INTERVIEW

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The Age of Algorithms: Interview with Professor Lev Manovich

It's 20 years since you published The Language of New Media. The book is now regarded as one of the most influential foundations for new media research. Did your predictions on how the media would look like in 2021 come true?

The Language of New Media was published in 2001, and was based on a number of my texts published earlier that I expanded. The first of these texts appeared in 1991. So, in reality, the book is almost 30 years old now. So why it is still used in many thousands of university courses today?

One of the reasons is that I did not try to predict the future. Instead, my goal was to place "new media" (new cultural and media forms that use computers) in the larger context of history of the arts, design, film, photography, and computers. I showed how new media relied on conventions and techniques that were already dominant in modern culture. At the same time, I also discussed new representational and aesthetic possibilities that new media offers or can offer. This historical perspective is what assured the book's longevity, as I see it.

One of the goals of the book was to try and discover and outline key common characteristics that digital cultural objects and digital phenomena share. This is reflected in the book organization. I don't talk about digital cinema, multimedia, web sites in separate chapters. Instead, it is laid out in a different way: each chapter describes a concept that many new media objects and phenomena share, such as an "interface" or a "database."

And did you expect the critical importance of software and algorithms that happened over the last decade?

I used the term "software studies" and "software theory" for the first time in *The Language of New Media*.

And in early 2000s, I started publishing texts developing this idea further. I prefer this term to "algorithm studies" or "critical code studies" because algorithms are only one part of software.

The field of software studies gradually took shape in the mid-2000s. In 2006, Matthew Fuller, author of the pioneering book *Behind the Blip: Essays on the Culture of Software* (2003), organized the first Software Studies Workshop in Rotterdam. In the introduction to the workshop, Fuller wrote: „In a sense, all intellectual work is now ‚software study,' in that software provides its media and its context, but there are very few places where the specific nature, the materiality, of software is studied except as a matter of engineering." In 2008 I organized a second Software Studies Workshop and after that The MIT Press started "software studies" publishing series (https://mitpress.mit.edu/books/series/software-studies). Today the crucial roles played by algorithms in most areas of contemporary society including politics, economics, media and culture have become visible to everybody – but this was not the case even eight years ago.

You introduced the notion of the "cultural software". In what ways this concept advance our understanding of digital culture?

I am using the term "cultural software" to refer to types of software which support actions we normally associate with "culture." These cultural actions enabled by software can be divided into a number of categories. The following are some of them: 1) creating, sharing and accessing cultural artifacts which contain representations, ideas, beliefs, and esthetic values (for instance, editing a music video, designing a package for a product, or writing a blog post); 2). engaging in interactive cultural experiences (for instance, playing a computer game); 3) creating and sharing information and knowledge (for instance, writing an article for Wikipedia, adding places in Google Earth); 4) developing software tools and services which support all these activities – web browsers, photo and video editing apps, programming languages for artists such as Processing, game engines, and so on.

Why the perspective of software studies is important? Let's say I want to better understand the media objects that billions of people experience and engage with every day: websites and blogs, animated titles of TV shows and ads, designs, illustrations, photos, and so on. Very often, these objects are parts of interactive media experiences—navigating the Web, playing a video game, browsing Instagram and TikTok. The examples of "engagement" are sharing, editing, remixing, and commenting. And all this media is experienced, created, edited, remixed, organized and shared with "cultural software." Therefore, to understand media today we have to learn about this software—its genealogy (where does it come from), its anatomy (the key features shared by all media viewing and editing software), and its effects in the world. How does media design software shape the media being created, making some design choices seem natural and easy to execute, while hiding other design possibilities? How media viewing/

managing/remixing software shapes our experience of media and the actions we perform on it?

These are the questions I added in my 2013 book S*oftware Takes Command*. And because today "media" and "software" are so intertwined, this book also asks a big question – what "media" is today conceptually? Do the concepts of media developed to account for industrial area technologies, from photography to video, still work in relation to media that are designed and experienced with software? Do they need to be updated, or completely replaced by new, more appropriate, concepts? For example: do we still have different media or did they merge into a single new meta-medium? Are there some structural features that motion graphics, graphic designs, websites, product designs, buildings, and video games all share since they are all designed with software?

In short, does "media" still exist?

In your new book Cultural Analytics you identify the rapid growth of "more media". What are the key differences between "new media" and "more media"?

"More media" is a phrase I first used in 2009, as a way of labelling the new scale of media culture – which includes not only billions of people creating their own content and sharing it online, but also more semi-professionals and professionals worldwide. For example, according to the last year's data, there are 30 million YouTube channels which have at least 10 subscribers.

"New media" and "more media" are not opposites. The latter is a new stage of "new media development.

The Language of New Media (written in 1999) described the forms of digital culture that emerged in the 1990s. *Software Takes Command* (first version published online in 2007) covered the history of software for media creation and editing and the new visual languages their enabled as they were adopted around the turn of the 21st century. My latest book *Cultural Analytics* (written in 2016-2019) investigates the new post-2005 stage where billions of people create digital media and share it online. So, this is what I called "more media."

Here cultural software is given new roles. We delegate to it more agency. It is no longer only a tool, a medium, or an assistant. Instead, it now engages it in cultural behaviors – for example, deciding what new posts to show, and if we have this option on. And while for now we still take photographs, write posts, and perform other cultural actions ourselves, gradually such actions may get fully automated in the future. For example, in 2018, Google added the autocomplete feature to Gmail that automatically completes the email response as you start writing – you only need to press the Tab key to accept. This is why all cultural and media scholars and students need to acquire a good understanding of data science and artificial intelligence (AI) fields.

First media became digital. In the 1990s, algorithms (in cultural software) are used only by professional creators as low-level tools to create and edit media, i.e., digital images, video, texts, music, and design. Next (in the 2000s), the new scale of media being created and shared by both professionals and normal people led to our society adopting algorithmic methods for its organization (i.e., search engines) and discovery (i.e., recommendations). And in the following stage, which starts around 2016, the technology behind these algorithms is being replaced by a new one (i.e., supervised machine learning using deep neural networks). So, this is where we are now.

In 2007 you created the Cultural Analytics Lab, of which you are the director. What prompted the creation of the lab and how has it evolved over the years?

Everyone is constantly saying that we are drowning in information in the ocean of information. And the other hand, everyone understands that new abundance of data creates completely new opportunities. *Cultural Analytics* aims to create an apparatus that can allow us to adequately see and describe the present. Research labs, media creators and publishers, museums, universities, non-profits and endless other organizations publish information online about their activities. This potentially can be used to create much more detailed maps of our world and our culture than we have today. These maps will show us both popular and infrequent topics, ideas, visual styles…And they can be updated periodically or in real time. Twitter's lists of popular hashtags and Google Trends are very rudimentary and very partial examples of such maps. and each uses only one type of data (tweets and google searches, respectively).

It seems to me that any person living now or 1,000 years ago is in a similar situation – information appears in front of us, and our brain processes it. „I like this young man, I can marry him; this one I don't like, and I will never marry him." The human brain is an amazing computer – much more powerful than all super-computers today. It is constantly processing millions of impressions – visual, spatial, auditory, gustatory. And it is constantly comparing everything. For example, you see an image and immediately realize that it is unique; you see another image and realize that it is rare but not unique; and you see yet another image and realize it's very common.

However, each of us sees only a tiny percentage of physical or media reality. For example, let's say I want to compare designs of cafes in all capitals in Central and Eastern Europe that opened in the last five years. It will be impossible for me to visit them. Or maybe I want to see all exhibitions taking place every month in New York, which has around 1800 galleries – and this is also impossible. So, while my brain would be able to identify the typical and unique and compute trends, I will not be able to feed it all the needed information.

However, in many cases, the information is available online – for example, every gallery in the world has a text about its shows and some images of the artworks from every exhibition. Can we collect all this information and use computational and visualization methods to see all these images together, and be able to ask questions – what is typical and what is unique, or what are the frequently used techniques and themes, or is there any visual difference today between the languages of fine and commercial arts, and so o? And can we do the same for all films being released every year, all TV dramas, all books, and so on? This was the motivation that led me first to think of cultural analytics in 2005 and then set up the lab after I got funding.

What area has been insufficiently explored? In other words: What's the next big step in media studies?

I don't think that the questions I will describe below will become "big" any time soon. But they are important for me, and certainly they have not been sufficiently explored.

I am gradually realizing that we don't know what really happens when we look at photographs, or other images. Semiotics treats images as signs. Humanities and media studies often only pay attention to their semantics – focusing on meanings and interpretations of their "content." Experimental psychology of art and philosophy think about aesthetic pleasure images can give. Pragmatic philosophy and social sciences talk about effects and actions provoked by images, and how they can change our beliefs.

But certainly, this is not all images do. They may be doing much more. They can be also doing much less – partly, because of their abundance today.

You look at endless photos, some briefly, some longer, in different contexts. Your brain "processes" them, using memory and language. The responses to images may also provoke emotions. This is all true. But all the terms listed above – meanings, pleasures, effects, emotions – in my view are simplistic, too broad and often maybe not be even relevant. Maybe in the future neuroscience can help as it progresses. But as of today, we don't know how the brain really works in detail, and therefore our theories about what happens when we look at images are only theories.

I look at hundreds of Instagram images in a day. I go to museum and see a few dozens paintings. Most of them I don't remember afterwards. Do they even leave tiny traces in my brain with its 100 billion connected neurons? I see them, yes, mechanically – like an AI which is always switched on. But do they ‚affect' me? Do I ‚read them'? Do I ‚interpret' them? Do I feel ‚emotions'? Do they make me see the world ‚differently? No.

Certainly, some techniques do exist to measure and predict some effects of visual media – eye tracking devices, EEG and FMRI recordings, statistical analysis that may look at the behavior of many online users after they looked at some ads or products listings. And for the industry, this may be enough. A particular ad campaign resulted in the strong increase of sales of product A or better recognition of brand B. And often, this is also enough for social sciences. A study found a strong correlation between teens looking at content C and their behavior D. But for me, this is not enough. I want to know what else happens when I see a single image, or a thousand images. Did the proliferation of images (the result of digital media and the internet!) changed their effects on us?

Artificial intelligence is playing an increasingly important role in the modern world. How are media, design, and aesthetics are being affected by Artificial Intelligence?

This Fall, I am finishing my second book on these topics (the first called *AI Aesthetics* was published in 2018). Since my space here is limited, let me briefly summarize a couple of points developed in more detail in the book.

How much of a revolution is the adoption of AI in media production and design? In thinking about media history, we often focus too much on most recent technologies – such as AI. However, all media creation in human history always required use of some tools. As soon as a human wanted to externalize ideas or images in their head, or represent something which exists or can exist, some form of *media technology* was needed. The surface of a cave and mark making instruments 100,000 years ago, or clay and stone later, analog photo and film cameras later still, and so on.

In other words, creating material cultural representations and certain types of cultural performances (such as making music with some instrument – but not singing or dancing) was always a result of a "collaboration" between a human and some tool or a machine. From this historical perspective, there is no fundamental difference between all other media technologies and AI – regardless of whether we mean, by the latter, the traditional algorithms we write, agents-based simulation, supervised machine learning using deep neural networks, or other approaches.

This, however, does not mean that the development of "media AI" does not lead to any fundamental changes. But what are these changes, besides speeding up many production tasks, or further democratizing it, or enabling some new effects? Does AI lead to some fundamentally new types of representations or communication techniques, comparable to the adoption of print, linear perspective, film, audio recordings, television, digital images, 3D computer graphics, VR, internet or the web? So far, the answer is no. Does it mean that the changes in media culture AI is bringing about are only qualitative? It is too early to say.

But – why do we think that qualitative changes are necessarily more important than qualitative? The technologies behind the web are the same today as 30 years ago, but the adoption of the web as the standard medium of communication in 1990s and 2000s decades changed society significantly.

To conclude, let me mention one example of a recent qualitative change in media culture that AI has contributed to. For me, it's a really good example of how a quantitative change can have very big consequences. Did you notice that over a period of a few years – approximately between 2014 and 2019 – the quality of images captured by cameras in mobile phones improved dramatically? Partly it was due to the increase of sensor resolution and other hardware improvements, and also addition of multiple lens to a phone. And partly it was due to the use of AI in cameras. Looking at the photos I captured with my phone in early 2010s, I find many of them are unusable. But by approximately 2020, it became difficult to take a really bad photo. Practically in any situation, the photo has a perfect exposure (i.e., enough details in dark, medium, and light parts) and the main subject in is focus.

I think this is a huge change. Billions of people take photos these days, and many of them do it daily – and the ability to capture good photos in almost every situation really enhances their lives, and their loved ones.

Lev Manovich was interviewed by Jacek Mikucki in October, 2021.

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Dr. Lev Manovich is a leading theorist of digital culture, and a pioneer in using big data to study visual culture. He was included in the list of „25 People Shaping the Future of Design" in 2013 and the list of „50 Most Interesting People Building the Future" in 2014. He is the author and editor of 14 books including *Cultural Analytics*, *AI Aesthetics*, *Theories of Software Culture, Instagram and Contemporary Image*, *Software Takes Command, Soft Cinema: Navigating the Database and The Language of New Media* which was described as „the most suggestive and broad-ranging media history since Marshall McLuhan." Manovich is a Presidential Professor at The Graduate Center, CUNY, and a Director of the Cultural Analytics Lab. The lab created projects for the Museum of Modern Art (NYC), New York Public Library, and other organizations.