Future Tripping VR Project - Immersive Data Visualization of Social Networking from the Arab Uprisings

Abstract

Future Tripping VR project offers new design approaches to data visualization while expanding our understanding of how the logic of digital computation influenced and shaped twenty-first century global social movements. The project's objective is to contribute to the increasing demand for understanding contemporary political speech, rapid social change, and data science drawing on social media and using the Middle East as a case study. Through critique of database narrative and shifting media practices during political, economic, and environmental shifts of the twenty-first century, this project articulates techniques of data analysis as a research method in media studies and the digital humanities. The central questions are "How can we create a virtual and augmented realities installation and software application that is cinematic using real-time social media?"; "How might an embodied approach to understanding the patterns of data humanize the scholarship?" Using a practice-based design methodology, our research cluster proposes to build a 360 degree, first-person immersive, augmented reality (AR/VR) production of the Arab uprisings of 2011 using a substantial archive of social media from the current version of R-Shief.

Keywords

Virtual Reality, Arab Spring, Social Network Service, Twitter, Facebook, Data Visualization.

Introduction

Due to the advent of mobile and network technology, most people in these days are carrying a data handling device such as cell phone, laptop or tablet, the speed of travel of the information is becoming more influential to public compared previous generation.

This flow of information does a critical role in a certain period. In the case of Arab Spring, the new way of propagation through wireless network showed that this influence of short and simple text-based information can be an excessive power of commitment that drives people's behavior toward change.

We recognized from the statistics after the massive "sandstorm," the data usage during this period skyrocketed. Especially, the number of active Twitter users in Saudi Arabia, it increased nine times a year from September 2011.[1] Furthermore, we were able to trace back to the usage of Social Network Service (SNS) by accessing these companies Application Programming Interface (API).

Building Data Collection System of R-shief.org

During the turmoil, our system R-Shief (r-shief.org), web server containing over twenty-six billion social media post (Twitter, Facebook, Instagram, YouTube, etc) in various languages, was able to collect massive Twitter data through the API. With all these data, we had to filter by the criteria based on our question of this project to offer meaningful data set to researchers.

Twitter is one of SNSs that communicate text-based information which is a powerful and straightforward way of appeal an opinion compared to the Facebook. Because of its unique structure, the speed of propagation certain issue between related people (followers) is expeditious. In addition, Twitter data always store the detail information of the sender, such as location, time, ID at the same time. This allows API users to collect tons of critical information to trace back the origin of conversation.

Based on the Twitter API, our project addresses momentous political and cultural dispute between people and countries in the Arab area. Our long-term survey related to the political issues in Arab countries, particularly on Egypt from the social media, our system offers multiple users a much-talked-about issue on various platforms by sorting

[1] Arab Social Media Report, Twitter in the arab Region (http://arabsocialmediareport.com)

Fig 1. screenshot of R-shief.org. from May 2009

thousands feed from them. The structure of our data mining system facilitates recognizing the language of a tweet based on its character.

Users who really want to read the most pressing issue at some point, they are visiting and searching related keyword through a search engine. However, the formal internet website doesn't offer the cross-platform comparison. Not like formal search engine service, our

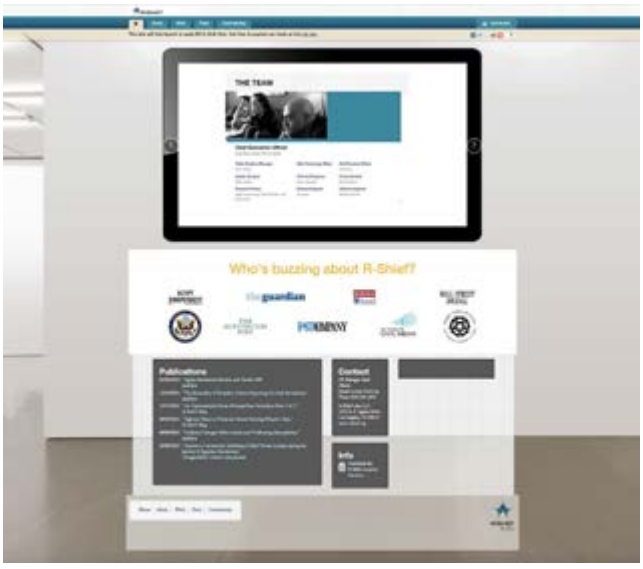

Fig 2. screenshot of r-shief.org. from Dec 2012

system R-Shief offers guidance to the user instantly to their greatest interest. The internal analyzing program in the system provides visualization of the data simultaneously to give a better understanding of the issue.

Fig 3. screenshot of R-shief.org. from May 2015

Furthermore, the advantage of R-Shief's real-time visualization system is that either the source of the data comes from Arabic and the region or the selection of the important keywords or tags can be modified by the users.

Interactive Design for Handling Massive Tweeter Data

There are still many services to analyze the impact of social media based on the API systems of each social media companies. Our application, which is different from the existing services, is that the user can process and reorganize the objectized data in virtual space in real time.

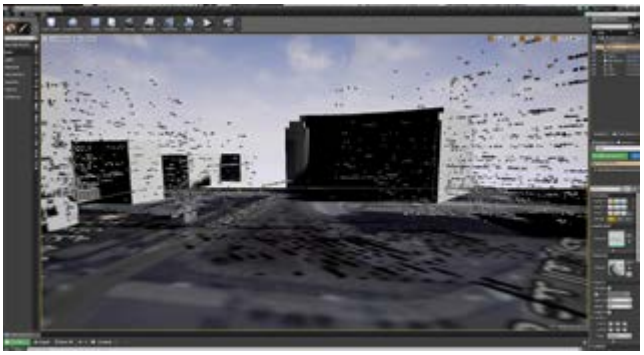

Fig 4. screenshot Arab Tripping VR project

Through a head mount display and the motion sensor, the user can sort, move, destroy and deliver these objected text data from our R-shief system. The data based on text objects are generated differently position, size, and color based on the local position and the number of released tweet data around the current position of the user (Tahrir Square). This makes user more recognizable tweet data compared to the 2D screen based data visualization.

To give a more realistic sense, we recreated the virtual space similarly to the current Tahrir Square. Our virtual space has day and night and reproduces various lighting effects and passages of automobile people.

Fig 5. screenshot Arab Tripping VR project, the second version

Conclusion

Our system is collecting and analyzing the amount of data from social media service from Arab countries since 2009 to serve researchers who are studying this topic filtered data with minimal effort.

We built a system that migrate collecting data to the VR space that can effectively classify and reprocess various data in real time. Unlike the numerical data that can be easily classified by a program, text-based data like Twitter is written in various languages need to be translated according to human interpretation. We have made the Arab Tripping VR project easy to apply each user's individual criteria to user's classification system.

References

Mourtada, Racha & Salem, Fadl. (2013) ***Arab Social Media Report: Twitter in the Arab Region***, http://www.arabsocialmediareport.com

Abou-El-Fad, Reem. (2015) ***Revolutionary Egypt: Connecting Domestic and International Struggles.*** New York: Routledge.

Jamali, Reza. (2015) ***Online Arab Spring: Social Media and Fundamental Change,*** MA, USA, Chandos Publishing.

Herrera, Linda. (2014) ***Wired Citizenship.*** New York: Routledge.

Authors Biographies

Intae Hwang, a researcher, product designer. He holds MFA in sculpture, MFA in Art and Technology, and PhD candidate in Media Arts and Technology Graduate program at UCSB.

Laila Shereen Sakr, Assistant Professor of Film and Media Studies at UCSB. She created R-Shief to archive and visualize social media content of Arab countries.

iPhotograms: An Exploration of Technology Through Cyanotype

Reese Muntean and Kate Hennessy

Simon Fraser University
rmuntean@sfu.ca and hennessy_kate@sfu.ca

Abstract

Our technologies are becoming evermore ubiquitous and universal. Technology now composes our lives. At the same time, in a sense we become more separated from these technologies due to a lack of understanding of the hardware and software of which they are made. This paper introduces these ideas of the black boxing of technology through the lens of science and technology studies along with media archaeology. These ideas form the conceptual framework behind *iPhotograms*, a series of cyanotype photograms examining the black box of an iPhone 5. In this project, a modern camera, the iPhone, was disassembled, dissected, and documented using one of the oldest photographic processes.

Keywords

Media archaeology, science and technology studies, photography, cyanotype, historic photographic processes.

Introduction

Our technologies are becoming evermore ubiquitous and universal. As Roger Burrows explains, our social "associations and interactions are now not only *mediated* by software and code they are becoming *constituted* by it" (Burrows 2009). Technology now composes our lives. At the same time, in a sense we become more separated from these technologies due to a lack of understanding of the hardware and software of which they are made. We may understand the basics of a Raspberry Pi or simple coding, but much of the physical components composing and the underlying algorithms governing our smart phones, tablets, computers, watches, gaming consoles, and cameras remains hidden from view and outside the understanding of the average person.

This paper introduces these ideas of the black boxing of technology through the lens of science and technology studies along with media archaeology. These ideas form the conceptual framework behind *iPhotograms*, a series of cyanotype photograms examining the black box of an iPhone 5. In this project, a modern camera, the iPhone, was disassembled, dissected, and documented using one of the oldest photographic processes. This work peers into the inner workings of our technology and asks how much we can know or need to know. This paper will begin with an overview of the theoretical underpinnings of the project, introduce related work, visit the historic process of cyanotypes, and offer an overview of the *iPhotograms* series.

Exploring the Black Box

Latour discussed this black box in 1987, noting that 'cyberneticians' used the term when the physical components of a system or the set of commands in software became too complex. By black boxing the complex inner workings, they could focus on only the input and output (Latour 1987). Social constructivists revisited this idea, calling for the opening of the black boxes of our technology and exposing the systems and processes by which they came to be (Pinch & Bijker 1987). Some found this exercise to be unremarkable and without any insight, suggesting that theorists and philosophers need a better understanding of the technologies examined (Winner 1993). Others highlight how important understanding these social constructions are and how much human participation and interaction with technology depend on the way these systems are organized (Kallinikos 2002).

If we think of our technology as a combination of hardware, software, and wetware, then these ideas of the social constructivists begin to unpack the human (wetware) component of our technology (Winthrop-Young 2010). While social constructivist discussions around black boxes may focus on the hidden or underexplored social forces at play in the development and adoption of technology, others are examining the black box quite literally and physically.

Matthew Kirschenbaum describes electronic textuality, explaining that there is physicality to it even if it exists on a scale too small for us to normally consider (Kirschenbaum 2008). He explains,

Bits can be measured in microns when recorded on a magnetic hard disk. They can be visualized with technologies such as magnetic force microscopy... When a CD-ROM is burned, a laser superheats a layer of dye to create pits and lands, tiny depressions on the grooved surface of the platter. The length of these depressions is measured in microns, their width and depth in nanometers.

Media archaeology is also an approach researchers use to study new media and technology. Erkki Huhtamo and Jussi

Parikka explain the practice of media archaeologists as rummaging through

… textual, visual, and auditory archives as well as collections of artifacts, emphasizing both the discursive and the material manifestations of culture. Its explorations move fluidly between disciplines, although it does not have a permanent home within any of them (Huhtamo & Parikka 2011).

Hertz and Parikka later explore the possibilities of media archaeology as an artistic method. They draw on Latour's ideas of *punctualization*, of bringing a complex system together to serve as a single object. They look at the disassembly, or depunctualization, of these single objects and what this process means in our current paradigm of planned obsolescence of consumer electronics (Hertz & Parikka 2012). With products that are designed to be unfixable without serviceable parts, disassembling them becomes almost subversive. It involves opening up the black box that the manufacturers never wanted us to see or explore. DIY enthusiasts, tinkerers, and circuit benders all incorporate this idea of media archaeology in their practices of breaking open and modifying technology in engaging and expressive ways.

Related Work

Along with the concepts and ideas discussed thus far, *iPhotograms* is inspired and informed by a number of artists and researchers working with alternative photographic processes and digital photography.

Adam Fuss is one such artist who returns to historic processes as part of his work. This movement of the "antiquarian avant-garde" uses the history of photography for metaphors and insight in visually exploring the present (Rexer, 2002). Fuss incorporates the photogram in his work. Photograms are images produced with photographic processes but without a camera or lens (Neusüss 1994) often involving the placement of objects directly onto photosensitive paper. Barbara Tannenbaum interprets the photogram as a "conveyer of literal fact; the actual physical presence of the object or the light is recorded directly onto the paper" (Tannenbaum 1992).

In Fuss's series, *Love*, the light and chemistry of the photogram can be viewed as a metaphor for something spiritual, or metaphysical, something otherwise unseen or barely perceived. In this series, Fuss disembowels rabbits and arranges them on sensitized paper. In this literal dissection, exposure changes depending on the translucency of the various parts of the body, and the acids of the innards further impact the paper with rainbow effects (Modrak & Anthes 2011). I extend this idea by using photograms as literal fact to document the process of dissection by taking apart common technology and exploring what hidden or unknown information might be revealed during the process.

Trevor Paglen is a photographer who explores ideas of counter surveillance in his work, photographing things we are not supposed to see. Kafer (2016) discusses his Paglen's work *Limit Telephotography* that documents military bases from afar, noting that Paglen is exploring the limitations of photography in its ability to document government secrets or reveal truths or knowledge about information that is being hidden from the general public (Kafer 2016). Using lenses of up to 7000mm while shooting in the desert at night, the resulting images are blurred, vague shapes of vehicles and structures. *iPhotograms*, too, plays with this question of what we can actually know and document visually when powerful institutions, whether commercial or military, are in place to keep that information under wraps.

In their design research, Pierce and Paulos apply the idea of counterfunctional things to the digital camera. The two explore severely limiting the functions of the camera, such as an ultra-low resolution camera (some as low as 1x1, 2x3, 4x4) or a wooden camera that requires the photographer to saw open and break the enclosure (Pierce & Paulos 2014). These processes would render the images so abstract they would be unrecognizable or destroy the camera itself in the process. In my work with *iPhotograms*, I, too, explore the destruction of the camera as part of the photographic process and investigate the meaning that can be found within abstracted images or outlines.

History of Cyanotypes

The use of cyanotypes is not without meaning in *iPhotograms*, so I will briefly explain the history of the process. The term cyanotype comes from Greek, meaning "dark blue impression." Indeed, the result of this photographic process is a distinctive blue and white image. Sir John Herschel invented the process in 1842. Light interacts with ferric ammonium citrate and reduces it to a ferrous salt, which in turn reduces the potassium ferricyanide. The insoluble Prussian blue pigment, ferric ferrocyanide, is left as a precipitate. Areas not exposed to light stay in a ferric state, and the remaining unreduced salts wash off with water during the development process. As it dries, the ferric ferrocyanide re-oxidizes (Hirsch 2008).

Along with the development of the cyanotype process itself, the use of cyanotypes also has roots in technology and the sciences. Herschel used the process to duplicate intricate notes, and architects and shipbuilders used the process to create multiple copies of line drawings – literal blueprints. Anna Atkins is often credited with the first example of using cyanotypes in an aesthetic way. In 1843 she published the first book illustrated photographically, *British Algae: Cyanotype Impressions*. Given her background in botany and the careful cataloging of the algae images,

though, these illustrations seem more like documentation of various specimens rather than a purely aesthetic pursuit (Modrak & Anthes 2011). Indeed photography is an ambiguous "half-art, half-science" with constant innovations (Rexer 2002).

The Process of *iPhotograms*

The process of creating *iPhotograms* involved disassembling an iPhone and documenting the exploration with cyanotypes. This first involved obtaining the necessary equipment. I purchased the chemicals online via a craft supply website, the tool kit for smart phones at a specialty electronics store, developing trays at camera store, and paper and other supplies at an art store.

Once I had obtained the supplies, I prepared the solutions of Potassium Ferricyanide and Ferric Ammonium Citrate by adding water and waiting 24 hours to fully dissolve. When the solutions were ready for use, I mixed them in equal parts and applied the resulting sensitizer to the paper, which dried in my darkened bathroom.

While the paper was drying, I would sit at my desk in front of my laptop computer to watch a YouTube video on how to take apart the iPhone 5. These instructions, while quite basic in terms of their purpose, still offered an account of what each part of the phone was. After completing a step, I would pause to create an arrangement with the different pieces on my work surface. Once I settled on an arrangement, I would transport the pieces into the darkened bathroom and transfer them to the coated paper.

The next step in the process was exposing the paper in the sun. Given the cloudy and sometimes rainy weather, I would place the paper on a covered porch for anywhere from 45 to 90 minutes. During this time, I photographed the arrangement on the paper as it was developing to later use these photographs in the cyanotype process as negatives. Once the chemicals turned from a light green to bronze color, I would remove the phone from the paper and fix the image by agitating the paper in a tray of water.

I then repeated this process of taking apart the next section of the phone, arranging it, developing the photogram in the sun, and photographing this part of the process. Once the phone was complete disassembled, I printed the photographs taken of each step. These were printed on regular computer paper, rubbed with olive oil, and placed on top of chemical-coated paper to create a more detailed cyanotype. The printer negative and the paper were clamped between sheets of plexiglass and again placed in the sun to develop and fixed with water. I also began experiments with using macro photography to shoot extreme close-ups of the small parts with the intention of again using these as printer negatives for cyanotype prints. Further work will build on these detailed, macro shots.

Figure 1: Photogram from *iPhotograms*

Reflection

While the resulting images in the *iPhotograms* series may not offer a better understanding of how our current technology—photographic technology in particular—works, the process and the images do serve to illustrate various ideas and concepts around new media.

Perhaps one of the most surprising parts of the process to me was the difficulty of obtaining the necessary tools to take apart an iPhone. Certainly there were kits to purchase online, but most shipped from China with a delivery window that failed to meet necessary time constraints. Eventually I was able to find a kit through connections in the DIY community. This seemingly simple step nearly thwarted the timely completion of the initial tests, and it speaks to the ideas raised by Hertz and Parikka. Consumer electronics are not meant to be fixed or repaired, at least not by an untrained individual (i.e. an ordinary consumer). There are, as they noted, communities of people who tinker as I found through my investigations into local electronic supply stores and YouTube instructional video searches.

The process itself was also an exploration of the layers of black boxing technology as well as black boxing information. When first developing the project idea, I had a very clear notion that I wanted to explore modern cameras and photography by taking apart the necessary technology that many people today do not understand. As noted, there are so many complex systems in place that result in a single object that we use to take photos. Yet to take a photo today, all we have to do is take out our phones and tap the screen a few times. The simplicity of producing a cyanotype fits nicely with this idea of simply tapping to create an image. Two chemicals are mixed in equal parts with little possible hazard, and after that, all one needs is sunlight and

water. But much like the complex system that is involved with our ability to take a photograph simply by tapping our phone, a complex chemistry process is still the foundation of the cyanotype process. I admit that part of the reason I included the history and background of the cyanotype process in this paper is to remind readers how unfamiliar even natural systems may seem! This project questions how much we know or need to know about the black boxes of technology, but it also reiterates how much knowledge we have already put away into similar black boxes.

Figure 2: *iPhotograms* image using printer negative

Conclusion

In this paper, I discuss ways our current technology is hidden from our understanding and how difference scholars open, or at least tease apart, the complex systems that convert our inputs to outputs. I also look at other artists and researchers who are grappling with similar questions in creative ways and detail the photographic historical context for my artistic process.

This paper, and the *iPhotograms* series, is an exploration of modern camera technology in the spirit of media archaeologists. Using the cyanotype process to examine the literal and theoretical black boxes of our technology, this project builds on the work of other artists, academics, and researchers to question what we need to know and what we can know about the inner workings of the technology that constitutes our lives.

References

Burrows, R. (2009) Afterword: Urban Informatics and Social Ontology, in M. Foth (ed.) *Handbook of Research on Urban Informatics*, pp. 450–4. Hershey, PA: Information Science Reference.

Hertz, G., & Parikka, J. (2012). Zombie media: Circuit bending media archaeology into an art method. *Leonardo*, *45*(5), 424-430.

Hirsch, R. (2008). *Photographic Possibilities: The Expressive Use of Equipment, Ideas, Materials, and Processes*. CRC Press.

Huhtamo, E., & Parikka, J. (2011). *Media Archaeology: Approaches, Applications, and Implications*. Berkeley, US: University of California Press.

Kafer, G. (2016). Documenting the Invisible: Political Agency in Trevor Paglen's Limit Telephotography. *Contemporaneity: Historical Presence in Visual Culture*, 5(1), 53-71.

Kirschenbaum, M. G. (2008). *Mechanisms: New media and the forensic imagination*. MIT Press.

Latour, B. (1987). *Science in Action: How to Follow Scientists and Engineers Through Society*. Harvard University Press.

Modrak, R., & Anthes, B. (2011). *Reframing Photography: Theory and Practice*. Taylor & Francis.

Neusüss, F. M. (1994). "From Beyond Vision," Experimental Vision: The Evolution of the Photogram Since 1919. Denver Art Museum.

Pierce, J., & Paulos, E. (2014). Counterfunctional things: exploring possibilities in designing digital limitations. In *Proceedings of the 2014 Conference on Designing Interactive Systems* (pp. 375–384). ACM.

Pinch, T. & Bijker, W. E. (1987). The social construction of facts and artifacts: Or how the sociology of science and the sociology of technology might benefit each other. In W. E. Bijker, T. P. Hughes, and T. Pinch (ed.) *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, pp. 17-50. Cambridge: MIT Press.

Rexer, L. (2002). *Photography's antiquarian avant-garde: the new wave in old processes*. Harry N Abrams Inc.

Tannenbaum, B. (1992). *Adam Fuss: Photograms*. Akron Art Museum.

Winner, L. (1993). Upon opening the black box and finding it empty: Social constructivism and the philosophy of technology. *Science, Technology, & Human Values*, *18*(3), 362-378.

Winthrop-Young, G. (2010). *Hardware/software/wetware*. Critical Terms for Media Studies, 186-198.