

ART AND MACHINE LEARNING (10-335)
CMU 2022 SPRING
PROJECT 2

BODY WORLDS — WORLDS WITHIN BODIES



NELLIE TONEV

Group 22

Background: 2nd Year undergrad student (10-335) studying Cognitive Science & HCI

DESCRIPTION

My concept for this project was creating a visually interesting surrealist image that took the magical style of painter Josephine Wall and applied it to photographs of human cadavers preserved and displayed in museums within a traveling exhibition called Body Worlds: Decoded. I used Style Transfer and experimented with many different image and parameter combinations to create my final results. These final two images capture the elements that draw me into both human anatomy as a scientific study and the surrealist art style as a form of creative expression.

Concept

My concept centers around applying surrealist concepts to human forms, and this is an idea that I've been interested in for several years. As a child, I was given a book containing the art of Josephine Wall,^[1] and I really enjoy the way that her paintings place living figures in extremely detailed and ethereal surreal environments.

I came back to this concept two years ago, as a senior year in high school, when I took a course on human anatomy and physiology while also completing a portfolio for AP Studio Art. My portfolio centered around the ways in which organic and inorganic compounds interacted, and I created several pieces^[3] blending pieces of humans with minerals, technology, elements, etc. I was curious to see if I could recreate these blends through the machine learning techniques we covered in class, though my final product ended up diverging from that idea.

My interest in human anatomy ended up taking over as I progressed through this project since so many of my surrealist ideas involved humans in some manner. I decided to use photographs from the Body Worlds: Decoded exhibition^[2], which was displayed at the Tech Museum of Innovation (now called The Tech Interactive), where I worked for three years. I spent a lot of time studying at this exhibit over the years, and I find their process of preserving human cadavers and displaying them in dynamic forms to be simultaneously fascinating and a little bit unsettling.

Ultimately, my final results apply the surrealist style of Josephine Wall to the dynamically posed/torn apart cadavers from Body Worlds. I think the final image serves to free these cadavers from their glass exhibition boxes and places them in a surreal environment, where they almost look robotic as they blend with elements of nature.

Technique

While I spent some time looking through various ML processes that we covered in class, such as Pix2Pix, DeepDream, and CycleGAN, I ultimately settled on using Style Transfer in order to apply the style of Josephine Wall to the photographs from the anatomy exhibit.

My process largely involves fine-tuning my use of Style Transfer—adjusting the reference photos, concept weight, and image size—until I ended up with images that I felt best represented the concepts I was interested in exploring.

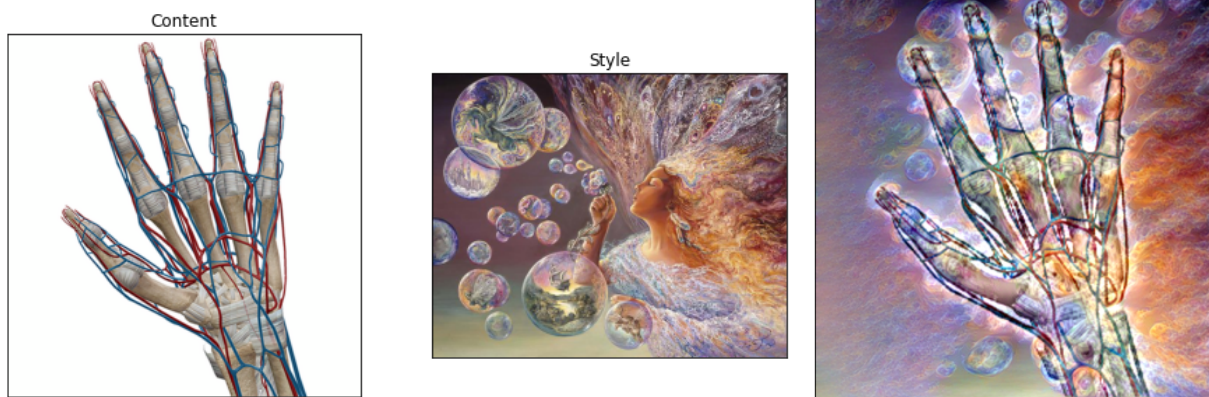
Process

My process started with a general exploration of several ML techniques that we learned in class (Pix2Pix, DeepDream, Style Transfer, CycleGAN), but I did not include many results from this portion, since they mostly just involved following tutorials and looking at the reference outputs from the Colab Notebooks.

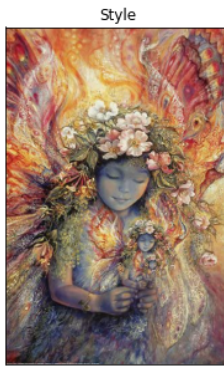
Once I settled on using Style Transfer through the Stross Style Transfer Colab Notebook, I first used the default parameters and just tried applying the style of Josephine Wall to the reference image of a frog. I thought this ended up as a very cute image:



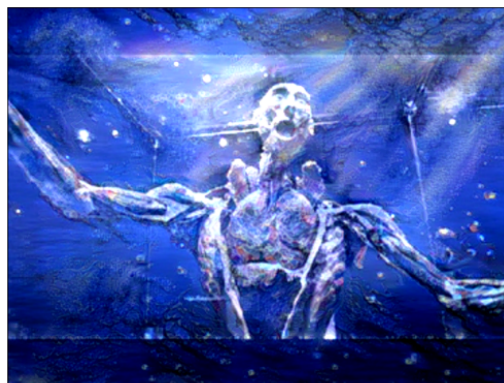
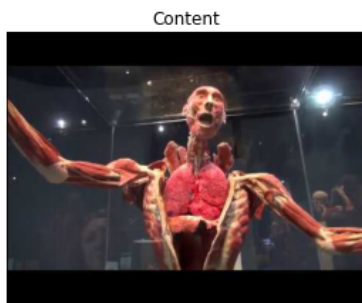
Next, I applied that same style reference image to an anatomical image of the bones and blood vessels within a human hand. I really liked the way the algorithm incorporated the colors and the bubbles into the hand, as well as filling in a painted background.



Here is where my process began to blend with my interest in the Body Worlds Decoded exhibit. I switched up the Josephine Wall reference painting to one that involved more flowery components and vivid background colors. I thought that Style Transfer did a cool job of applying these style features to the background of the exhibit photo, but I thought the background of the original concept image was too distracting, as I wanted more surrealist features to be directly applied to the body.



From here, I took an image with a larger contrast between the body figure and the background, choosing one with a mostly black background. I also switched out the style image again to a more monochromatic one in order to experiment with different colors. Here, I also began changing the Style Transfer parameters. For this image, I changed content weight from 0.5 to 0.3 and expanded the image maximum size to 720 from 515. In doing so, I wanted to put more emphasis on the surrealist style, since Josephine Wall's paintings are so detailed, and I did not want to lose any of that.



While I really liked that output image, I found this next content image, which I especially loved, since it had the two halves of a face separated out, with the heart as the central focal point. I repeated the same parameters with this new content image.

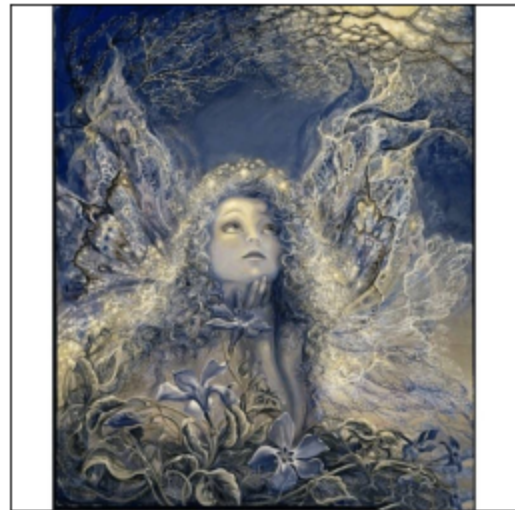


After this, I thought that the vivid blues may have been too strong and were starting to drown out the figure in the foreground. As a result, I once again swapped out the reference image for style with one with more muted colors.

Content



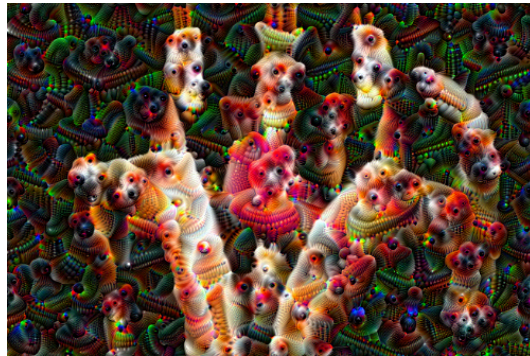
Style



I then applied those same parameters to the previous concept image of the singing cadaver, where the lungs were the focal point. These two images together became my final result.



After this, I tried out DeepDream on the same concept image that I used for the final Style Transfer input. However, I thought this result was quite creepy, and it took away the surrealist elements that I really loved from Josephine Wall's style. So I decided to go back to Style Transfer.



Finally, I wanted to experiment with my initial idea of creating human/nonorganic blends that I had done in my artwork from a few years ago. One idea was blending ballerinas from “Firebird” with a fiery phoenix. I tried this out with Style Transfer and got an interesting result.



Reflection

The final results that I chose were the ones that most spoke to me in terms of my concept ideas. I really liked how the Style Transfer maintained the focal points of the bodies' hearts and lungs in the original photos while adding a surrealist element to them that no longer makes them feel human-like, let alone dead.

As for the techniques I used, I think it would be interesting as a future exploration to use larger datasets, especially since Josephine Wall has many different paintings, and there are many more features of Body Worlds: Decoded that I wasn't able to explore or represent here.

RESULT

Below are the two thumbnails of my final result images. Since the reference style image from Josephine Wall involved many plant/floral elements, those are indicated in the appearance of each body. To me, they look almost like petrified trees, which are dead/fossilized but remain upright. While the surrealist

environment of Josephine Wall's paintings serves to separate the cadavers from their glass encasings, it's still possible to see the outlines of their confinement, which I thought was an interesting dynamic. The blend between the surrealist world in Wall's imagination and the real bodies is a concept I find entrancing to look at, and I hope that energy comes across to other viewers.



Original Files for Result:

<https://static01.nyt.com/images/2013/05/10/arts/20130510-BODIES-slide-ONBS/20130510-BODIES-slide-ONBS-jumbo.jpg>

<https://www.fairy4u.com/images/figurines/josephine-wall-fairy-fantasy-art-stargazer-86414.jpg>

<https://i.ytimg.com/vi/cX6mzPUuDKo/hqdefault.jpg>

CODE

<https://colab.research.google.com/drive/1CXuTjER2caqdGCOiF04-2uGdl8-AiZYb?usp=sharing>

REFERENCE

[1] <https://josephinewall.co.uk/>

[2] <https://www.nytimes.com/2013/05/10/arts/design/body-worlds-pulse-at-discovery-times-square.html>

[3] Some of my paintings from 2019-2020:

