Abstract Art Generation

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Project Proposal
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Abstract

The development of the abstract style in art has allowed for the integration of geometry and precision into an age old form; the intention of this project is to recreate the 2 dimensional style of certain celebrated abstract artists in a 3D space. The final project will be presented to the viewer in such a way that they will have full control over the re-generation of the painting, as well as full control over the 3D rotation of the scene projected onto a 2D canvas. In order to achieve this, I have spent quite a bit of time finding art which would prove interesting to recreate within the canvas space - the artists I have chosen, Wassily Kandinsky and Jackson Pollock, have rendered styles which can be recreated through the development of specific shapes, lines, and materials that can be randomized within a set of limits. The entire program will be written in Javascript utilizing the THREE.js library, and its final intention is to be presented online in a user-friendly style. The final project will feature smooth camera controls, and a design intuitive to users who are not familiar with my process.

1 Introduction & Background

Throughout human history, art has been used to a great degree in the pursuit of the recreation of real images; future generations would have to rely on the descriptions of a scene or a king, for example, if an artist was

not consulted to create an accurate landscape or portrait. Some artists, like Johannes Vermeer, developed techniques within the market and field of painting that proved integral in the field of hyper-accurate representation of a scene or object, but it was not until the development of photography in the mid 19th century that art was truly forced between a rock and a hard place; artists had to make the decision to compete in a services market against a growing technology, or to develop a new and unseen method of art. The direct result of this difficult decision is the creation of the concept of an *art movement*. From this concept came many incredibly important movements, which can be recognized in world famous expressionist, pointillist, cubist, and modernist artists. This particular project will be used as a homage and tool to facilitate the appreciation of **abstraction**.

The early 20th century Russian artist known as *Wassily Kandinsky* is considered by many to be the grandfather of what we now know as abstract art, and is most well known for his role in the maturation and development of geometric abstraction. His work significantly features purely abstract images - he transitioned from painting almost entirely impressionist works to focusing on turning images that highlight geometric patterns and shapes, arranged with the aid of a particular color palette, into full abstract compositions. His work was not entirely accepted within its early days - in the 1930s, Nazis took his first compositions from the Bauhaus School of Art and displayed them in a state art exhibit titled "Degenerate Art", before ultimately destroying them. Kandinsky believed that painting was similar to composing music, and that ultimately, abstract art is a physical representation of the way that music makes listener feel. Many of his compositions can be found on display at the Art Institute of Chicago.

The later 20th century American artist known as *Jackson Pollock* was a significant member of the art movement of abstract impressionism. He was known most famously for his unique style of art, drip painting. Pollock composed his paintings in his own style as well, which he attributed to his appreciation of Native American art; he found it important to work on and appreciate his artwork from many sides at once, and often worked by walking around all four sides of his prone canvas. From the early 1940s to the early 1950s, Pollock's work was featured in museums nationally, until his untimely death in 1956 as a result of drunk driving. Nearly a dozen of his compositions are also on display or kept in archive at the Art Institute of Chicago.

The intention of this project is to recreate the styles of these two celebrated abstract artists in a medium that was unavailable to them at the time: a 3 dimensional canvas space. As all but the works and legacy of these two artists remain, the project will revolve around the random generation of geometric objects that can simulate the style of their paintings. This will be achieved in **Javascript** utilizing the library offered by **THREE.js**. The project will be generated in three dimensions, but presented for viewing in two dimensions.

2 Goals

What must be completed in order for this project to continue is the perfection of each artist's styles; as of the writing of this project proposal, the program has a sufficiently user-friendly camera control system, and an appropriate and complete canvas and environment for each artist's work to be featured on.

Primarily, before assigning particular algorithms or boundaries in pursuit of the accurate creation of each style, it is imperative to ensure that the program works seamlessly on any platform that the user may decide to use. The most pressing issue in this field is that three.material's 'stroke' command does not work on Windows machines. As this is likely the most commonly used operation system among individuals who will use this program, it must be addressed immediately.

Secondly, the most important aspect of the project is to recreate objects within the scene - currently, the Kandinsky object recreations are rudamentary, and the Pollock recreations are in development. By the time that this project is presented to the MATH 198 class, the Kandinsky generation will be nearly complete, but unpolished, and the Pollock generation will have an explanatory demonstrational version. After the successful integration of ANGLE.js, the development and perfection of these algorisms is the *only* feature that will necesitate a need to be worked on.

Finally, it is important that the final online presentation of the project is clean, professional, and distraction free, to aid appreciation of the art and its style.

3 Methods

As was mentioned in the introcudtion, the project will be utilizing **Javascript** and its three-dimensional library **THREE.js**. In addition, it will have to utilize another THREE.js sub-library, ANGLE, which ensures that the stroke width of lines and shapes are accurately represented; on Windows machines, this is impossible without the use of this library.

The canvas that the work will be displayed on will be a three dimensional cube, with only its interior textured; materials on its exterior sides will not be rendered. Its wireframe will not be featured in the final presentation - the reasoning of its removal is to facilitate the intended 2D projected effect, and simulate a real, flat canvas. The user will be able to refresh the painting's randomly generated qualities in an intuitive way, and will also have access to a simple and pleasing accelerating camera control, manipulated by the arrow keys. The project is intended to be displayed in a straightforward and user-friendly way intentionally, to make efficient the process of appreciating the canvas and its work with no other distractions.

In order to recreate the style of Kandinsky, the program will focus on his geometric composition series to be created with a number of predetermined and commonly found shapes, materials, and lines from his works. These objects will be applied a color and material of a random quality, and their shape will be given a random, but limited, set of coodinates for each point and corner. Reminiscent of his famous compositions, the works will be largely centered around the origin of the cube, at 0,0,0. The user's ability to orbit the center canvas will allow him or her to change the objects' projected proportions.

In process of recreating the style of Pollock, significant developments must be made in impersonating his famous drip painting style - these will be conducted exclusively with the THREE.basicLineMaterial tool offered by THREE.js. Like the Kandinsky renderings, its composition will be featured exclusively within the bounds of the canvas, and will be intended to be viewed as a flat work. However, unlike the previous rendering, the only randomized qualities will be that of color, position, and stroke width. The stroke width is intended to be rendered randomly in different parts of the same line material. The most important aspect to be developed is an algorithm that can create

sinusoidal, spiraling, and unbroken lines that can be visualized properly on Windows machines.

In order to create a design that is user-friendly and intuitive to understand, I will test this program with individuals of different backgrounds and ages, such as my peers and my family members. In addition, I will consult individuals who I know that are more knowledgeable and experienced in the field of art history than I am. Their feedback will help me form a final accurate, appreciable, and respectable program.