

# ***Selfiecity*: Exploring Photography and Self-Fashioning in Social Media**

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[This article discusses the project *Selfiecity* available at <http://selfiecity.net/>.]

User-generated visual media such as images and video shared on Instagram, YouTube, and Flickr opens up fascinating opportunities for the study of *digital visual culture*. Since 2012 the research lab led by Lev Manovich (Software Studies Initiative, [softwarestudies.com](http://softwarestudies.com)) has used computational and data visualization methods to analyze large numbers of Instagram photos. In our first project *Phototrails* ([phototrails.net](http://phototrails.net)), we analyzed and visualized 2.3 million Instagram photos shared by hundreds of thousands of people in 13 global cities. Given that everybody is using the same Instagram app, with the same set of filters and image correction controls, and even the same image square size, and that users can learn from each other what kinds of subjects get most attention, how much of the variance between the cities can we find? Are networked apps such as Instagram creating a new universal visual language which erases local specificities?

We can also ask about the historical connections between user-created networked software-driven photography and the earlier photographs, such as 20th professional photojournalism, art photography, advertising photography, amateur photography, and so on. In addition to asking about continuities and discontinuities (what techniques and conventions have persisted, which ones became more prominent, which ones disappeared), we can also bring in the question of variability. Does the easiness of capturing, editing and sharing photos leads to more aesthetic diversity? Or does it instead leads more repetition, uniformity and visual social mimicry, as food, cats, selfies, and other popular subjects drown everything else out?

Our work in *Phototrails* revealed strong similarity between the cities in terms of basic visual characteristics - such as tonality and colors of images - and also the use of filters. But this finding was partly an artifact of the method we used. We disregarded the content of photos, the differences in compositions and other aspects of photographic aesthetics, the relative popularity of various photos types and many other possible dimensions of difference. Instead we considered the photos only as assemblages of color pixels.

To compensate for some of the limitations of this first study, we designed a new project *Selfiecity* ([selfiecity.net](http://selfiecity.net)). Rather than using an arbitrary sample of social media images,

we focused only on one kind – the popular selfie genre. This chapter discusses how we assembled the selfie dataset, our research methods, the presentation of the work via visualizations and a website, and some of our findings. It also reviews recent art historical debates about the selfie, placing it into the broader context of photo history, and asking how the Instagrammed selfie differs from its precursors.

## **Making Selfiecity**

**The Project Team.** To work on *Selfiecity*, we assembled a large multi-disciplinary team. The team includes media theorists, an art historian, data scientists, visual designers and programmers who worked between New York, Germany and California. The project was coordinated by Manovich, while Moritz Stefaner (one of the leading visualization designers in the world) was responsible for creative direction and visualizations. Other team members are: Dr. Mehrdad Yazdani, Dr. Dominikus Baur, Jay Chow, Daniel Goddemeyer and Nadav Hochman.

The project presentation online combines *Findings* about the demographics of people taking selfies and their poses and expressions; a number of media visualizations (*imageplots*) which assemble thousands of photos to reveal the interesting patterns; and an innovative interactive application (*selfiexploratory*) which allows visitors to explore the whole set of 3200 selfie photos, sorting and filtering it to find new patterns. In addition, the website [selfiecity.net](http://selfiecity.net) also includes three essays about history of photography and the selfie phenomena, the functions of images in social media, and media visualization method.

**Data Collection.** The first stage in working on this project was creation of a selfie dataset. This required many steps. When you browse Instagram, at first it looks like it contains a large proportion of selfies. A closer examination reveals that the large percentage are not selfies, but photos taken by other people. For our project, we wanted to use only single person “true selfies” for the project.

The team partnered with Gnip, a third party company which at that time was the world’s largest provider of social data ([gnip.com](http://gnip.com)). After developing the software that interfaces with Gnip service, in September 2013 we started to collect Instagram photos in different locations. After many tests, we focused on central areas in five cities located in North America, Europe, Asia, and South America. In each city we chose the central area, keeping these areas approximately the same size.

We wanted to collect images and data under equal condition, so we selected a

particular week (December 5 - December 11, 2013) for the project. The following are the numbers of photos shared on Instagram in the central areas of our 5 cities during this week, according to Instagram data provided by Gnip (sorted by size):

NYC - 207K

Bangkok – 162K

Moscow – 140K

Sao Paulo - 123K

Berlin - 24K

Total: 656K photos.

To locate selfies photos, we randomly selected 120,000 photos (20,000 or 30,000 photos per city) from the total of 656,000. Between two and four Amazon's Mechanical Workers tagged each photo. We experimented with different forms of a question, and the best results were for the simplest one: "does this photo shows a single selfie"?

We then selected top 1000 photos for each city (i.e., photos which at least 2 workers tagged as a single person selfie). We submitted these photos to Mechanical Turk again, asking the 3 "master workers" not only to verify that a photo shows a single selfie, but also tag gender and guess the age of a person.

As the final step, at least one member of the project team examined all these photos manually. While most photos were tagged correctly (apparently most Mechanical Turk workers knew what a selfie was), we found some mistakes. We wanted to keep the data size the same to make visualizations comparable, so our final set contains 640 selfie photos for every city (eliminating the mistakes), for the total of 3200 photos.

**Computer analysis.** The sample set of 3200 selfies photos was analyzed using state-of-the-art face analysis software from Orbeus Inc. (rekognition.com). The software analyzed the faces in the photos, generating over 20 measurements, including face size, orientation, emotion, presence of glasses, presence of smile, whether eyes are closed or open, and others.

We have used these measurements in two ways. We compared the measured faces characteristics between cities, genders and ages (see *Findings* below). We also included some of the measurements in the *selfiexploratory* interactive application, to allow website visitors filter the selfies database by any combination of selected characteristics (see *Selfiexploratory* below).

The software also guessed gender and age of a person in each photo. We found that the gender guesses were generally consistent with the guesses of Mechanical Turk workers, whereas the age estimates differed significantly.

## Visualizing the images

Typically data visualization shows simple data such as numbers. However, a single number can't summarize a photo. It is not a "data point" but a whole world, rich in meanings, emotions and visual patterns. This is why showing all photos in the visualizations is the key strategy of the project. We call this approach "media visualization."

In the words of Moritz Stefaner reflecting on the project: "Showing the high level patterns in the data — the big picture — as well as the individual images has been an important theme in our project. How can we find summarizations of big data collections, which still respect the individuals, and don't strip away all the interesting details? This has become a quite central question to us, not only with respect to selfies." Moritz created a few different types of visualizations for the project described below.

**Blended Video Montages** (<http://vimeo.com/moritzstefaner/selfiecity-five-cities>). Each video presents 640 selfies from each city. It goes through all the images but not in a simple sequence, Instead, a few selfies are superimposed on the screen, with new ones fading on top of the old ones. The faces are aligned with respect to eye position and sorted by the head tilt angle. The videos combine individual photos to create more abstract representations, which still show details of these images and the context.

This visual strategy is designed to create a tension between individual shots and high-level patterns. We don't show each face by itself. But we also don't superimpose all face together – which would only produce a generic template. Instead, we show something else: a pattern and individual details at the same time.

**Imageplots.** Inspection of photos one by one can reveal a lot of detail, but it is difficult to quantify the patterns observed. We created histogram-type visualizations that show distributions of genders, ages and smiles in different cities. Like normal data visualization, they allow you to immediately see patterns expressed in the shapes of the graphs. But because these graphs are composed from individual photos, they also give you a way a different way to explore the interplay between the particular and the general.

**Selfieexploratory** (<http://selfiecity.net/selfieexploratory>). The key part of the project is the interactive visualization app which allows the site visitors explore the selfie dataset. visitors can filter the photos by city, gender, age and a number of face measurements extracted by software.

The application combines both human judgments and computer measurements – two ways of seeing the photos. The gender and age graphs on the left use human tags and

guesses. All other graphs on the right use software faces measurements. Whenever a selection is made, the graphs are updated in real-time, and the bottom area displays all photos that match. The result is an innovative, fluid method of browsing and spotting patterns in large media collection. “We see a big potential in this type of interface and plan to extend it to other applications, such as museum collections or personal media”, explains Dominikus Baur, lead developer and UI designer for *Selfiecity*.

## Selected Findings

In addition to presenting the selfie dataset through visualizations, videos, and interactive *Selfieexploratory* application, we also decided to present selected findings in a more conventional format as statistics. Out of a larger set of findings, we selected and presented the following five:

***People take less selfies than often assumed.*** Depending on the city, only 3-5% of images we analyzed were actually selfies.

***Significantly more female selfies.*** In every city we analyzed, there are significantly more women selfies than men selfies (from 1.3 times as many in Bangkok to 1.9 times more in Berlin). Moscow is a strong outlier - here, we have 4.6 times more female than male selfies. (While we don't have this data for other countries, in the U.S. proportion of female to male Instagram users is close to 1:1, according to Pew Internet survey).

***A young people's sport? Indeed.*** Most people in our photos are pretty young (23.7 estimated median age). Bangkok is the youngest city (21.0), whereas NYC is the oldest (25.3). Men's average age is higher than that of women in every city. Surprisingly, more older men (30-) post selfies on Instagram than women.

***Bangkok, Sao Paulo are all smiles.*** Computational face analysis revealed that you can find lots of smiling faces in Bangkok (0.68 average smile score) and Sao Paulo (0.64). People taking selfies in Moscow smile the least (only 0.53 on the smile score scale).

***Women strike more extreme poses, especially in Sao Paulo.*** Women's selfies have more expressive poses; for instance, the average amount of head tilt is 50% higher than for men (12.3° vs. 8.2°). Sao Paulo is most extreme - there, the average head tilt for females is 16.9°!

These findings present only some of the patterns we found. In general, reviewing all the patterns, we concluded we discovered that each of our five cities is an outlier in its own unique way. Depending on which dimension we choose, one of the cities usually stands

out. However, then we combine many dimensions together, Moscow and Bangkok stand out from other cities.

## **The Limitations and Affordances of Instagram**

The very short history of Instagram selfies started on January 27, 2011 – the day when Instagram made possible the use of hashtags. Jennifer Lee from Oakland is said to have become the first Instagram user to tag her self-portrait as #selfie on this very day (Laird 2013; Testa 2013). On November 19, 2013 Oxford Dictionaries announced selfie as “the international Word of the Year.” Since then this hybrid phenomenon of vernacular photography and social media has created quite a bit of media hype. A selfie, according to Oxford Dictionaries, is “a photograph that one has taken of oneself, typically one taken with a smartphone or webcam and uploaded to a social media website” (Oxford Dictionaries Blog 2013). In popular media, selfie was very soon labeled “a symptom of social media-driven narcissism,” (Pearlman 2013), a “new way (...) of communicating with one another through images” (Rawlings 2013), “the masturbation of self-image” (Marche 2103), a “virtual ‘mini-me’” (Clark 2013), and so on. Other writers have proposed that the selfie among else can function as a means of self-expression, a construction of a positive image, a tool of self-promotion, a cry for attention and love, and a way to express belonging to a certain community (Cep 2013; Leary 2013; Nelson-Field 2013).

In our project we wanted to show that no single interpretation of the selfie phenomenon is correct by itself. Instead, we wanted to reveal some of the inherent complexities of understanding the selfie – both as a product of the advancement of digital image making and online image sharing and a social phenomenon that can serve many functions (individual self-expression, communication, etc.). By analyzing a large sample of selfies taken in specified geographical locations during the same time period, we argue that we can see beyond the individual agendas and outliers (such as the notorious celebrity selfies) and instead notice larger patterns, which sometimes contradict popular assumptions. For example, considering all the media attention selfie has received since late 2013, it can easily be assumed that selfies must make up a significant part of images shared on Instagram. Paradoxically enough, our research revealed that only approximately four percent of all photographs posted on Instagram during one week were single person selfies.

We also need to keep in mind that we are investigating a phenomenon which has distinct socio-economic limits. Selfies production is limited to users of smartphones who are also active users of Instagram. The United Nations’ International

Telecommunications Union reported “around 6.8 billion mobile subscriptions” by the end of 2013 (Embley 2013), which is a significant number considering that the world population of approximately 7.1 billion at that time (according to world population data from [www.geohive.com](http://www.geohive.com)). The number of smartphones, however, is estimated to be significantly lower – only 1.4 billion by the end of 2013 (Heggestuen 2013). The number of Instagram users is even smaller – more than **150 million monthly users in 2013** (Rusli 2013). For a person to be an active Instagrammer anywhere in the world means to fall within a certain income bracket that supports the purchase of a smartphone and monthly expenses related to network subscription and service fees (or to be a dependent of such a person). And while we don’t have statistics for instagram use across ages in general, at least in the five cities we analyzed the majority of selfie takers are in their 20s, with median age estimated to be 23.7 years.

These demographic and socio-economic constraints are joined by already mentioned constraints and affordances of the software itself. Writing about Phototrails ([www.phototrails.net](http://www.phototrails.net)), Manovich and Hochman described these characteristics: “Instagram automatically adds geospatial coordinates and time stamps to all photos taken within the application. All photos have the same square format and resolution (612 x 612 pixels). Users apply Instagram filters to large proportion of photos that give them an overall defined and standardized appearance” (Hochman and Manovich 2013).

This standardization of photo experience by the photo sharing app has benefits for the researchers. For example, the automatic addition of standard geo-location information to each photo by Instagram allows us to explore the global and local spatial patterns, quickly mapping millions of locations using visualization software. The square format and the same size of all photos are also very helpful in comparing many photos using our media visualization techniques. (Photos which have very different proportions are harder to visualize effectively).

All the photos contributed by Instagram users can be said to contribute to a giant archive. But it is an archive of a new kind. We can think of Instagram as an archive in the process of becoming. This unfinished, live and living archive raises many exciting questions from the perspective of the recent and much discussed “archival turn” in art historical writing.<sup>1</sup>

## **Selfie as a New Genre of Photography**

Selfie can be interpreted as an emerging new sub-genre of self-portraiture, as an example of the digital turn in vernacular photography as well as a side product of the

recent technological developments, which in their impact and scope are not unlike the revolution in photographic practice associated with the Kodak Brownie camera and its wide availability starting in the early 1900s. Sometimes the term ‘selfie’ is applied retroactively to proto-selfies or photographic self-portraits made in the nineteenth and early twentieth-century. These historical reviews inevitably start with Robert Cornelius’s ‘selfie’, a daguerreotype self-portrait made in 1839. Another outstanding and well-known example of an early attempt at dramatically staged self-portraiture is Hippolyte Bayard’s *Self-Portrait as a Drowned Man* made in 1840 (see a historical discussion on this image in Sapir 1994). For clarity’s sake, the term ‘selfie’ here is used only in relation to the self-portraits shared via social media, in accordance with the definition provided by Oxford Dictionaries. In photographic self-portraiture, according to art historian Amelia Jones, “technology not only *mediates* but *produces* subjectivities in the contemporary world” (Jones 2002: 950, emphasis in original). Accordingly, **the implications of particular technologies, such as the smartphone cameras and online image-sharing platforms, are exactly what makes selfie substantially different from its earlier precursors.**

Selfie is not only a photographic image that we recognize as a self-portrait and which bears a formal resemblance to numerous canonical photographic self-portraits from the nineteenth and twentieth centuries. Instead, selfie is a product of a networked camera. The essential attributes of a selfie include its instantaneous distribution via Instagram or similar social networks (Rawlings 2013) as well as the related metadata (generated automatically such as geo-tags, added by the user such as hashtags, or appearing subsequently such as the comments, “likes,” and re-sharing by other users). The very *raison d’être* of a selfie is to be shared in social media. It is not made for maker’s own personal consumption and contemplation. By sharing their selfies, Instagram users construct their identities and simultaneously express their belonging to a certain community. Thus performing the self is at once a private act as well as a communal and public activity.

For example, let’s consider just one aspect of this convergence of private and public acts. From the perspective of history of fine art photography, a self-portrait in a mirror is a well-known formal device (see Wilson 2013: 58). It seems even disquieting how true and relevant today is what art historian Jean-François Chevrier wrote almost thirty years before the explosion of the selfie-mania: “The most intimate place for narcissistic contemplation, the room with the mirror – a bathroom for example – becomes in this context the most common of places, where every distinction of the self is in the end abolished” (Chevrier 1986: 10). When we inspected individual selfies from our dataset, we found that a selfie taken in front of a mirror is among most popular types. Moreover, often it is the very bathroom mirror, as already mentioned by Chevrier. Selfies made in the privacy of a bathroom are used as utterances in communication that takes place publicly on Instagram.



While art historians and historians of photography traditionally engage in a close reading of a singular image, *Selfiecity* instead focuses on patterns in a larger set of images, employing computational analysis of many characteristics such as pose (for example, looking up/down, left/right), facial expression, and mood. It is a paradox of photography in social media: each individual image is and is not important. Even before the rise of Instagram and selfies, Lynn Berger pointed out that with the advent of smartphone cameras readily connected to the Internet, “the *practice* and *experience* of everyday photography have become more important than the pictures themselves” (Berger 2011: 183, emphasis in original).

Does this turn signify also a qualitative change, a real paradigm shift? Berger seems to argue that a change is only quantitative: “Digital cameras, photo sharing websites and camera phones do not fundamentally alter snapshot photography; they simply amplify an already existing practice” (184). However, we would more readily agree with scholars who have argued for a noticeable paradigm shift, or what Edgar Gómez Cruz and Eric T. Meyer have called “the fifth moment of photography” (Cruz and Meyer 2012). The ease and simplicity of taking images with smartphone and sharing them online are among the factors contributing to this shift toward this new stage of photography, which is characterized by “complete mobility, ubiquity and connection” (219). Production and distribution of photographic images now is simplified, streamlined, and democratized to a degree unthinkable even ten years ago. What implications does this process have on our reading of selfies?

### **Taking a Snapshot of the Paradigm Shift**

To analyze the hybrid phenomenon of selfie, the *Selfiecity* team developed new tools and methodologies as well as expanded the approaches elaborated in previous research projects by Software Studies Initiative, “integrating methods from social computing, digital humanities, and software studies to analyze visual social media (...) and introducing new visualization techniques which can show tens of thousands of individual images sorted by their metadata or algorithmically extracted visual features” (Hochman and Manovich 2013). *Selfiecity* reaches into different fields of inquiry. In a way, the project is very much about photography and self-portraiture, the traditional fields of art historical scholarship. Yet it is as much about testing the limits of software designed to analyze large amounts of visual information and visualize the results of such analysis – a kind of work which may also belong to the field of computer science. While focusing on Instagram, one of several available platforms of online image-sharing, *Selfiecity* comments on the social media in general. The project views social media as a vehicle of voluntary interpersonal communication, and discusses the visual

component of such communication. Selfiecity provides a departure point for further discussions regarding topics such as the functions of photography as arguably the most democratic and accessible technology of image-making of the present moment, or the nature of visual communication and self-fashioning in the social media.

One of these topics concerns the shifting status of photography. Photography per se is and has always been a borderline medium, its theoretical perception endlessly oscillating between that of a mechanical apparatus and a creative tool capable of artistic expression. Does agreeing with the latter automatically render all selfies as belonging to art? Does that mean that finally “everyone is an artist,” just like Josef Beuys envisioned it? Are selfies the ultimate onslaught of all the ills of amateur photography, so often frowned upon by art historians and theorists of professional photography? Similar questions have been already asked also from within the artworld. For example, the iconic gesture of selfie-taking has been monumentalized by Brendan Lynch and Naomi Larbi as a realistic, life-size sculpture of a female nude, holding a smartphone in an extended arm.<sup>2</sup> In another example, selfies were the subject of the video installation *National #Selfie Portrait Gallery* presented at the *Moving Image* show in London.<sup>3</sup> Despite the dominant skepticism, we should expect that sometime soon a museum will pioneer in collecting, displaying, and theorizing selfies as the vernacular visual form of the twenty-first century. Just like family snapshots and anonymous amateur photographs which have entered museum collections and have been generously theorized since the 1990s (Nickel 1998; Batchen 2001; Langford 2001; Curtis 2011), selfies too will inevitably find their place in art and photography museums. New image-making and image-sharing technologies demand radically new ways of interpretation and analysis, and *Selfiecity* is an attempt to explore some of these ways.

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## Notes

<sup>1</sup> For a general introduction about the archival turn in relation to photography, see *Visual Resources: An International Journal of Documentation* 18(2), 2002 ('Following the Archival Turn: Photography, the Museum and the Archive'). For a recent debate on archives and digital data, see *Journal of Visual Culture* 12(3), 2013 ('The Archives Issue').

<sup>2</sup> This untitled sculpture dominated the exhibition *The Still House Group: +1 #5* by Brendan Lynch and Naomi Larbi taking place in exhibition space +1 in January – February 2014. The exhibition was curated by Jonathan Rider as part of *Art in General New Commissions* program. Images and more information: <http://www.artingeneral.org/exhibitions/565>.

<sup>3</sup> *National #Selfie Portrait Gallery* was curated by Kyle Chayka and Marina Galperina . More information: <http://www.moving-image.info/national-selfie-portrait-gallery/>.

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