

Lev Manovich  
www.softwarystudies.com

## **Cultural Analytics: Visualizing Cultural Patterns in the Era of “More Media”**

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We have moved from the stage of “**New Media**” to the stage of “**More Media**” (2004 -.) We are living through an exponential explosion in the amounts of data we are generating, capturing, analyzing, visualizing, and storing – including cultural content. On August 25, 2008, Google's software engineers announced on [googleblog.blogspot.com](http://googleblog.blogspot.com) that the index of web pages, which Google is computing several times daily, has reached 1 trillion unique URLs.<sup>1</sup> During the same month, YouTube.com reported that users were uploading 13 hours of new video to the site every minute.<sup>2</sup> And in November 2008, the number of images housed on Flickr reached 3 billions.<sup>3</sup>

**User-generated content** is one of the fastest growing part of the expanding information universe. According to 2008 study, “Approximately 70% of the digital universe is created by individuals.”<sup>4</sup> In other words, the size of media created by users competes well with the amounts of data collected and created by computers (surveillance systems, sensor-based applications, datacenters supporting “cloud computing,” etc.)

The exponential growth of a number of both non-professional and professional media producers over the last decade has created a fundamentally new cultural situation and a challenge to our normal ways of tracking and studying culture. Hundreds of millions of people are routinely creating and sharing cultural content - blogs, photos, videos, online comments and discussions, etc. As the number of mobile phones with rich media capabilities is projected to continue growing, this number is only going to increase. In early 2008, there have 2.2 mobile phones in the world; it is projected that this number will become 4 billion by 2010, with main growth coming from China, India, and Africa.

Think about this: the number of images uploaded to Flickr every week is probably larger than all objects contained in all art museums in the world.

At the same time, the rapid growth of professional educational and cultural institutions in many newly globalized countries along with the instant availability of cultural news over

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<sup>1</sup> <http://googleblog.blogspot.com/2008/07/we-knew-web-was-big.html>.

<sup>2</sup> <http://en.wikipedia.org/wiki/YouTube>.

<sup>3</sup> <http://blog.flickr.net/en/2008/11/03/3-billion/>

<sup>4</sup> IDC (International Data Corporation). *The Diverse and Exploding Information Universe*. 2008. (2008 research data is available at [http://www.emc.com/digital\\_universe](http://www.emc.com/digital_universe).)

the web and ubiquity of media and design software has also dramatically increased the number of culture professionals who participate in global cultural production and discussions. Hundreds of thousands of students, artists, designers have now access to the same ideas, information and tools. It is no longer possible to talk about centers and provinces. (In fact, based on my own experiences, I believe the students, culture professionals, and governments in newly globalized countries are often more ready to embrace latest ideas than their equivalents in "old centers" of world culture.)

If you want to see the effects of cultural and digital globalization in action, visit the popular web sites where the professionals and the students working in different areas of media and design and note the range of countries from which the authors come from. Try [xplsv.tv](http://xplsv.tv) (motion graphics, animation), [coroflot.com](http://coroflot.com) (design portfolios from around the world), [archinect.com](http://archinect.com) (architecture students projects), and [infosthetics.com](http://infosthetics.com) (information visualization projects). For example, when I checked on December 24, 2008, the first three projects in the "artists" list on [xplsv.tv](http://xplsv.tv) came from Cuba, Hungary, and Norway.<sup>5</sup> Similarly, when I visited [coroflot.com](http://coroflot.com) (the site where designers from around the world upload their portfolios) on the same day, the set of entries on the first page revealed a similar global cultural geography. Next to the predictable 20<sup>th</sup> century Western cultural capitals - New York and Milan – I also found portfolios from Shanghai, Waterloo (Belgium), Bratislava (Slovakia), and Seoul (South Korea).<sup>6</sup>

Before, cultural theorists and historians could generate theories and histories based on small data sets (for instance, "classical Hollywood cinema," "Italian Renaissance," etc.) But how can we track "global digital cultures", with their billions of cultural objects, and hundreds of millions of contributors? Before you could write about culture by following what was going on in a small number of world capitals and schools. But how can we follow the developments in tens of thousands of cities and educational institutions?

The ubiquity of computers, digital media software, consumer electronics, and computer networks led to the exponential rise in the numbers of cultural agents worldwide and the media they create – making it very difficult, if not impossible, to understand global cultural developments and dynamics in any substantial details using our 20<sup>th</sup> century theoretical tools and methods. But what if can we use the same developments – computers, software, and availability of massive amounts of "born digital" cultural content – to track global cultures in ways impossible with traditional tools?

To investigate these questions – as well as to understand how the ubiquity of software tools for culture creation and sharing changes what "culture" is – in 2007 we established Software Studies Initiative ([softwarestudies.com](http://softwarestudies.com)) at University of California, San Diego (UCSD) and California Institute for Telecommunications and Information (Calit2). Together with the researchers and students working in our lab, we have been

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<sup>5</sup> <http://xplsv.tv/artists/1/>, accessed December 24, 2008.

<sup>6</sup> [coroflot.com](http://coroflot.com), visited December 24, 2008. The number of design portfolios submitted by users to [coroflot.com](http://coroflot.com) grew from 90,657 on May 7, 2008 to 120,659 on December 24, 2008.

developing a new paradigm for the study, teaching and public presentation of cultural artifacts, dynamics, and flows. We call this paradigm **Cultural Analytics**.

Today sciences, business, governments and other agencies rely on computer-based analysis and visualization of large data sets and data flows. They employ statistical data analysis, data mining, information visualization, scientific visualization, visual analytics, and simulation. We propose to begin systematically applying these techniques to contemporary cultural data. The large data sets are already here – the result of the digitization efforts by museums, libraries, and companies over the last ten years (think of book scanning by Google and Amazon) and the explosive growth of newly available cultural content on the web.

We believe that a systematic use of **large-scale computational analysis and interactive visualization of cultural patterns** will become a basic research method in humanities and in cultural criticism. What will happen when humanists start using interactive visualizations as a standard tool in their work, the way many scientists do already? If slides made possible art history, and if a movie projector and video recorder enabled film studies, what new cultural disciplines may emerge out of the use of visualization and data analysis?

In our lab we have been developing techniques to analyze and visualize the patterns in movies, cartoons, motion graphics, photography, video games, web sites, design, architecture, and other types of visual media. The key idea underlying all our projects is to bring together three developments: 1) availability of massive cultural data sets; 2) the techniques of image processing and computer vision to automatically analyze visual media; 3) techniques from information and science visualization, media design, and digital art to visually represent the results of the analysis.

In November 2008 we received a grant from the US National Endowment for the Humanities Digital Humanities Office ([www.neh.gov/odh/](http://www.neh.gov/odh/)) that gives us 300,000 hr of computing time on US Department of Energy supercomputers. This would allow us to analyze millions of still images – art, design, street fashion, etc. – as well as tens of thousands of movies, from feature films to YouTube videos. This scale of data is matched by the size of visual displays that we are using in our work. We are located inside one of the leading IT research centers in the U.S. - California Institute for Telecommunication and Information Technology (Calit2). This allows us to take advantage of the next-generation visual technologies - such as HlperSpace, currently one of the highest resolution displays in the world. (Resolution: 35,640 by 8,000 pixels. Size: 9.7m x 2.3m.)

One of the directions we are now beginning to explore is the development of visual systems that would allow us to follow global cultures in real-time. Imagine a real-time traffic display (a la car navigation systems) – except that the display is wall-size, the resolution is thousands of times greater, and the traffic shown is not cars on highways, but **real-time cultural flows** around the world. Imagine the same wall-sized display divided into multiple windows, each showing different real-time and historical data about

cultural, social, and economic news and trends – thus providing **a situational awareness for cultural analysts**. Imagine the same wall-sized display playing an animation of what looks like an earthquake **simulation** produced on a super-computer – except in this case the “earthquake” is the release of a new version of popular software, the announcement of an important architectural project, or any other important cultural event. What we are seeing are the effects of such “cultural earthquake” over time and space. Imagine a wall-sized computer graphic showing **the long tail** of cultural production that allows you to zoom to see each individual product together with rich data about it (à la real estate map on [zillow.com](http://zillow.com)) – while the graph is constantly updated in real-time by pulling data from the web. Imagine a visualization that shows how other people around the world remix new videos created in a fan community, or how a new design software gradually affects the kinds of forms being imagined today (the way Alias and Maya led to a new language in architecture). These are the kinds of projects we want to create.

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