PROJET PERSONNEL EN HUMANITÉS

Introduction to the Nature and Consequences of the Relationship between Digital Art and its Industry

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Contents

1. *Preface and elementary concepts*

Before working our way to the core of our subject, we explain here a few fundamental principles as well as define some of the terms we will use later on. We begin by laying out the basis of the two philosophical concepts of Art and Technique as defined by the first philosophical thinkers who took interest in the matter. We then show how those definitions have evolved in a way that is applicable to society, which presages the evolution of Art and Technology through the appearance of the digital arts.

1.1 ART, CRAFT, TECHNIQUE AND PHILOSOPHICAL PRINCIPLES

We explore here some of the principles that have been defining the relationship between Art and Technology since the Antiquity. Those principles lie at the base of the mutations which are currently occurring in the creative and digital industries and apply to all forms of artistic practice.

1.1.1 Art and Technique as two opposites

During the philosophical golden age of Antiquity, Art and Technique were defined as two major concepts of Human Culture. While they both are the result of productive work, the technologies born from Technique and the aesthetics stemmed from Art were seen as opposites under many factors. Most of the ideas that derived from those factors can be summarized under two principles : purpose and nature.

The first principle defines the *purpose* and therefore intent behind the practice of Art or Technique. Art was defined as purposeless which means that it doesn't need to have a utility whereas technology born form Technique need to be useful according to certain tasks they are born to accomplish. The *purpose* however does not dictate the *use* as artworks are made to be *appreciated* and gazed upon by a public hence the need to pursue aesthetics, as according to Aristotle's work *Poetics*. Technique on the other hand finds its use through *exploitation* and utilisation for which technology is made.

The second principle adds an opposition in *nature*. This is to say an artwork *exists* as its *original* product alone. Any copy of an artwork therefore isn't born from the same process as the original, the artistic process, but rather from a crafting process. Thusly, any copy of an artwork does not possess artistic value while a copy of a technical product retains the *same* value as the original. One could even say that the idea of an original product does not make any sense when it comes to technologies, which is fairly conceivable.

1.1.2 The modern conception of Art and Craft

The factors of opposition detailed previously have been heavily criticised throughout History, by both philosophers and artists. The conception we now have of those two concepts evolved greatly from the artistic revolutions of the 20th century and even further with the digital revolution (cf. §3). Consequently, there is a need to correct some of the ideas explained earlier, starting from a very important and fundamental assessment : Art cannot exist without getting involved with Technique. Those two concepts therefore cannot be incompatible in the artistic practice. Besides the technique required to produce art, *tools* are also required to produce artworks (cf. §1.2.2). Furthermore, those tools must be the product of craftsmen and require Technique to be made.

Regarding the *purpose* of artworks and technical products, it has been observed that both Art and Technique can be traded for monetary compensation. Financial gain is therefore a valid purpose of the production of Art, for which time, skill and work is necessary and must be compensated for. This is contrary to the hypothesis according to which Art is deprived from any intent and should have no use but the pursuing of beauty. Moreover, Art is also able to convey social and political messages as demonstrated in History.

Finally, copies of artworks can also retain artistic value as per digital artworks (cf. §3.3.2), which possess intellectual and monetary value regardless of originality.

1.2 DIGITAL ART

What is Digital Art ? Before analysing the mechanics of the creative and digital industries, we introduce here a few ideas that are crucial to the understanding of this new and peculiar form of Art.

1.2.1 The two approaches of Digital Art

While digital art embodies any form of artistic practice achieved by using a digital tool set[1], its realm can be in most cases roughly broken down to two approaches : the digital artist is either a part of the digital creative industry and therefore has more affinity with technologically oriented processes of art (cf. §3.2) or someone closer to conventional artistic practices and has been using technology as subjects and tools to produce his or her artworks (cf. §2.2.2). These two approaches differ drastically in their use and application of digital technologies and therefore need to be considered separately.

The first category of digital art (excluding hobbyists) represents a *line of work* close to an *industry*. People who practice art in this category are illustrators, graphic designers and modelers, digital composers and musicians, etc. These professions constitute the modern *creative industry* and have contributed to the thorough development of the digital arts and the evolution of the very definition of what is considered as an artwork today (cf. §3.2.2). More often than not, these artists work from within a company like any industrial worker, or as freelancers as per contemporary business practices. Indeed, Art is seen here as a business product, subjected to supply and demand factors influencing a *market*. Historically, the creative industry was born following the appearance of digital media[2] which favored the need to produce large quantities of artistic assets to function (cf. §3.2). Two of those early media were the Internet and the video game industry. The former brought basic *aesthetically pleasing* graphics processing and the latter stimulated the development of digital music and 2D then 3D works before the use of cinema CG.

The second category of digital artists are above everything else *artists* and have no other employment title related to the industry. Some examples include photographers, filmmakers, online novelists, performance artists and composers. Those are therefore actors from the broader artistic community who took interest in the potential of electronic technologies to incorporate in their art or simply to explore. The History of this Art *gone digital* also dates back to early applications of the progress made in the 1960s regarding communication networks and concepts of *hypermedia* which would allow for documents and sounds to be linked over connected electronic devices. Decades before the digital revolution, artists from movements such as Dada took an interest in the industry's shift towards electrical devices and its implications for Art.

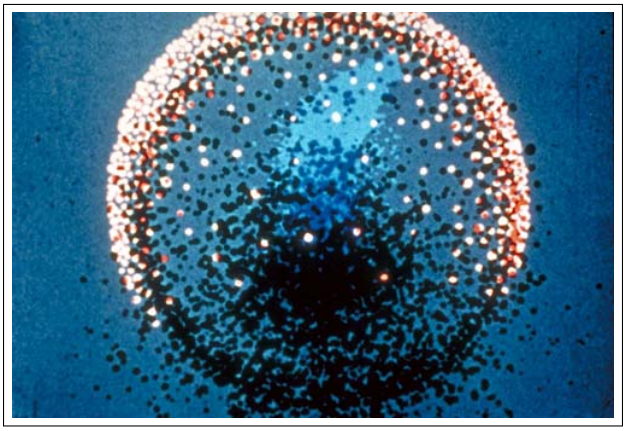

Figure 1.1: From *Yantra*, 1957, James Whitney, filmmaker dedicated to abstract cinema

1.2.2 A new generation of tools

The core of a digital artist's tool set is the computer or precisely the computation power offered by a processor, whether it is embedded on a robot or inside a personal computer while running softwares processes. However, similarly to the approaches (cf. §1.2.1), the tools used in order to produce digital artworks differ according to their users. Due to its industrial nature, the creative software and hardware markets are in fact dominated by a handful of professional solutions required and used by most of the content producers whereas dedicated artists enjoy much more freedom regarding the material they may use during their exploration of the digital medium.

Namely, common applications which are considered as staples in the digital industry include the infamous *Adobe Creative Cloud* suite (mainly Photoshop, Premiere Pro, After Effects, InDesign and Illustrator) but also SYSTEMAX's *PaintTool SAI* or *Clip Studio* for illustrators, Autodesk's *3DS Max* and *Maya*, Pixologic's *ZBrush* licenses for 3D artists and Digital Audio Workstations such as *Ableton Live* or Apple's *Logic Pro X*. As for the hardware, most professional graphic arts only require a pen tablet besides a computer while digital musicians may need to invest into a wide range of different devices comprised of synthesisers, sound systems and multiple types of audio workstations (kick generators, loopers, rhythm and bass machines, etc).

Figure 1.2: The newest wacom graphics display : the Cintiq 32' ©wacom

While softwares and computers are acting up as paint tubes and canvases for artists who are already practicing digital art, those who are still exploring its possibilities on the other hand are free to resort to any new technology they deem fit to the task, including VR (cf. §2.1.1) and robots[3]. Among those artists is Aydın Büyüktaş[4], a Turkish photographer and 3D artist who recently gained exposure through his works in photography by using drones and post-processing to create paradoxical sceneries.

Figure 1.3: *Grand Bazaar*, from the artist's *Flatland* gallery ©Aydın Büyüktaş

Due to the freedom and amount of technology that is available to them, contemporary digital artists have the possibility to challenge their creativity even further compared to other artistic fields hence the exploratory nature of the majority of work that is being done as of today. Given the progress and innovation factors that are fueling the digital industry, this phenomenon is likely to continue and may very well be a legitimate part of the digital arts' contemporary process.

2. *Art and Technology*

In this chapter, we focus on further describing the historical relationship of mutual influence that exists between Art and Technology (cf. §1.1) and its current form through the appropriation of digital technologies. As previously explained, Art and Technique have been two deeply connected concepts throughout the history of Culture and modern digital Art does not contravene that observation. On the contrary, we show that it carries on respecting this relationship as we first discuss the stimulating nature of Art to the development of new technologies. We then focus on exploring how digital tools can be used to make art.

2.1 A DRIVING FORCE FOR NEW TECHNOLOGIES

When considered as a tool, existing tech can be given a new purpose through Art, yet it can also be the source of new innovations when necessary. We explore here these two possibilities through cases that show how these principles apply to the digital world.

2.1.1 The possibilities of VR

Ever since the appearance of computers, the creative industry has been one the fastest communities to be able to smell potential through their repurposing for making art. The day computers became capable of processing graphics through displays prefigured the birth of pixel art, and much later Photoshop. When progress was made in signal processing and digital sampling, synthesisers and later MIDI recordings also became possibilities. As such, we are currently witnessing the appearance of a new case of technology finding its purpose through Art : Virtual Reality.

Among all the possible applications of VR which are currently investigated, the one that interests us was first offered and popularised by Google, in the midst of its effort to explore artistic potential of new technologies (cf. §2.2.1). The result became known as *Google Tilt Brush*, followed by a few other softwares such as the VR version of the infamous *Substance Painter* or Facebook's *Quill*. Unsurprisingly, the idea was to first target a specific audience to evaluate the potential of such a tool. The first users of Tilt Brush were therefore professional artists and designers from multiple sectors including fashion, architecture or automobile. However artists beyond the design industry quickly outnumbered their counterparts are we now see illustrators, 3D and environmental artists and sculptors alike exploring the new platform and producing their first pieces[5,6].

Figure 2.1: Tilt Brush showcase in Paris ©Gerada Studio

Given the current aspects and results being produced, one can naturally experience some reservations regarding the long-lasting potential of VR in the creative industry. What's more, most of the current work which is being done via those softwares are not intended for industrial or commercial use. Despite the value of pursuing Art as a sole motive, VR technology still has the need to be perfected in order to extend its lifespan and be recognised as something more than a game or a sketching tool.

The artistic community is however very optimistic regarding the future of a VR-comprised creative industry[6]. Among the benefits that are often quoted, VR is cited for its ease of use and effectiveness while representing 3D space. Those signs show that the possibilities of such technology are indeed real while only being restrained by technical drawbacks as of today.

2.1.2 The case of wacom : a tech firm driven by the Art market

Besides exploiting existing technologies, the creative community has been known for fueling innovation and pushing for new discoveries for as long as artists have been making art. When it comes to the digital industry, the case we ought to discuss would be the one of *wacom*, a Japanese tech company and pioneer specialized in interactive systems bearing stylus technology.

While the important part that wacom played in the development of touchscreen technologies has been obscured by the work of Apple, the Japanese firm remains a leader which needs no introduction or self-proving in regards of the creative industry. In fact, before the global *iPhone revolution*, touch-sensitive displays were already the focus of an entirely different and much smaller market : computer devices for artists.

Figure 2.2: The first graphics tablet ever released ©Apple II Doc. Project

Apple in 1979 then took the initiative by developing an accessory for the *Apple II* which purpose was to allow user input based on stylus contact on a screenpad. This first device came as a response to the birth and development of CAD solutions and even preceded the first wacom tablet by 5 years[7]. At that time, the birth of a new market fueled the invention of multiple technologies and devices among which were the ancestors of modern laptop trackpads[8]. In this context, the strongest innovation appeared in the hands of 1983-founded wacom, proposing an application of magnetic waves emitted by the screen and captured by the pen to ensure wireless and batteryless styluses[9,10].

The appearance of personal computers therefore motivated the creative community to update their tools through efforts of repurposing computers' calculation power in design applications which in turn sparked the idea of touch-based inputs. Despite Apple redirecting their efforts towards touch sensitive displays, wacom saw the opportunity to join a race based on innovative technology which allowed them to gain the monopoly of the whole creative display system's market until recent months.

2.2 Exploring the artistic potential of Technology

We have just seen how technology evolves and finds new applications through Art. To further explore this idea, we present here some of the current initiatives created in order to develop the potential of new technologies in an artistic fashion or for artistic purposes.

2.2.1 Google is making Art

While the role of the infamous tech giant in the digital industry is well-known, few people were aware until recently of the interest it has been holding towards Art. And yet Google has been collaborating with artists ever since it started expanding its activities beyond their work on their search engine. We will discuss their prime reason for getting involved with Art in §3.3.1 while focusing here on their effort on exploring the artistic usability of digital technologies.

As explained previously, research in artistic applications can lead to new financial opportunities and victories in the modern creative market (cf. §2.1.2) especially now that it is well implanted within the digital industry. Therefore it is of no surprise to see the world's first-to-second most valuable brand[11,12] investing considerable amounts of resources in art-related research and development projects. One of those initiatives is the Google Arts&Culture Institute and its physical HQ in Paris, *Le Lab*. This project was initially created as a web compendium featuring entire portions of hundreds of world famed galleries, museums, cultural monuments and database documents digitalised[13]. Since its mission of digitalising art (cf. §3.1), the initiative also evolved into establishing a physical office available for artists to use[14] and even includes a VR laboratory. The intent here would be to aid artists through work resources or even lodging and observing their use of the technologies in return. The motivation behind *Le Lab* has been however subjected to criticism and even inducing boycotts from French officials[15] as gathering such data about artists and the methods justified as trade-offs can lead to skepticism from the general opinion, considered the nature of the multi-billion tech firm. Despite the almost certain possibility of a camouflaged R&D project, the Google Institute still shows the importance of exploring artistic applications of new technologies under the relationship existing between the creative community and the digital industry.

2.2.2 The Paris Nemo Biennial of Digital Arts

With the increase of digital artists, artists exploring digital tools, collaborations and projects intended to help them, it has become possible over the recent years to gather artworks and their creators through various events, namely exhibits and conventions. Those events have the objective of both providing exposure for the artists and their work but also to gather feedback from the mainstream public regarding digital Art.

The most recent and relevant example of this is the Nemo Biennial of Digital Arts that took place in Paris from October 2017 to March 2018. During these 6 months, no less than 130 events attributed to 190 artists took place according to the biennial's webpage[16]. These events

include exhibits, shows and performances, concerts and panel conferences all centred around digital arts. While artists have been experimenting with digital technologies to find their potential for decades (cf. §1.2.1), awareness about those technologies from both outside and within the artistic community is still very limited. There is also a need to experiment with the newest and latest technologies as well. The Nemo Biennial therefore features experiences like *Lévitation* by D. Guez et B. Didier which uses VR headsets and neural sensors or *#SoftLove* by Frédéric Deslias which explores the hypothetical point of vue of a digital personal assistant[17].

Figure 2.3: *Semi-Senseless Drawing Modules* by yang02 which had a performance in Gare de Lyon, Paris (photo was taken at the Tama Art University 80th Exhibition in 2015, Tokyo) ©Rakutaro Ogiwara

3. *An evolving relationship*

What makes the relationship between digital technology and Art special resides in the fact that it has overtaken the way that previously technology used to interact with artistic fields (cf. §2.1). Just as these changes motivated the production of this report, they are the main focus of the following sections. Our aim here is to first bring up the general tendency of all forms of contemporary Art to become digital. We then focus on presenting the major increase in both demand and production of Art our society is experiencing, only to come down to an exposition of the new problems such mutations can cause in a modern and digital era.

3.1 THE DIGITALISATION OF ART

The digital revolution has brought with its advent incredibly efficient ways to spread knowledge on the Internet. As a result, we are currently experiencing the transformation of quantities of art both through the digitalisation of old pieces and the creation of new ones directly saved on electronic platforms and devices alongside their analogical counterparts.

3.1.1 Different paces of digitalisation

When the digital revolution occurred in the 1960s, it had not yet affected most of the artistic fields that are today importantly digitalised[18]. Just like the different aspects of society, the shift towards electronic devices came at various paces for the different art genres and their use of technology. What's more, his phenomenon especially had to tackle some of the values attached to tradition and respect of old processes that have been deeply rooted in the classical arts.

As a result, different technologies brought with them different tendencies within the artistic community : the market transition towards compact discs occurred in the late 1980s[19] while digital cameras for photographers and consumers only entered the market in the late 1990s[20], the same time as digital cinema projectors. Contemporary artistic fields in the likes of photography or cinema therefore adopted digital media rather quickly while more traditional fields such as music, literary or fine art genres saw a shift between the traditional community and innovators like Dadaists (cf. §1.2.1). The Internet and digital technologies also favored the conception of artistic practice as recreational activity besides the appearance and increase of independent artists. Since the digital arts have become gradually more accessible, Art itself has become available to virtually anyone to produce or enjoy. This has caused a change in the relationship between people and their comprehension of Art, thus raising new issues such as the disappearance of its value as a profession in the common opinion.

3.1.2 The resurgence of Classical Art through digital applications

Accompanying the initiative of various institutions and actors to provide exposure to classical arts (cf. §2.2.1) and make them available to a new generation of Internet consumers, recent exhibits have been known to provide interesting Internet experiences such as the online Monet exhibit open for the 2010 gallery at the Grand Palais in Paris[21] or the interactive visiting section of the Louvre's website[22].

Despite its incompatibility with digital processes, today's Classical Art has found through technology some ways to spread its influence and save its heritage. Most international art museums now possess some degree of digital technology to guide and introduce their visitors to their collection and some modern approaches are even considering *blockchain* approaches for handling dealings in the Fine Art market and prevent fraud[23].

3.2 THE DIGITAL ERA AND EXPLOSION OF ART DEMAND

A digital society rests upon the perpetual production of both data and content. Concerning the later, producing content has become possible with the enhancing of the digital tools which are now used to make artistic assets quicker and better. However despite this change of pace, we always seem to be in need of more art for our businesses, websites, games, films...

3.2.1 The multiplication of digital media

The presence of Art within the digital industry heavily depends on the multitude of digital mediums that exist to create, use and share the *content* and *data* which constitute the core of the digital world. The lifespan of those media and the entire industry upon which they rest is therefore determined by the amount of new content that gets produced continually.

For instance, according to multiple sources[24,25], there should be at the moment of writing this document well over 1.85 billion websites (meaning unique domains) accessible from the surface web. Although artistic assets do not represent a necessity for all of them, it should be safe to assume that their general amount should be on an even larger scale considering all the videos, pictures, and audio tracks also hosted on the Internet, alongside actual website assets like icons or logos. We can add to this the contents produced by the digital entertainment industry (not necessarily hosted or linked to sites as assets but rather shared as content) which comprises films, music, video games, literary productions and other mediums that required heavy quantities of art and link these numbers with the increasing population of users.

Finally, it should also be noted that most of the numbers we describe here are increasing at least linearly every year. Regarding the population of users, only less than half of the world's population accessed the Internet in 2017[26] and great amounts of users are expected to gain Internet access over the next years especially in the African and Asian continents. Among digital media, both music and video game industries have seen an increasing and shifting towards independent production, favoring the increase of content. Revenue gain has also switched to the mobile market for the game industry, market which featured about 3.5 billion applications on the Google Play Store at the end of last year[27].

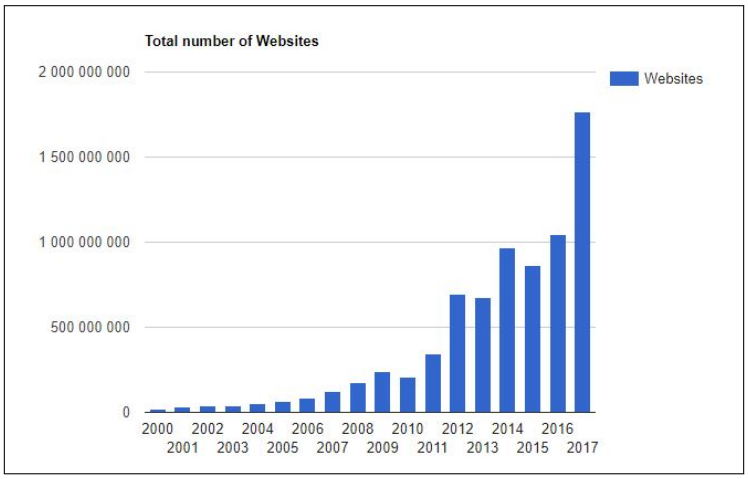

Figure 3.1: Total Number of Websites (2000-2017, intended as unique domains) ©www.internetlivestats.com

3.2.2 A new form of art product : the asset

As seen per the previous section, media at the source of digital art demand are expanding with the amount of Internet users and content. These media introduced the use of artworks called *assets* which constitute part of a given product either to embellish it or to serve as a feature. While these works differ from conventional art by their purpose and amount, they have been treated likewise because they require some degree of artistic skill and sensibility to be produced and are equally attached to notions of intellectual property and copyright (cf. §3.3.2). Common types of assets include audio samples, sound effects, melodies, icons, color palettes, 2D textures and game sprites, 3D meshes, particles and models, text fonts, etc.

Figure 3.2: A 2D video game sprite sheet ©Pascal CHIU

Artistic assets are therefore the result of both the demand created by the industry and the evolving definition and nature of Art in our society. Considering their importance in those matters, their appearance thus brought the necessity to re-adapt how artworks are perceived and used. In a sense, assets belong to a branch of artworks derived from much older *commissioned works* going from the Sistine Chapel to many digital illustrations produced nowadays. Those two types of art are considered much like products and are traded for monetary compensation. However unlike any commissioned work, assets incorporate aspects of industrial production like the re-usability of their components, leading to another issue which is the industrialisation of the artistic process. Incidentally, most Valuable and expensive assets are not reusable due to both the constant demand for original content (cf. §3.2.1) and the legal rights a publisher holds upon its artworks (cf. §3.3.2). This in turn contributes to the general need for more art to be produced while giving birth to a vicious circle of art consumption.

3.3 THE EMERGENCE OF NEW STAKES AND ISSUES

The effects caused by the previous points have had deep consequences on the digital industry but also on other components of our society such as scientific research or human rights. Here, our reflexion brings us to other dimensions of our culture in which new stakes have risen due to the change of our perception of Art.

3.3.1 The Art barrier in AI development

As one of the primary subjects of research in the digital industry, artificial intelligence embodies a critical issue for all parties concerned including private entities such as *Open AI* and of course, *Google*. The latter however has taken a different approach to the task as it has been recently adding artistic methods to its research. Beyond opportunities of R&D, what Google sees in Art also includes an answer to some of the key problems of AI development.

The most recent example of the company's endeavours is *Google Quickdraw*[28], an online platform where any user can feed learning input to a neural network through a doodling game experiment. One could argue that this project does not make proper use of *artistic* methods but merely doodles from Internet users however the *intent* behind such an experiment is what interests us here, and will be discussed a bit later. Moreover as we have seen previously (cf. §3.2.2) digital artworks need to be considered through a new perspective despite not representing what was previously considered as *Art*. Further down the scale of artistic projects is the rather famous *AutoDraw*[29] which uses the same properties of neural networks to identify used drawings to match with pre-made assets. Finally, some notorious examples of AI works related to Art include projects *DeepArt*[30] by members of various European Universities and *Fast Photo Style*[31], a deep learning project by researchers from NVIDIA.

The common trait between all these cases is the *intent* that exists behind the will to include Art in AI research. That is in fact the hypothesis we try to develop here : the research community's will to *make art that is recognisable to machines*.

Figure 3.3: Example of configured output of the DeepArt algorithm ©Project DeepArt

Considering the progress made in AI research, it has been a general tendency to attempt to close in on human intelligence in order to enhance our algorithms and even someday allow them to overtake our own capabilities. One crucial step towards that goal *to make smarter AI according to humans* would therefore to allow AI to understand *humanity* through Art, or at least to simulate that understanding. On a rational level, we are already able to

design solutions that are proven to be significantly more efficient than us. As we are making considerable progress regarding synthesising speech and language, achieving AI-made art is becoming an implicit, natural step to aim at, and even perhaps a necessary condition towards *true intelligence*.

3.3.2 Intellectual Property

As we attempt to discuss major issues born from the use of art in the digital industry, the question of intellectual property and its presence over the Internet comes to mind as a problem that cannot be overlooked. Property rights became a problem as soon as it was noted that contrary to conventional artworks, digital pieces do not have a distinction between *original* works and *copies*. The artwork is however seen as an *immaterial* work, independently of its instances, namely the digital *files*. The intellectual property attributed to the work and therefore *copyright* still lies with the author of said work, who can exert a hold over any digital copy (or file) of his work and distribute them through licenses.

This system however does not work properly outside of the professional field and is often infringed upon even in expensive, professional projects. The reasons behind these infringements lie in the very nature of the Internet, which allows for instant and unlimited sharing of foreign intellectual property whereas the entire premise of copyright laws are based upon the ability to enforce litigation[32]. While this might be possible for resourceful companies, the Internet currently remains a place where artists are required to trade exposure for their own rights over their artwork as the problem does not sum up to who retains the ownership of an original copy. Consequently, another issue appears when it comes to proving the ownership of a digital artwork for which current practices include proving antecedence or retaining physical copies or proof.

The main issue with intellectual property on the Internet is that it threatens the way that the web currently functions on multiple levels. Truthfully enforcing copyright laws from now on would generally upset many users for whom it would be contrary to the free sharing space nature of Internet, however unpractical it may sound. The current state is therefore reflected by an implicit status-quo where warnings and measures exist in order to protect digital property but are discreet enough to let us question their will to be efficient.

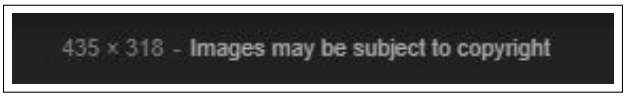

Figure 3.4: Google Image warning caption for any image displayed through the search engine

4. *Conclusions*

4.1 ENDING THOUGHTS

Digital Art surrounds us everyday whether it is on the Internet or in the streets, while the creative industry is supplying the media that we consume on a daily basis and rely on for one of the biggest parts of our modern culture. It is new but also peculiar in the sense that it has evolved beyond the relationship that exists between Art and Technology unlike any previous artistic movement. In the past few decades, different aspects of our culture have been assimilated into this new, digital way of life, and Art has become a part of it through redefining itself. These changes have brought new ideas, creations, technologies, and issues to consider.

As an important part of our Humanity, I strongly believe that Art will have a central role in the upcoming issues society will face. Its evolution through the digital arts appears as a natural course that follows the digialisation of our society and could very much lead to unlocking our understanding of our own abilities and their reproduction.

4.2 ACKNOWLEDGEMENTS

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