in time, and to assess what might be a likely scenario for the value appreciation of the piece over time.

To know whether a work of art is actually authentic is thus particularly important when it comes to deciding whether or not to purchase a particular artwork. (Candela, Lorasso & Matteucci, 2009).

Art forgery is definitely one of the biggest challenges (if not the biggest) faced nowadays by art collectors. Authorities estimate that around 50% of traded art is forged (Walther, 2014; Artnet News; 2022; Art Observed, 2022), whereas in countries such as Russia and China this can be as high as 80%. One of the most famous cases is Wolfgang Beltracchi, who managed to deceive the art market for more than 30 years by producing and selling forgeries. Modern technology, particularly that which uses artificial intelligence (AI), has dramatically simplified and expedited procedures for art authentication both when it comes to speed as well as costs. So, the process itself is much simplified, i.e., collectors just have to photograph their art piece instead of packing a shipping to a different country. In this article we shall discuss this, by reviewing traditional approaches to art authentication, as well as how this task might be approached today, given AI (The Guardian, 2021).

The focus for our article is for the typical purchaser of art, such as art collectors. But auction houses as well as art dealers may also find our article of interest. Also, we shall exclusively focus on recognition of authenticity for paintings and drawings in this article, and not on photography, sculptures or art installations.

## Traditional approaches

To rely on trusted experts is central here. Such experts might typically be found through reputable auction houses as well as through reputable art dealers. Most reputable auction houses must actually guarantee the authenticity of every piece they sell. The same is the case when it comes to good art dealers.

To develop a long-term relationship based on trust is essential when it comes to building a network of qualified, experienced and solid experts. Thus, it goes without saying that such

experts should be reputable in their own right. So, it is fundamental that a particular art collector, for instance, relies on a relatively small member of such experts.

From the point of view of collecting and investing in art, authentication is the biggest risk factor. Collectors should adhere to a comprehensive due diligence relying on expert assessment, provenance research, chemical analysis, and AI based authentication. Regrettably there doubts may still arise when it comes to the authenticity of particular pieces of art. Such doubt may come up much later in time. Testing might be called for. Some may choose to begin first with AI based testing, then an expert— whereas others may opt for the other way around. It is up to the purchaser to decide whether the first step. Blockchain is useful for securely storing information about artworks. Blockchain authentication is applicable to living artists, who are themselves able to confirm their authorship of the respective artworks, before storing the information on the blockchain. Obviously, this is not possible for deceased artists; therefore, in this case it is necessary to authenticate the artworks differently (e.g. through AI/deep learning methods) before putting them on the blockchain.

For the technological authentication, there are two main approaches: X-ray scanning and pigment analysis. X-ray scanning might reveal a lot, particularly when it comes to the extent to which a particular piece of art might have been “painted over”, i.e., where an artist might have wanted to alter the motive. Such analysis might provide input to particularly trained art experts say, when it comes to determining whether a given motive might represent what might be considered typical for the artist at a given time period.

A final step to determine authenticity might be to undertake some of the invasive testing.

This typically involves particular testing of paint particles taken from the piece of art.

- Chemical testing, particularly to determine age.
- Testing of a particular color type. Was this in use when a painting might be claimed to have been created?

These steps of testing for authenticity shall typically lead to more and more certainty when it comes to whether a painting is original or not. The dilemma, however, is that they tend to take more and more time, and are becoming increasingly expensive as well. For this reason, it is typically not practical to go through all these steps before deciding to purchase a particular piece of art. To rely on one’s auctioneer contacts or one’s trusted art dealers has traditionally typically been the only step taken.

## Today's reality

To be able to make relatively fast and inexpensive testing for authenticity by drawing on AI has opened up a new reality when it comes to testing today (www.efma.com, 2021). For example, this involves analyzing particular patterns of strokes, paint thickness, brush type, etc. when it comes to how a given artist paints, quite analogous to how to verify the authenticity of handwriting. Thanks to new technologies based on extremely efficient algorithms (Gaulhofer K., 2021) and extensive databases, the process is relatively simple: to take a photo of a particular painting, to send this to an emerging AI-analysis expert. Thus, it is no longer necessary to physically arrange for expensive and complicated transport of the given painting which can involve elaborate packing, custom declaration forms, insurance, etc. AI is an accessible, modern, objective method to authenticate art. It is very fast and easy to use by collectors, who just have to take a decent photograph of the artwork in question using their smartphone and upload it onto the AI service provider's server. The AI expert shall then be able to compare the stroke patterns in the painting against their database, which is a bit like a "library" of what the provider may have already uploaded directly, photographed, or obtained from other sources and already have available. This "library" is known to contain pieces that are authentic, typically coming from well-researched art collections of well-known museums. All the images in the library are documented in catalogue raisonnées and have a CR number (Customs Registration number). If for example an art piece from a museum does not have a CR number, they do not include it in their library. Art authentication therefore has thus become more simple, fast and inexpensive.

A pioneering expert when it comes to the type of AI-based testing is the Zurich-based firm Art Recognition. This firm helps to get a fast, unbiased opinion about art authorship in a simple and accessible way, via computer-based analysis of the artist's strokes, based on research partnership with Tilburg University (The Netherlands) and thanks to its own rapidly growing database of authenticated artworks.

Thus, this new way of testing, based on the emerging AI-based technology, being simple fast, and inexpensive, allows for testing to be made before the decision to acquire a particular piece of art. And it opens up for more precise ways of doing business for auction houses, as well as for art dealers.

Let us finally delineate what so-called “Blockchain” authentication might imply, particularly to avoid confusion with the more general AI-based authentication approach. One main worry with blockchain authentication is that a piece placed on blockchain in one location in the world, may not be guaranteed to be the same piece that shows up in another location. In other words, on the blockchain, is a piece truly unremovable? Do we know enough? Blockchain, although impressive, is relatively new, and perhaps there are ways to manipulate (Kelly, 2022).

## Conclusions

To authenticate art has been a challenge for a long time. From the point of view of collecting and investing in art, authentication is the biggest risk factor. Collectors should adhere to a solid due diligence relying on a combination of human expert assessment, historical provenance research, chemical analysis and AI based authentication. Authenticity is of course the factor that dictates the purchasing price for any piece of art. And, equally so, it dictates the pattern of accrual in value that might be expected. Testing for authenticity is, in other words, critically important when it comes to investing in art. For many years, such authenticity testing has been both expensive and time consuming. Today, however, with the advent of AI-based technology, a new reality of testing has emerged – fast and inexpensive (The Economist, 2021). The pattern of steps taken when acquiring art is thus changing. Today, testing to verify authenticity can be done before making an art investment decision. Additionally, the key to accepting and using new technology in authentication is to use it in conjunction with traditional methods— not as a replacement. Technology based authentication solutions are collaborative and compatible with others and are not meant to replace them.

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