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Paper: **Generative Art from Digital Leftovers or:**
How I Learned to Stop Worrying and Love the CRUFT

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This paper will give an overview of the technical methods used in creating CRUFT, as well as examining some of the aesthetic issues of using chance and automation, which bring into question our assumptions about originality, creativity and craft, as well as the role of the artist within the creative process.

Topic: Computational Art and Algorithms

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Generative Art from Digital Leftovers or: How I Learned to Stop Worrying and Love the CRUFT

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1. Abstract

CRUFT are images created by automated computer scripts that first download source material from the Internet, and then process this information, generating new art work 24 hours a day, 7 days a week. Beginning in 2003, early versions generated CRUFT images from the digital leftovers of the main stream media news sites using indeterminacy and randomness. Recent developments have included genetic algorithms for the evolution of entire populations of images.

This paper will give an overview of the technical methods used in creating CRUFT, as well as examining some of the aesthetic issues of using chance and automation, which bring into question our assumptions about originality, creativity and craft, as well as the role of the artist within the creative process.

2. Generative Art Created From Digital Leftovers

Beginning in 2003, it became clear that the United States was going to fight a war in Iraq [1]. This build up, as well as the way it was portrayed in the main stream media caused me to feel much frustration and anxiety. As the 24 hours a day, 7 days a week cable news cycle continued to reenforce the ideas that war was inevitable, I began to think about how these digital images operated, one day influencing our daily discourse, the next day they would just vanish without a trace. These digital leftovers reminded me of redundant computer code. Code that was once useful, but later forgotten and obsolete. This code is described by Wikipedia as the following,

> Cruft (occasionally kruft) is computing jargon for "code, data, or software of poor quality". The term may also refer to debris that accumulates on computer equipment. It has been generalized to mean any accumulation of obsolete, redundant, irrelevant, or unnecessary information, especially code. An alternative usage is becoming more generalized to refer to any unneeded or unwanted computer hardware or obsolete equipment. [2]

In response to the 24/7 news cycle I created automated computer scripts that would download source images from the main stream media and create digital collage on a similar schedule. I borrowed this computer term and applied the name CRUFT to my collage created from digital leftovers.

2.1 Generative Art: Historical Examples

My working definition of Generative Art is a method of making art that focuses on a process that is self-contained and operates with some degree of autonomy. My CRUFT images are made using rules and random processes. I will now present several historical examples of generative art that also use rules and randomness such as Marcel Duchamp's *3 Standard Stoppages*.

> A working note of Duchamp's describes his idea for this enigmatic work: "A straight horizontal thread one meter long falls from a height of one meter onto a horizontal plane twisting *as it pleases* and creates a new image of the unit of length." Here, three such threads, each fixed to its own canvas with varnish, and each canvas glued to its own glass panel, are enclosed in a box, along with three lengths of wood (draftsman's straightedges) cut into the shapes drawn by the three threads. [3]

Duchamp openly embraced the use of random chance by allowing the three threads to fall as they please, and to capture that randomness by glueing the threads in the exact position as they fell. This early conceptual work created in 1913 relies on a "standardizing" of random chance, and manages to comment on the role of the artist, raising questions about societies assumptions regarding artistic intention.

A second historical example of generative art I wish to present is a musical composition by the composer Steve Reich called *Pendulum Music,* from 1968. The piece is created by suspending microphones over speakers to create feedback. The written score for this composition reads as rules and instructions that openly embrace random processes.

> Pendulum Music
>
> "Three or more microphones are suspended above the speakers by means of a cable and stand. The microphones are pulled back, switched on, and released over the speaker, and gravity causes them to swing back and forth as pendulums. As the microphone nears the speaker, a feedback tone is created. The music created is then the result of the process of the swinging microphones."
>
> "The piece is ended sometime shortly after all mikes have come to rest and are feeding back a continuous tone by performers pulling the power cords of the amplifiers" [4].

This composition outlines the simple rules to create an autonomous process that incorporates random chance to create the composition of feedback tones. The final historical example I wish to present is a drawing by the artist Sol Lewitt. This example is entitled *Wall Drawing #139 (Grid and arcs from the midpoints of four sides) [5]* created in 1972. This is an early wall drawing by Lewitt, which is executed in black pencil. Lewitt believes that the idea behind a work is more important than it's execution. The drawing exists only as an idea written as instructions on paper, to be created as needed by any person at any place. Accompanying the drawing is a certificate of authenticity signed by the artist. Lewitt states, "In conceptual art the idea or concept is the most important aspect of the work ... all planning and

decisions are made beforehand and the execution is a perfunctory affair. The idea becomes the machine that makes the art. [6]"

2.2 Principles of New Media Influencing Cruft

Much of the characteristics of my creative process used in making CRUFT images are due to the fact that I am making art from digital sources. In his 2001 book, *The Language of New Media*, Lev Manovich describes the general principles underlying new media:

- Numerical representation: new media objects exist as data

- Modularity: the different elements of new media exist independently

- Automation: new media objects can be created and modified automatically

- Variability: new media objects exist in multiple versions

- Transcoding: The logic of the computer influences how we understand and represent ourselves. [7]

These ideas have influenced my thinking since 2003. By working with digital sources downloaded from the Internet, my source material is by default numerically represented. As computer data it is modular as individual images, and as pixels. I can automate the process, and the individual images are variable depending on the source material. Finally I can transcode the source material into other formats. I consider each individual CRUFT image a snapshot of that moment in time, and the actual computer code as the conceptual artwork that continually runs on the server. Much like a theatrical play, the actors follow the script, and each individual performance is different and by comparison my cruft images change, yet the computer code stays the same.

My CRUFT programs follow basic algorithms or rules, regularly downloading source material and following my instructions to produce a new image. This image is then uploaded to my website. In 2003 I made two cruft images from main stream media news sources. *Hourly Cruft* was created from the images on the New York Times homepage. Every hour since 2003, my computer code has made a new image that has since been archived on my website. A second CRUFT called *Premise Cruft,* uses the main image on the CNN web site is downloaded, converted to black and white, and cropped. The current headline is downloaded and pasted into red rectangles at the top and bottom of the image. This CRUFT has been produced once every four hours since 2003. These images tell a story as a snapshot of that particular moment in time, but they can also be viewed as a series over the years, showing us what these news sites think is important. The images now tell the story of a discourse manipulated by the media. In the *Premise Cruft* we see the same stories repeated usually being one of these familiar narratives such as a foreign terrorist threat, or the occasional domestic terrorist scare, the kidnapped white girl, and the occasional hurricane or natural disaster.

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3. Methods and Procedures

My CRUFT processes are automated and run on a server 24 hours a day, 7 days a week. They are created by writing simple algorithms that download and manipulate images using many of the same techniques anyone would use with an image editing program such as Photoshop or The Gimp. The automated process allowed me to create work around the clock following the cable news cycle. My past automated CRUFT were created in three basic steps as represented in Figure 1.1

BASIC GENERATIVE ART PROCESS

1. INPUT >> 2. PROCESSING >> 3. OUTPUT

Figure 1.1

We begin with INPUT which is simply downloading source files from the Internet. Then with PROCESSING, which is the manipulation of the images and text following simple rules which are 'recipes' for the creation of a digital collage. Finally we have OUTPUT, which is the creation of the final image, as well as the publishing of the image to my website. Beginning last year I began developing CRUFT inspired by artificial evolution. This consists of the same three steps as before, although now evolution takes place during PROCESSING, see Figure 1.2

EVOLUTIONARY ART PROCESS

1. INPUT >> 2. PROCESSING >> 3. OUTPUT
                                 |
                  1. Imperfect Replication (Copies + Mutation)

                  2. Selection (Successful Images Survive)

                  3. Repeat (until desired output is achieved)

Figure 1.2

Evolution can be simplified to the concepts of an initial population, reproduction, mutation, and selection. I have created computer algorithms inspired by such ideas. During the processing stage the reproduction step of evolution is simulated by replicating the images. Each copy is intentionally imperfect which is they way I have chosen to create mutation. The evolutionary step of selection is simulated by having the computer determine which images are successful, and this criteria ulitmately becomes an aesthetic choice. The selected successful images survive, the unsuccessful images are deleted. I then repeat these steps until the desired outcome is achieved.

3.1 Indeterminacy and Randomness

As I have continued to develop the computer code that creates CRUFT, I have always embraced the use of random chance and indeterminant processes. For example by using source images from CNN in *Premise Cruft,* it is completely indeterminant what images will appear on the CNN web site, and hence I never know what images will appear in the art work. In *Hourly Cruft,* I roll virtual dice in the computer code, to make random selections of images that are then used. As I have mentioned in the previous section on historical examples of generative art, there is a long tradition of using random processes. I am interested in random choices, and how once randomness is used to make art, our societies assumptions about authorship, genius, and the role of art is then called into question. I also like that by using random chance and indeterminacy, every time the CRUFT code runs, the resulting image will always be different, and merely a record of it's moment in time. John Cage discusses some of these ideas in his essay C*ompositions as Process, II. Indeterminacy.*

> "This is a lecture on composition which is indeterminate with respect to its
> performance. That composition is necessarily experimental. An
> experimental action is one the outcome of which is not forseen. Being
> unforseen, this action is not concerned with its excuse. Like the land, like
> the air, it needs none. A performance of a composition which is
> indeterminant of its performance is necessarily unique. It cannot be
> repeated. When performed for a second time, the outcome is other than it
> was. Nothing therefore is accomplished by such a performance, since that
> performance cannot be grasped as an object in time. A recording of such
> a work has no more value than a postcard; it provides a knowledge of
> something that happened, whereas the action was a non-knowledge of
> something that had not yet happened. [8]"

I have always kept a web archive of the many thousands and thousands of CRUFT images, videos, and text compositions my computer code has created. There are literally thousands I have never seen. I agree with John Cage when he discusses recording an indeterminate performance that then has no more value than a postcard. I think of my CRUFT images as postcards that only provide a record of what happened. What truly interests me is the process of the script running and interacting with the source images at that moment during the time of creation. I enjoy working and convincing myself that I have control of the CRUFT process, when in fact I do not. To openly embrace a lack of control, and a lack specificity in a process without a forseen outcome is both exciting and terrifying.

3.2 Feedback

My recent investigation using evolutionary models to manipulate images has led to an interest in feedback and cybernetics. When images are replicated imperfectly, they exhibit a form of mutation, and from these images successful ones are selected which then creates a feedback loop where the successful images will again be replicated imperfectly, this continues in a cycle until the desired outcome is acheived. This loop generates images in a cause-and-effect chain, where the mutation of one

generation directly affects the outcome of the next generation. I have now begun investigating the creation of a feedback loop between myself and a running cruft process. Allowing myself to act and inter-act with the process and become part of the input turns my previous CRUFT into performance. Since September of 2010, I have been developing a live art performance where the CRUFT process generates images in real time, with a projection of these images upon myself and a large screen. With this arrangement I now stand within the projection, with my actions and silhouette actually becoming part of the manipulated images. This creates a complete circuit or feedback loop, where the amplified sounds I make become part of the input, the processed images contain text, that then directs my movement.

*L*ive art using genetic algorithms, Brunell University, London 2010

4. Future Plans

As I have developed CRUFT images my generative art practice has continued to develop from simple automated processes that download source material from the Internet, which create relatively simple composite images, to much more complex algorithms allowing for text manipulation and the ongoing creation of still and moving images. My interest in the main stream media, and the way that the 24/7 news cycle manipulates the public discourse seems best to be investigated with an automated 24/7 art making process. I see this manipulation of public discourse as my subject matter for my future work for some time to come.

With my recent investigation into algorithms inspired by evolution, as well as the live art performances using CRUFT processes to produce the performance score, the combination of which will be some of the most exciting areas for my future research. As I now take part in the performance process and add to the input itself, computers with the addition of sensors begin to see, hear, and react to me and the environment in a whole new way. This human / computer feedback loop seems to be a natural progession leading my development towards a post-human art process.

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