Interview

Video still from "AutoVision", 2014, George Legrady, Danny Bazo, https://vimeo.com/111252770 (Date accessed: March 19, 2016).

In Conversation with George Legrady:
Experimenting with Meta Images. Artistic Approaches meet Computational Methods

Harald Klinke, Liska Surkemper

The computer is a valuable tool to get an overview of large datasets by creating visualizations as meta images. However, such visualizations that may seem so self-evident are never a one-to-one translation of the underlying data. Just like photography is no "pencil of nature" visualizations are no "pencil of data", but a transformation with many variables determining the result.

George Legrady is one of the pioneers who examine artistically the visual outcome of algorithms by creating new forms of visualizations and 3D installations. As the director of the Experimental Visualization Lab and Professor of Interactive Media at the University of California, Santa Barbara, he also introduces students of art, design, and computational engineering to concepts at the intersection between art and technology.

Liska Surkemper (LS) – George, you have been integrating computational methods in your artistic work since the mid-1980's. One may refer to you as an early adopter to the then new technology – what seems odd, considering you come from analogue photography. What was your initial motive as an artist to work with the computer so early?

George Legrady (GL) – The transition from working in the photographic medium, an optical-mechanical device, to expressing visualizations with a language-based processing machine seemed to me an inspirational progression, not as disconnected as many in the arts community at the time felt. I was already exposed to a digital instrument in childhood, the

piano, and music training did involve the inscription and description of mathematically defined code – the music score – as a means of registering and replaying music.

I was actually surprised back in the early to mid-1980s that there were fewer visual artists captivated by the digital. Of course, a few artists from an earlier generation that saw parallels to conceptual art engaged with the medium. There was the "Software" exhibition in 1970 at the Jewish Museum NYC with Nicholas Negroponte and the art theorist Jack Burnham, and artists such as Stephen Willats in London, and a number of others. It may be that what held back the exploration was the lack of digital imaging technologies to produce images of a reasonable quality. I was perplexed that advances in imaging technologies took so long to enter the marketplace given the ubiquity of photographic representation in the culture-at-large. Electronic and algorithmic music composition, and audio technologies had already evolved in the 1970s, so imaging lagged significantly behind. I had to wait from 1981, when I was introduced to computer programming in the studio of the abstract painter Harold Cohen at UCSD, until 1986 when the AT & T Targa Truevision Image Capture Board came on the market to have the opportunity to explore ideas about photographic imaging in the digital realm.

Harald Klinke (HK) – In the 1980's you examined the conventions of the photographic image. How do those experiences have affected your work since then?

GL – It has greatly affected how I have approached computer-generated image construction. Keep in mind that I began working with computers at a time when software was scarce and therefore I had to learn how to write my own. Into that code production, I brought those questions that in the 1980s were directed at the veracity of the photographic image – the image being transparent onto the world but meanwhile hiding the ideological hand that has guided its framing. I have addressed the issues related to this topic in an article published in the late 1980s titled "Image, Language and Belief in Synthesis".[1] The article discusses issues of belief in the digital image, and the necessity of constructing all details of an experience, simulating nature by including random deviations.

HK – How much does the camera determine the look onto our world and what we think reality is?

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GL – The optical component of the camera has not changed much in the last 6 centuries but much research is currently going on to mathematically simulate and go beyond the capabilities of conventional camera image capture systems. Depth perception is one area, and then creating something like the "Esper Photo Analysis machine" as seen in the Sci-Fi movie Blade Runner is another. In the film, the protagonist played by Harrison Ford, requests the machine to navigate inside a found photograph and redirect one's perspective view beyond the flattened depth of the standard 2D photographic image.

LS – Comparing what was possible thirty years ago and what is today: What was the most memorable or surprising technological development for you that has changed your approach or working method?

GL – Besides the amazing power of the "undo" button, the most significant transformation in the culture has been the exponential growth of communities of practitioners, media arts designers, architects, hacker cultures, etc. and the rapid transition to digitality in the culture-at-large. Prior to the introduction of the Mosaic web browser which opened the Pandora box of universal communication around 1993, there were few digital media practitioners, usually eccentric, intensively focused individuals who were more like inventors rather than users, as hardware and software had to be invented. 1992 saw the introduction of Quicktime, which allowed for time-based image and sound to be digitized. The Macromedia Director software introduced multi-linear branching, and interactivity into the sequencing of multimedia scenes.

LS – Talking about interactive media: what are current projects you are working on?

GL – I am working on a number of different projects in diverse fields such as computational research, media arts, data visualization, artworks for the gallery market, and reformulating early documentary photographic projects into digital archives as some now have historical relevance. The research component focuses on translating a photographer's decisions of framing and image composition into rules that can be computationally programmed to study what results a machine may deliver. "Swarm Vision", "AutoVision", "Exquisite Vision" have all been developed in my university lab working with my Ph.D. students to explore if the aesthetic decisions involved in photographic image composition could possibly be transferred to a computer. This work has been funded by a National Science Foundation Intelligence and Information Systems grant and the intent is to achieve both engineering and artistic results. We are very much at the beginning stage of teaching a computer how to take interesting photographs. The purpose of the effort is really to explore the question of to what degree can an artistic approach be inscribed into computational language. The media arts projects focus on cre-

ating interactive large-scale projection installations based on the engineering research just described. Many of these projects collect data while they are on exhibit. The analysis of that data is transformed into data visualization, as for instance, the public contributions in the "Pockets Full of Memories" exhibition and the data from the Seattle Public Library commission which has now gathered over 85 million datasets since its activation in September 2005.

LS – And what about your gallery work?

GL – The fine arts gallery work I am currently doing explores visual and cultural narratives using the lenticular imaging process, which I create at a relatively large scale. I am particularly interested in the cultural encoding that occurs with photographs over time. We see a photograph from today and we consider it for its information, whereas a photograph from thirty years ago has embedded within it a set of messages that it is from another era. There are semiotic, syntactic, and cultural content information that tells us so, and I am

intrigued by the significance of why we consider the time displacement to be of such a critical concern when we view such images. Photographs taken at a particular moment in time may also have cultural and ethnographic relevance, allowing us to compare the then and the now.

I have been digitizing and creating an online database of documentary photographs taken in the Canadian north in Cree Nation villages who have been negotiating over land rights since the early 1970s. The process of digitization and posting online has been recognized by research agencies as a form of cultural repatriation, and a National Science Foundation Arctic Social Science grant has made it possible for me to return to the Cree villages, to present the photographs I have taken some 45 years ago. This project has been done in collaboration with McGill University ethnographers, who have relations with the Cree cultural centers in the villages.

LS – Looking at the different kinds of projects you do: are you more interested in the aesthetic of the work, the examination of the digital method or is there another epistemic impact you want to foster? Or is it a combination of those things?

GL – I am interested in the combination of the two – the aesthetic and also what you call the epistemic as this may imply a few things. As you point out, there is the examination of methodologies of how one works with digital construction of information/

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knowledge, and there is also the larger question of how digital processes are reformulating how we see the world. Our understanding of things change over time, for instance nature in the 19th century was understood as a dangerous unknown. In the early 20th century, nature became a resource, and now we sample, digitize, reconstruct, simulate, and reinvent nature. Jean Baudrillard has raised the question of to what degree do we today truly experience nature. The digital is a way of understanding the world, it is a specific kind of filter, allowing us greater control as we can numerically process the analog world, but it also reformulates our understanding of the world, and creates distance. To use Vilém Flusser's discussion about the technical image, we "create, process and store symbols." If we look through the camera, it is "to pursue new possibilities" to produce information.[2]

HK – Since you mention the term image: what is the difference for you between visualization and (artistic) image?

GL – I would say that visualization is an expression of information (data) where the visual result is an outcome of how the data has been processed and has influenced the shape and form of the visualization.

The artistic image is somehow the reverse: an image is created through a process or through a technique that is an outcome of a combination of intended expression, procedure and chance events. For instance, how a

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pigment may be applied, or how an unintended movement or disruption may impact on the image composition at the moment the camera's shutter is released.

HK – Your work also includes experimenting with algorithmic generated visualizations. What kind of challenges do you encounter by operating with Big Image Data?

GL – In contrast to the more precise filters I imagine the Social Sciences proceed (I may be wrong), the projects I do with large data, for instance, "Pockets Full of Memories" and the Seattle Public Library, have a broader range of data expression and are therefore noisy. There are a lot of outliers, data outside of the expected range. This in itself is of course an interesting topic to explore and some of my students who have worked on the Seattle project have studied how the classification system in place will

INSTRUCTIONS

Contribute an object in your possession to the archive. Simply place it in the scanning station in the middle of the gallery and follow the instructions using the touch screen.

Use this computer to view www.pocketsfullofmemories.com where you can read comments about other visitor's objects and add a story to your own entry.

Conceived as an installation on the topic of the archive and memory, "**Pockets Full of Memories**" was exhibited on the main floor of the Centre Pompidou from April 10 to September 3, 2001. During this time, 20000 visitors came to view the installation and contributed over 3000 objects in their possession, digitally scanning and describing them. This information was stored in a database and organized by an algorithm that positioned objects of similar value near each other in a two-dimensional map. The map of objects was projected in the gallery space and also accessible online at www.pocketsfullofmemories.com where individuals in the gallery and at home could review the objects and add comments and stories to any of the them.

The archive of objects consists of objects that museum visitors carried with them, for instance, such common items as phones, keys, toys, clothing, personal documents, currency, reading material, and others. The size of the scanning box was the only limiting factor that determined what could be added to the archive. Surprisingly, the database includes an unusual number of scanned heads, hands and feet, extending the archive from simply being a collection of objects to encoding it with the corporeal presence of the contributors.

The 2D map on the projected screen in the gallery consists of 384 objects selected from the total database by the Kohonen self-organizing map algorithm. The ordering of the objects are based on the ways that the audience described them through the touchscreen questionnaire. The map of objects continuously organized itself until the end of the exhibition and the order of the final map is a consequence of all the contributions from the duration of the exhibition. This phenomenon is called emergence as the order is not determined beforehand but emerges through the large number of local interactions on the map. This is why the system can be called 'self-organizing'. Accessibility on the internet has provided a means by which to extend the dialogue for visitors, as the internet audience has the opportunity to add comments and stories to any object, and from anywhere in the world. Many visitors who have traveled from other geographical areas have used this as a means to make contact with friends and family back home who then have added their own responses.

Produced in collaboration with Dr. Timo Honkela, Media Lab, University of Art and Design Helsinki, (Kohonen self-organizing neural-net algorithm); C3 Center for Culture and Communication, Budapest (touchscreen data collection, hardware and software); Projekttriangle, Stuttgart, (design and visual identity); Dr. Brigitte Steinheider, Fraunhofer Institute of Research, Stuttgart / University of Oklahoma, Tulsa (questionniare and data analysis); Andreas Schlegel, (visualization programming); CREATE lab, UC Santa Barbara, (web software development). With the financial assistance of The Daniel Langlois Foundation for Art, Science, and Technology, Montreal, Canada, the Centre Georges Pompidou, and the Office of Research, UC Santa Barbara. The collected data can be viewed today at http://tango.mat.ucsb.edu/pfom/databrowser.php

Source: www.georgelegrady.com

Above: Detail of the Wall of Images, "Pockets Full Of Memories", 2001, Comissioned by the Centre Pompidou, Paris, George Legrady.

Below: Installation view of "Pockets Full of Memories" (extended)*,* 2005, at Cornerhouse Gallery, Manchester, George Legrady.

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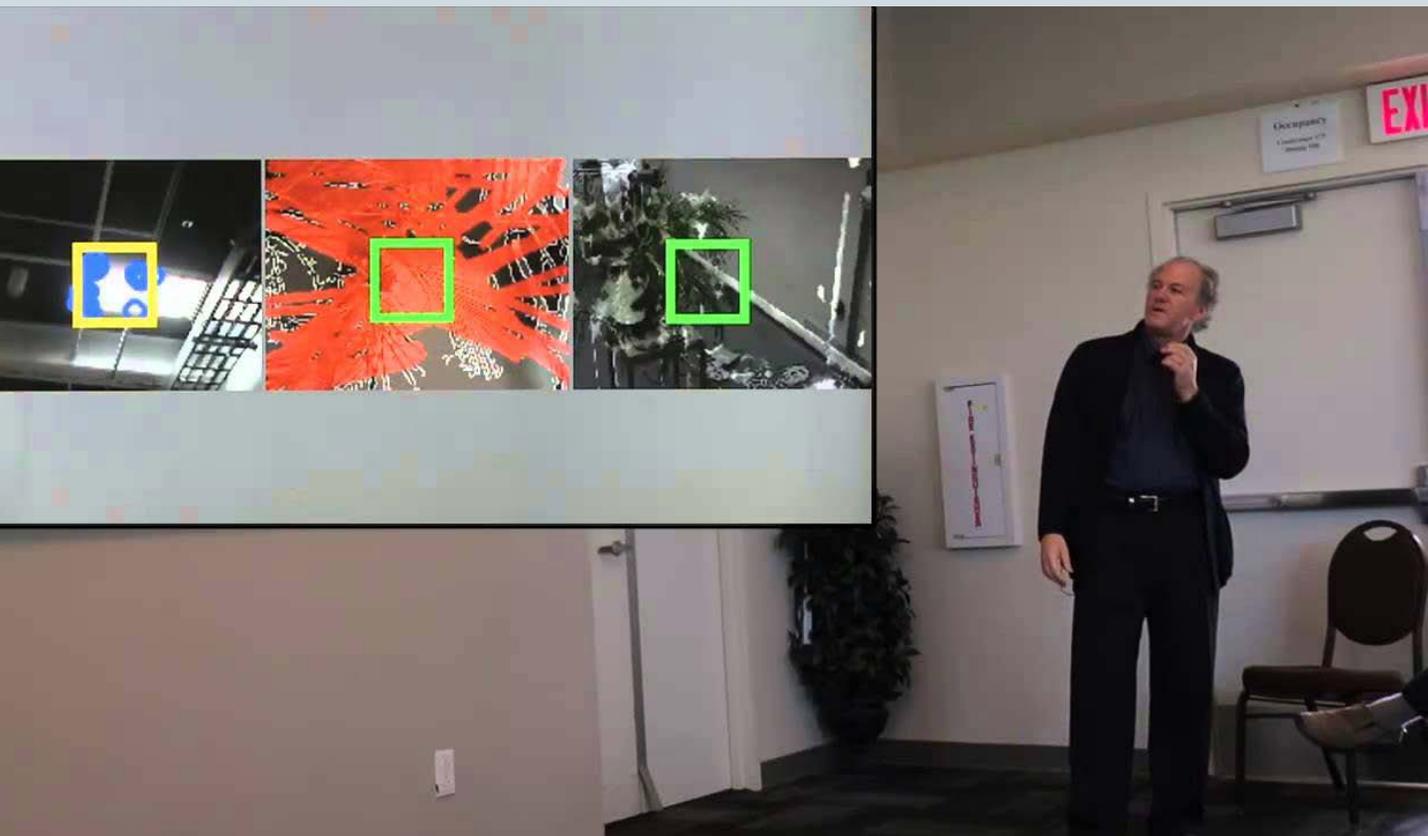
George Legrady on "Swarm Vision" at the spatial@ucsb Lightning Talk on Feb. 25, 2014. Video still: Center for Spatial Studies, UCSB 2014.

Sony PTZ cameras on rails as part of Swarm Vision, 2013, George Legrady, Marco Pinter, Danny Bazo.

"**Swarm Vision**" explores the translation of rules of human photographic behavior to machine language. Initiated by research in autonomous swarm robotic camera behavior, "SwarmVision" is an installation consisting of multiple Pan-Tilt-Zoom cameras on rails positioned above spectators in an exhibition space, where each camera behaves autonomously based on selected rules of computer vision that simulate aspects of how human vision functions. Each of the cameras are programmed to detect visual information of interest based on separate algorithms, and each negotiates with the other two, influencing what subject matter to study in a collective way.

Viewers can perceive both individual robotic camera behaviors (microcosmic) and their relationships to each other (macrocosmic) on 2 large screens. Visual fragments of spectators who enter the viewing space populate the images, leaving an imprint of their presence that become erased over time as the stream of new images replace the older ones.

Source: www.georgelegrady.com
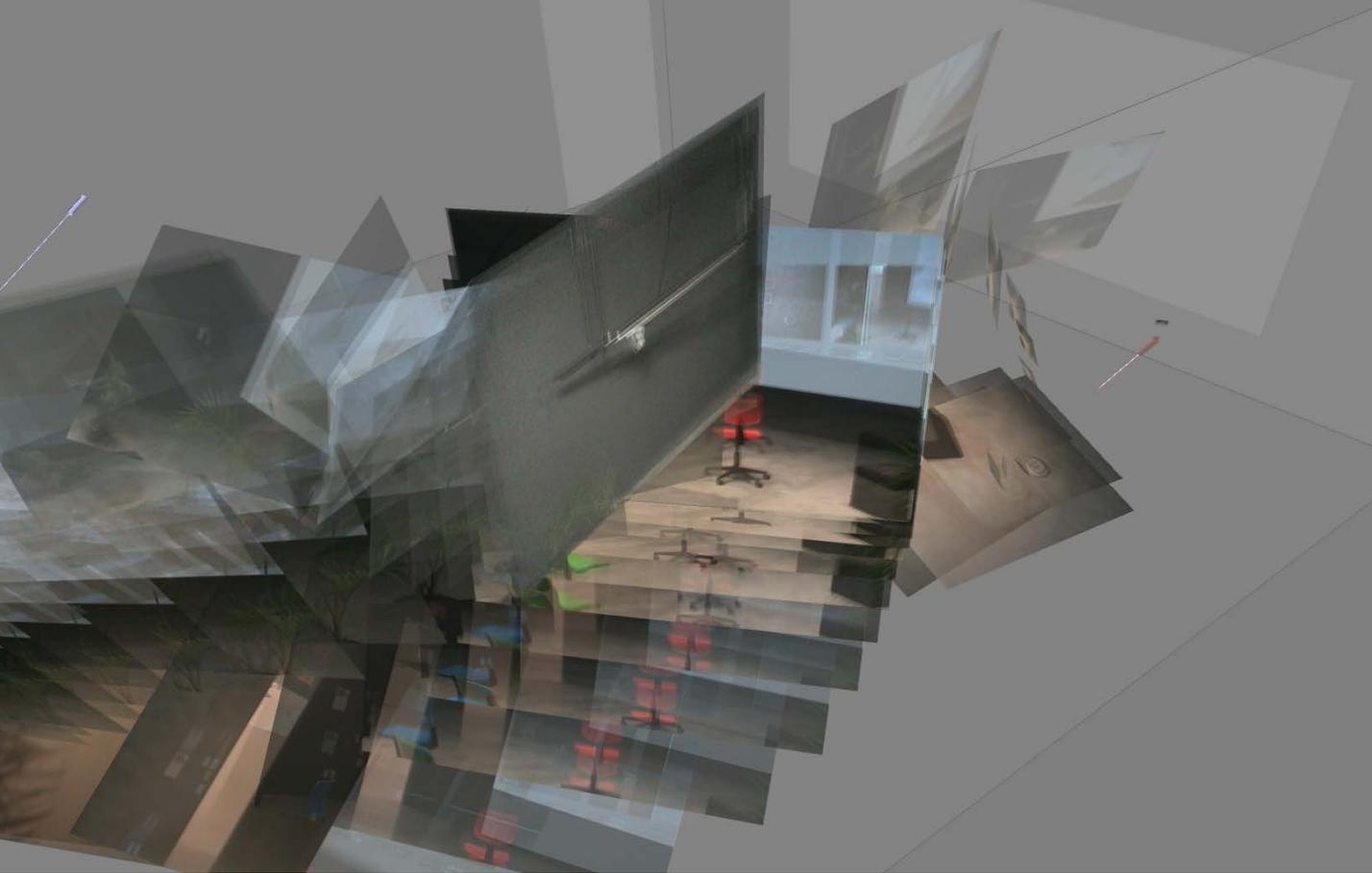
Examples of different 3D Scene Overviews, "Swarm Vision", 2013, George Legrady, Danny Bazo, Marco Pinter.
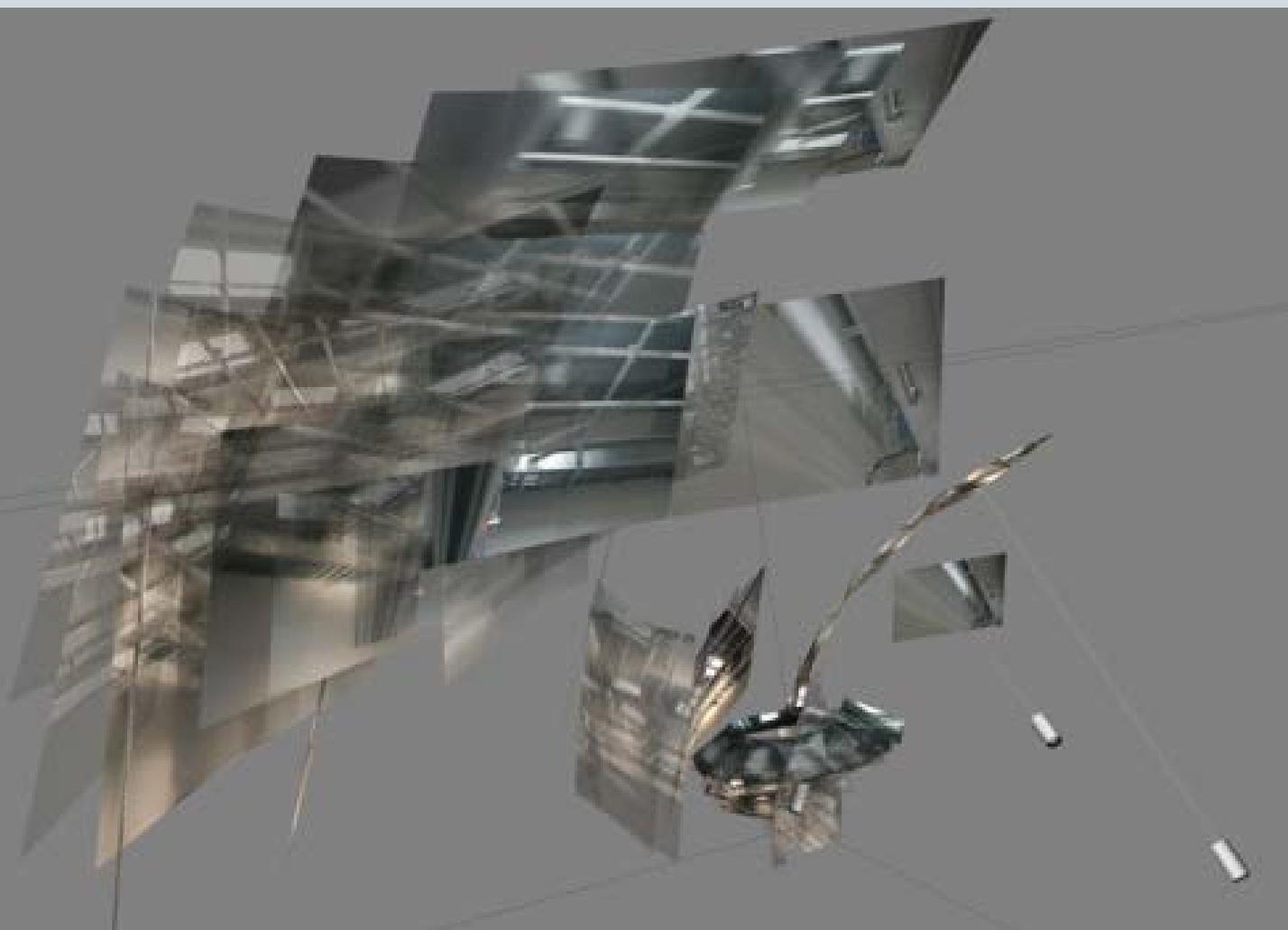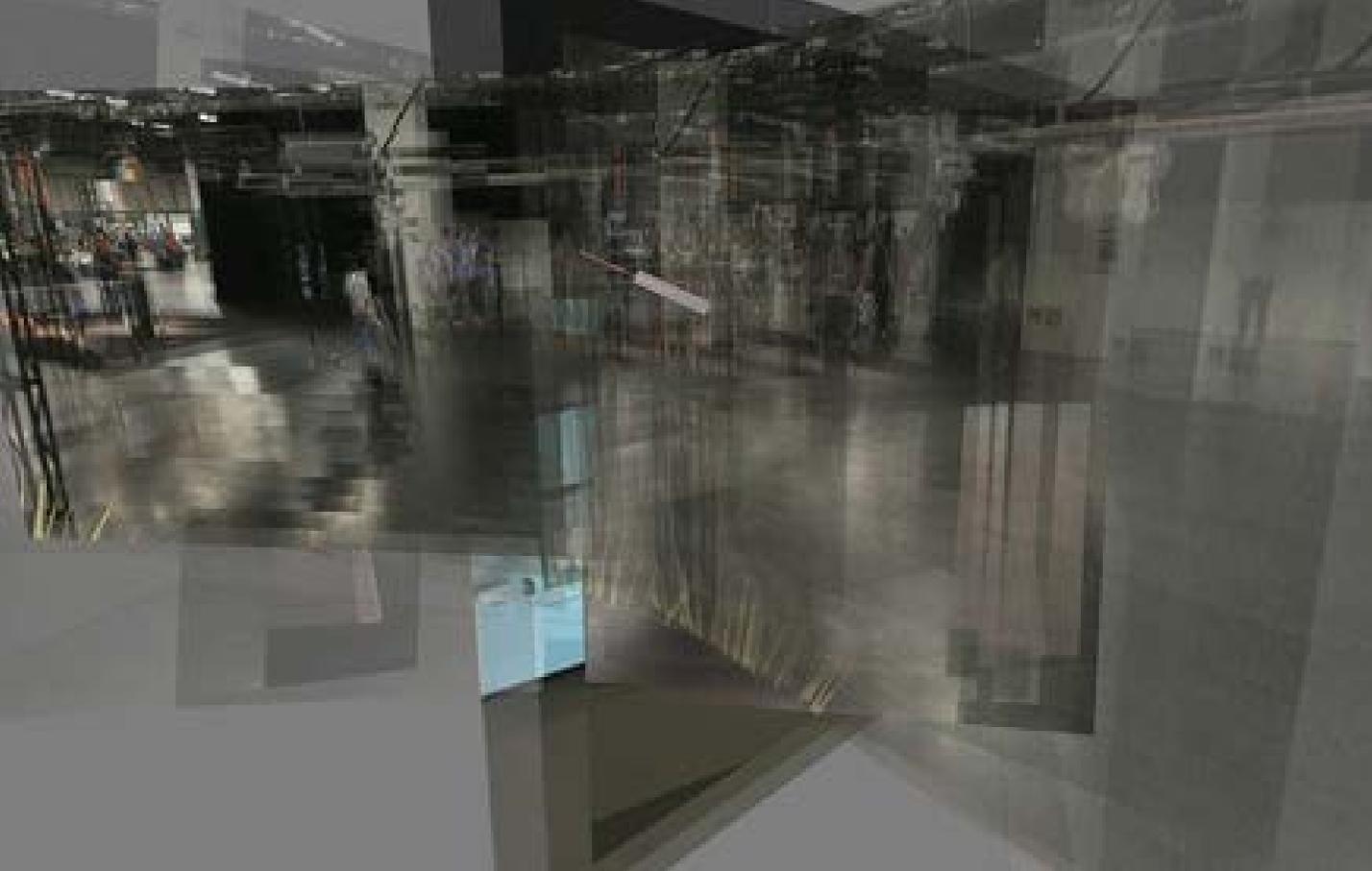
Visualization Screens: In the installation, four visualizations are featured on two screens/projections. The first screen features what each of the three cameras "see" - a depiction of what their vision algorithms are currently processing. The second screen shows an overview in a 3D reconstruction of the environment featuring a live video stream of the location of the cameras, and of the images they generate. Each camera continuously produces 10 still frames per second, and fills the 3D space with up to a hundred images per camera resulting in a volumetric form of layered stacked photographs that continuously changes as images fade away. The images' sizes and locations are determined by the locations and poses of the cameras, as well as their focal planes and focus locations at a given moment. The 4th visualization features the sum of activities situating all generated images and the three camera locations within a reduced virtual 3D spatial reconstruction of the exhibition space.

Contributions: Danny Bazo has a background in Film Studies, Engineering, and Robotics. His contributions include building most of the custom hardware and software development. Marco Pinter's background is in dance performance and kinetic artworks. His contribution to the project also includes his expertise in live video technology, robotics, and telepresence. George Legrady is project manager and brings conceptual directions based on his background in photography, conceptual art, and interactive digital media installations.

Source: www.georgelegrady.com

generate misclassified data entry, or system errors in the electronic transcription of data.

HK – You once said about your "Pockets Full of Memories" (2001-2007) installation that "any artwork that functions to gather data creates through necessity another artwork, consisting of the analysis of the collected data."[3] And in the installation "Swarm Vision" (2013) robot cameras simulate the photographer's gaze and perception by artificial intelligence. Is the computer substituting the artist in the long run? Or is the computer just a new kind of intelligent companion?

GL – In each of the artworks mentioned, they have been specifically designed to collect data so that the data could then be analyzed after the fact. This was an original approach in 2001 but of course all businesses do this today, in many instance, the services/sales they produce are just an alibi to collect the data as that is what is determining decision-making today. The bestseller "Big Data" from Mayer-Schönberger and Cukier shows how data collection, data correlation results in value, control and competitive advantage. In my case, I was purely driven by curiosity and feedback, the desire to get a sense of how the public understands the project, to what degree they will explore the boundaries, and what I will learn in the process that I would not have thought of otherwise.

LS – Speaking of learning: as we mentioned earlier, you are professor at UC Santa Barbara. Is the history of visual media part of your teaching?

GL – I am teaching in a practice-based program with a significant engineering foundation. One of the five core courses is titled "Art & Technology" and the course' content is determined by the faculty's expertise. We unfortunately do not have a "History of Visual Media" course. I used to focus on artistic practice and methodology and introduce examples from contemporary art and digital media art. The other core courses include Music & Technology, Digital Signal Processing, Multimedia Engineering, and Computer Graphics.

LS – What seminars are you offering right now?

GL – I have three major courses: In the fall I teach "Arts & Engineering / Science Research" seminar-type course which looks at how different disciplines approach research methodologies. We visit engineering and science labs each week, and ask the scientists to describe to us how they get from analysis of data to discovery, what their research methodology is, and what the process is by which results are achieved. We then discuss artistic methodologies and make comparisons. We ask the scientists to what degree does aesthetics play a role in the process of their discovery and representation? By aesthetics I mean decisions and observations based on the senses, an insight, a perception, etc.

In the winter I teach a studio course titled "Visualizing Information" which

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is very intense as it covers much in ten weeks: A production course on techniques of 1) data mining, 2) data aggregation, and 3) visualization in the java based Processing environment. Knowledge acquired include 1) how to identify and retrieve significant data from a dataset with MySQL, 2) develop skills in the fundamentals of visual language through programming, 3) visualize abstract data to reveal patterns and relationships, 4) normalize data to enhance legibility and coherence, and 5) implement interactivity within 3D volumetric visualization.

In the spring I currently teach a production studio course titled "Optical/Motion Computational Processes" with a focus on motion-capture and depth sensing using the Kinect or Asus Xtion sensor which students can use to create a work based on movement sensing and feedback systems through presence of spectators. All three courses integrate knowledge and methods from both the arts and engineering.

LS – What type of seminars work well and where do you run into problems? As your curriculum is open for students from different disciplines, it probably acquires interdisciplinary work skills, is that true?

GL – The MAT program includes students with a broad range of backgrounds such as computer scientists, engineers, physicists, electronic composers, audio technologists, graphic designers, architects and media artists. Each student arrives with a set of expertise, but is also challenged to acquire new skills. The intended goal is that students come in with one or more expertise and leave transformed and hybridized.

HK – You are also the director of the Experimental Visualization Lab in the Media Arts & Technology. What role does the software play in your curriculum?

GL – The Media Arts & Technology program is an arts-engineering program and computation is at the core of what we do, how we engage through the design of software and hardware. The Arts side of the faculty includes electronic composers, virtual architects, a systemics-based artist and I am an image-maker. Our engineer colleagues are specialists in haptics (touch), gesture recognition, Computer Vision, Augmented Reality and Computer Graphics. So computer programming is at the core of what we all do, and how we hybridize between our disciplines.

The challenge is to achieve our goal of interdisciplinary hybridity.

HK – What software do you use with the students?

GL – In my datavis course, we begin with exploring data collected through my Seattle Central Library artwork with MySQL queries, then follow visualizing using the java-based Processing language created by Casey Reas and Ben Fry. We correlate data from diverse sources (such as Apple, New York Times, Instagram, etc.) with JSON which is a data interchange format. My audio colleagues may use Python, the computer scientists use C++, architecture designers use Mathematica.

HK – Being a user of software seems to make the artist a second author besides the creator of the software. Do you think that is true? Or let's put it differently: How relevant is the relation artist/programmer to you?

GL – Given that critical decisions are made at the conceptual, aesthetic and software design level, the ideal is to be conversant in both. At this stage of my practice, I am privileged to collaborate with my students who develop much of the software for my projects. We work very closely through an interactive feedback and iterative process so that

the evolution of the code production is guided by much interaction.

HK –Do you think that being an artist today requires to become an IT-expert in order to regain a complete freedom of expression?

GL – That was a big topic of debate in the 1990s –should the driver of the car know how the engine was built. It all depends on how one purposes the technologies. Traditional artists may use digital tools such as Photoshop to enhance their photographs, or explore painting methods whereas media artists or artists-engineer hybrids will create their own software tools as instruments for specific projects. Media artists are interested in investigating new possibilities through inventing new software. Those with a theoretical focus create software to research the impact of technologies on our way of understanding the world, how to interact with the world, and what new technological representations can be achieved that have not previously existed. As mentioned earlier, this way of thinking takes us back to the 1980s and Jean Baudrillard's discussion of Simulacra – to what degree do we situate our understanding to interactions with the world, as contrasted to interactions mediated through technologies? And which one seems "natural" as the conventions of realities transform to increased technological mediation?

LS – What are the consequences for the academic curriculum? Being at the intersection of arts and technology, where do you see challenges in teaching?

GL – The challenge is to achieve our goal of interdisciplinary hybridity. It was difficult to achieve when the program began fifteen years ago as our students were set in their discipline-specific ways, and also the culture had yet to embrace interdisciplinarity to the degree we are witnessing today. There was a turning point around 2006 and we have been very successful since.

LS – In a similar way, we see interdisciplinary hybridity to be also the future of digital art history.

GL – You may be suggesting a creative approach to art history where software development becomes part of the analysis of data (historical and visual) and used to describe things in a creative (possibly non-linear way. There is nonetheless a separation between the practice of creation and the practice of reflection on the creation process. The first engages with the expressive process of representations and the latter is an analytical study of how that process takes place. I have had a theorist mention to me that their work begins when the artist's work is complete, and some artists have concerns that the theorists transform the intent of the work, but one cannot control how a work is perceived. The third model is the hybrid collaborative interaction between producer and analyst.

HK – Hence, a dialog of artists and art historians is critical – as this interview shows. We thank you very much for this inspiring conversation.

Notes

1 http://www.mat.ucsb.edu/~g.legrady/glWeb/publications/publ_art/textimage.html
2 Vilém Flusser: Towards a Philosophy of Photography, Göttingen, 1984 p.25 and 27.
3 Making Visible the Invisble. Iker Gil interviews interactive media artist George Legrady, in: MAS Context: Issue 7, Iker Gil, Chicago http://www.mascontext.com/issues/7-information-fall-10/making-visible-the-invisible/, Date accessed: 19 March 2016.

George Legrady is Chair of the Media Arts & Technology PhD program at the University of California, Santa Barbara, director of the Experimental Visualization Lab, and professor of digital media in the College of Engineering and the College of Humanities and Fine Arts. He is an internationally published scholar and exhibiting media artist, a pioneer in the field of interactive digital media arts.

His current research engages with data visualization, robotic computational integrated photography, and digital visual ethnography. He has received awards from Creative Capital Foundation; the Daniel Langlois Foundation for the Arts, Science and Technology; the Canada Council; the National Endowment for the Arts, and the National Science Foundation, and this year, a lifetime achievement prestigious Guggenheim fellowship.

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