Art and Machine Learning
Project 2

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The Modern Venus Project

1. Concept

> "And so art is everywhere, since artifice is at the very heart of reality. And so art is dead, not only because its critical transcendence is gone, but because reality itself, entirely impregnated by an aesthetic which is inseparable from its own structure, has been confused with its own image. Reality no longer has the time to take on the appearance of reality. It no longer even surpasses fiction: it captures every dream even before it takes on the appearance of a dream."
>
> – Jean Baudrillard, *Simulations*

With the rise of social media, the qualities we valued in art and entertainment have increasingly shifted away from providing escapist fantasies towards creating an idealized "reality". This can be seen in the exponential rise of the Kardashians in popular culture, the subsequent development of modern influencer culture, and the increasing popularity of reality television as a genre. Centuries ago in the mid-19th century, the art world saw a shift away from romanticism in painting. Many artists started focusing on depicting their subjects as truthfully and accurately as possible. The movement towards realism was a means of defying idealization in the way we view other people; art was previously used to immortalize aristocracy or capture grandiose historical events. Realism endeavored to depict normal people in their everyday lives, to illustrate life as it naturally is. Our cultural addiction to authenticity feels like it should mirror the realism movement in painting, but through social media, our perception of what is real and genuine has become extremely warped; our examples of authenticity from public figures tend to resemble other eras in art history, primarily the Renaissance period. Our project seeks to reveal the interplay between ideological and aesthetic movements towards realism in Western art history and our society's current fixation on perceived authenticity. We collected a selection of famous celebrity photos from recent years and matched them with paintings that embodied a similar tone, most of which tended to be from the Renaissance period, to stylistically interweave the two.

2. Technique

We wanted to explore different modes of authenticity and challenge notions of realism in historic art and the networked present. Therefore, we wanted our style transfers to feel as seamless as possible— the image composite had to retain as many of the art's structural elements as possible, while manipulating the presentation/the image's representation of its main figure to get closer to modern elements.

Once we settled on the creative and philosophical grounding for our project, we decided on the heuristics for success of our project: a successful image would update, or "yassify," classic art to suit the new standard for authenticity on social media. In order to improve the cohesion of our output, we had to experiment with style and content weight, and experiment with which combinations of images worked best (and conjecture reasons why).We also performed trials switching the content and style images, in order to see if that produced images with more cohesion. Finally, based on our conclusions from previous trials, we also experimented with preprocessing the images by cropping, rotating, and otherwise detailing the inputs to better line up.

3. Process
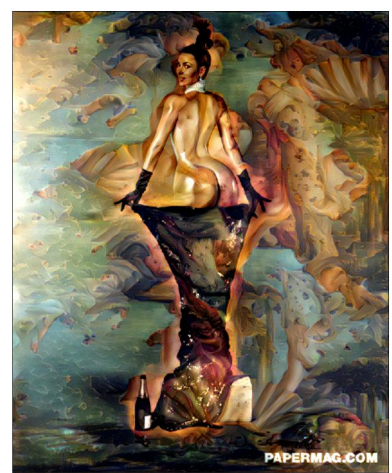
3.1 Choosing Images and Adjusting Content Weight

The artworks that we ended up being most happy with often consisted of purely modern and very recognizable pop culture related subject matter with distinctly classically inspired style elements or details. After several introductory trials, we decided to try to have the subject matter of both the source and style match. This partially was an homage to the similarity of human art and imagination through the century, but it also often produced better results, as these combinations tended to be more cohesive. One of the first images that we felt was able to capture our idea was one of Kim Kardashian combined with Botticeli's "The Birth of Venus".

| Content: Break The Internet Kim Kardashian | Style: The Birth of Venus by Sandro Botticeli | Content Weight: 0.5 |

This product embodied much of what we were looking for in our results. Both source images are iconic in their own right and are both extremely recognizable in their product. The content was very clean and polished, making it both a good candidate for a content picture, as the outline of Kardashian's figure is very easily recognizable in the result, and a perfect amalgamation of beauty standards today: clean, exaggerated, naked, bold. The Birth of Venus, on the other hand, was detailed, with rich context, demure. Again, this was a perfect style image, as suggestions of shell, angel, and ocean are very clear in the result and completely change its tone, and it was representative of what we wanted to show about classic art: beauty is demure, beauty is natural, beauty cannot be too loud.

This result did not have as high a content weight as some of the others we ended up liking. This was probably due to the simplicity of the content and intricacy of the style. Other successful transfers required more tweaking to get right. One of these was our combination of Kim Kardashian's Met Gala 2021 look and Renee Magritte's "The Lovers". We first tried creating a product using a content weight of 0.5. While we did like the end product, we experimented by increasing the content weight. This more heavily weighted the image of Kim Kardashian, which we believe put more emphasis on her silhouette.

The resulting image was both more Kardashian and Magritte, as recognizing her shape allowed her to don the same red top as the woman in the painting, making for a much more convincing combination.

Content: Kim Kardashian at the 2021 Met Gala

Style: The Lovers by René Magritte

Content Weight: 0.5

Content Weight: 0.75

Another image where upping the content weight was helpful was one of Ben Affleck smoking. This image had become a meme used by people to communicate weariness or exhaustion. This made us select Picasso's "The Old Guitarist" as the style image. Both images feature blue as the defining color and carry deep sadness - but one in a very real life, modern, relatable way, and another in a distant, nostalgic, metaphorical way. As for experimenting with content weight, the difference between the results was subtle, even with content weight reaching both extremes of 0.25 and 0.75. However, the final image with the highest content weight both placed emphasis on Affleck's face, highlighting the sunken in shadows just like Picasso did in "The Old Guitarist", but also transfers the sicily yellow skin tone to the actor, while results with lower content weight do not. The image is also more realistic, which was characteristic of Picasso's work in his blue era. In this case, the higher content weight allowed Picasso's painting to emphasize the emotion of the photo of Ben Affleck, while it obscured it in lower content weights.

Content: Ben Affleck Smoking

Style: The Old Guitarist by Pablo Picasso

Content Weight: 0.25

Content Weight: 0.5

Content Weight: 0.75

However, in some cases, it was actually detrimental to increase content weight. In a combination of a photo of Nicki Minaj and a painting by Jean Foquet, the images that were created at lower content weights maintained much more of the very important details of the style painting. Since the content of the painting had a very plain background, similarly with our first "Kim Kardashian Breaks the Internet" image, the style was prominent in the generated background. However, in the case where the content weight was 0.75, the angels in the background are blurred, and the most noticeable thing is color. However, at a weight of 0.5, the angels have distinguishable faces, lending much more of the style image to this result.

Content:
Nicki Minaj

Style: Virgin and Child
Surrounded by Angels
by Jean Fouquet

Content Weight: 0.5

Content Weight: 0.75

3.2 Content Style Reversals

Our experiment consisted mostly of choosing a pop culture/celebrity content image and a historical artwork as a style image. However, as one of our variations, we tested switching the content and style images, so the content image was a painting but the style was a modern pop culture photo. This had mixed success.

| *Kylie Jenner via Instagram* | *Girl with the Pearl Earring by Johannes Vermeer* | *Content: Kylie Jenner Style: Girl with the Pearl Earring* | *Content: Girl with the Pearl Earring Style: Kylie Jenner* |
| *Source: Daily Mail* | *Source: Wikipedia* | *Content Weight: 0.5* | *Content Weight: 0.4* |

This experiment with a picture of Kylie Jenner was somewhat a success. It was one of the few pictures we tried that arguably achieved the look we wanted better when the style and content was reversed. In the original version, most of the style transfer consisted of transferring color, instead of applying the desired classical influence of Vermeer's painting. However, in the reversed version, where the content was the painting, we get closer to our desired result. The pose and clothes are reminiscent of the old world style of "The Girl with the Pearl Earring", but the modern influence is clear in Jenner's fake tan and contour, which was transferred to the original image. To get this result, we decreased the content weight, which allowed for more of the style features to be visible. However, most of our trials were not nearly this successful.

Below are some examples of this style/content reversal being what we consider unsuccessful.

	A: Ben Affleck B: The Old Guitarist by Pablo Picasso	A: Nicki Minaj B: Virgin and Child Surrounded by Angels by Jean Fouquet	A: Break The Internet Kim Kardashian B: Birth of Venus by Sandro Botticeli	A: Kylie Jenner for Kylie Swim B: Venus of Urbino by Titian
Content A Style B	 *Content Weight: 0.75*	 *Content Weight: 0.5*	 *Content Weight: 0.5*	 *Content Weight: 0.75*
Content B Style A	 *Content Weight: 0.1*	 *Content Weight: 0.4*	 *Content Weight: 0.25*	 *Content Weight: 0.1*

Note: Images are not fully sourced as they will be sourced in other places in the report. Additionally, images are cropped or rotated for formatting purposes, but unaltered images will be submitted with the report as well.

The issue we usually ran into with this experiment was that the resulting image tended to resemble the content image so strongly and not take on any of the desired traits from the pop culture source image. In the second column, we combined a photo of Nicki Minaj and a painting by Jean Fouquet, depicting Agnes Sorel. The similarity between both images was that both women are wearing an outfit that purposely exposes one breast. We believe that the first image is a success - it recognizably depicts Nicki Minaj while at the same time showing details from Fouquet's painting. The red cherub's from the background of the painting feature also in the background of the resulting artwork. In order to highlight the cherubs, we chose a relatively low content weight of 0.5, rather than 0.75, in which they were less recognizable. However, when we switched the order, it was no longer recognizable that the result came from either of its parent images. It took on the fluorescent blue lighting from Nicki Minaj's photo, which washed out the old painting style and obscured its content, but did not contain anything that would make the photo recognizably linked to Nicki Minaj. This is evident in all of these cases. We even

attempted to significantly lower the content weight, to as low as 0.1, in hopes that more elements from the style image would be visible. Nonetheless, it was not clear from looking at any of the resulting images that a pop culture photograph was used in their generation.

The fact that our experiment worked better when using the pop culture image as content and painting as style is not surprising, as we were looking for results that seemed painting-like but portrayed modern subjects. This makes the relative success of the first Kylie Jenner image, however, rather interesting. The reason we think this worked so well is that these images were quite similar to composition. Both women were posed similarly, both wore hair wraps, and, probably most importantly, both were situated on the same part of the image. This meant that the transfer worked relatively well - the style of Kylie's hair wrap transferred onto the hair wrap in Vermeer's painting, as did the style of her jacket, and, most importantly, the style of her makeup. As mentioned earlier, the reason we like the result is that the influence of Jenner's fake tan and makeup was evident. This was only possible because the faces of the women in both images lined up quite well.

On the other hand, in our less successful examples, the images don't tend to line up nearly as well. The content of them remained fairly consistent (a woman bearing one breast in both, a woman standing naked in both, a woman lying mostly nude in both), but the content did not match closely enough in its location on the page. In the combination of Kim Kardashian and Venus, we can actually see a dark figure in the resulting image. This most likely was Kim's skirt from the style image. It is clear that the images did not line up enough to transfer Kim's look to Venus. The rightmost image also failed in an interesting way. In general, the image really was similar. However, in Kylie's photo, she lies on her left side. In the painting, Venus lies on her right. Because of this, the style transfer failed to align Kylie and Venus in the desired way.

The next step in this experiment was to pre-process the photos to help them line up better. This consisted mostly of cropping and rotating the style and content images to help them line up better. The following page shows the results of this on two of our examples.

The top row features the original source images and result. The second row features the edited source images and the new result. While the new result still does not achieve the look we are going for, Venus now dons Kim's iconic skirt, darker hair, and some makeup. While this difference was subtle, there is still an improvement.

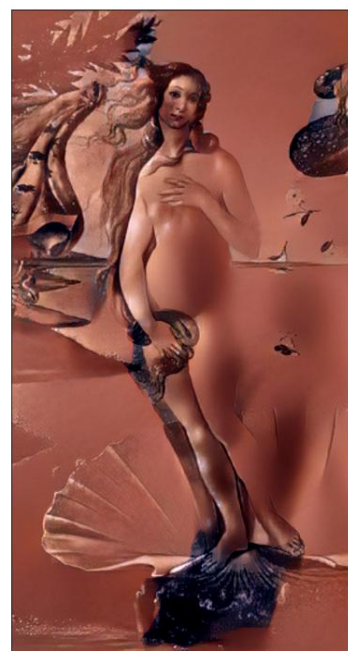original style

original content

original result

edited style

edited content

new result

This features a similar process, but with images of Kylie Jenner and Verus of Urbino by Titian. Here the result again shows improvement. Kylie's bikini now almost correctly sits on Venus, which does give the image a more modern look. However, since the facial and body poses are still fairly distinct, the modern influence and content in the image is quite limited.

original style

original style (did not edit)

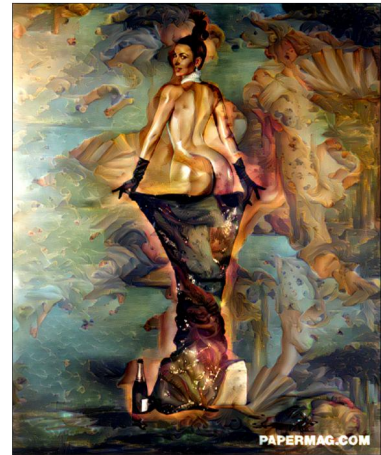original content

edited content

original result

new result

4. Top Final Products Gallery

Full image files will also be submitted with this report.

5. Reflection

Influencers and advertisers leverage authenticity not just as a facet of their platforms, but as a currency of status and reputation. Celebrities post "unfiltered" selfies and rants on Instagram; reality TV cameras and vloggers film unbroken hours of their real, authentic daily lives, and teenagers perform "effortless," unique personal brands on Tiktok and Instagram. With social media allowing for the democratization of entertainment, everyone from the Kardashians to niche micro-influencers to us now exist in the economy of authenticity. Every one of us constantly strives to portray ourselves as bigger and better and shinier than we are, simultaneously insisting that this is the most genuine representation of our "true" self.

Yet the muddying of reality and performance is hardly new. The constant fascination with the original, real self, and the depiction of this self, is not specific to our current moment at all. We've always been reaching for the most authentic way of seeing one another, whether through painstaking portraits or meticulously filtered selfies. In the mid-19th century, the Realism movement in art gained new, widespread attention, and artists pivoted to painstaking, realistic portraits of their subjects, usually normal citizens as opposed to wealthy aristocrats. Artists moved away entirely from their previous focus on mythologizing the upper class; art in the realistic tradition focused on everyday lives, everyday experiences, elevated into art.

Through our project, we hope to put these two movements in conversation with each other, to reveal overlaps in the aesthetic and philosophical movement towards performative realism in classical Western art and the endless, hungry need for authenticity in our modern world. As we tweaked weights and inputs for our style transfer, we tried to create images that united the pop culture and classical art images into a composite that was distinctly recognizable as both. We performed iterative trials with different content weights and sets of input, and emerged with several images that felt like visually interesting conversations between the art styles. We continued by experimenting with content-style reversals, feeding in a piece of classical art as the base and a modern photo for the style reference. We noticed that the result of this stage of the experiment usually resembled the classical art too strongly, almost overwhelming the influence of the modern photo. Then we played with cropping and rotating as a preprocess stage before feeding source images into the style transfer algorithm, in order to improve the match between the content and style images and create more seamless interplays between the two.

Over the course of our iterations, we discovered that there was no universal set of perfect parameters to achieve visually cohesive images— rather, different sets of inputs required fiddling for content and style weights to achieve optimal result. We were also interested in the distance between what the computer considers a united composite image, versus the human eye's conception of success. While copying over colors is technically a style transfer, it was rarer (and more rewarding) to find an image that we felt preserved the original "point" of the painting, with interpolated elements from modern photos.

This project allowed us to analyze authenticity as a timeless commodity, an artistic choice, rather than a fixed reality. We feel that our final results fuse art styles that might seem disparate into new, visually interesting ways of seeing— a new mode of searching for reality and authenticity— and hope to develop these creative and technical ideas further in future projects.

6. Future Work

        We enjoyed exploring various machine learning tools during this project, but given more time or resources, we would be deeply interested in expanding the project in a myriad of directions. The first thing we would love to expand on is the pre-processing of images before style transfer. We began work on this in our style/content reversal section. This technique showed promise, and we'd love to explore this avenue more. For example, while combining "Venus of Urbino" and the images of Kylie Jenner, we could experiment with different rotation angles to better line up the bodies. In addition, it could be interesting to do more image pre-processing with our original idea– where the content photo was a modern image and style was a painting– as we only really worked on this in our reversed experiment. Another method to explore for expanding upon our style transfer concepts is using more selective style transfer algorithms. For example, we could perhaps render a mask for the base image to submit with the base and style image so that the style transfer is more heavily weighted in the areas defined by the mask. Since our project was based on portraits that tend to center around a defined object in the image, this path is definitely one we are interested in exploring.

        We'd also be interested in training an algorithm on both a collection of paintings, perhaps divided by style, and a collection of modern pictures to generate models for converting images to the style in question. When we were initially discussing our project, we were interested in doing something of the sort using a dataset of photos of Instagram models, in order to create a model for this very specific photographic style that has become ubiquitous on social media. This style has become so identifiable that some people have started to use this style in an exaggerated manner, "yassifying" these normal images. Using a dataset of photos from celebrities and influencers on social media would hopefully help us to experiment more with the "yassification" aspect of this project– projecting modern beauty standards onto artworks of the past. By investigating more specialized style transfer algorithms, like neural transfers or style interpolations, we could focus less on selecting singular appropriate images and instead create an amalgamation of beauty standards - then and now - and efficiently combine them into a handful of images.

        A potential new direction this project could also evolve into is using Generative Adversarial Networks (GANs) to generate entirely new images of celebrities with Renaissance style details using machine learning models. For instance, we could feed the generator with a training set manually generated by Strotss Style Transfer algorithms on pre-existing results, such as the ones achieved in this paper. The final results of the generator would produce a fascinating output of entirely machine generated "yassified" images. These products can then be used to understand how the algorithm understands the concept and look of a celebrity while maintaining a classical appeal to the image by reverse engineering the output. One such possible method of doing this would be to use the DCGAN tutorial as explained by Nathan Inkawich.

WORKS CITED

In Code

https://github.com/futscdav/strotss

In Report

Baudrillard, J. (1983). *Simulations*. (P. Beitchman, Trans.). Semiotext(e).

Image Citations

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