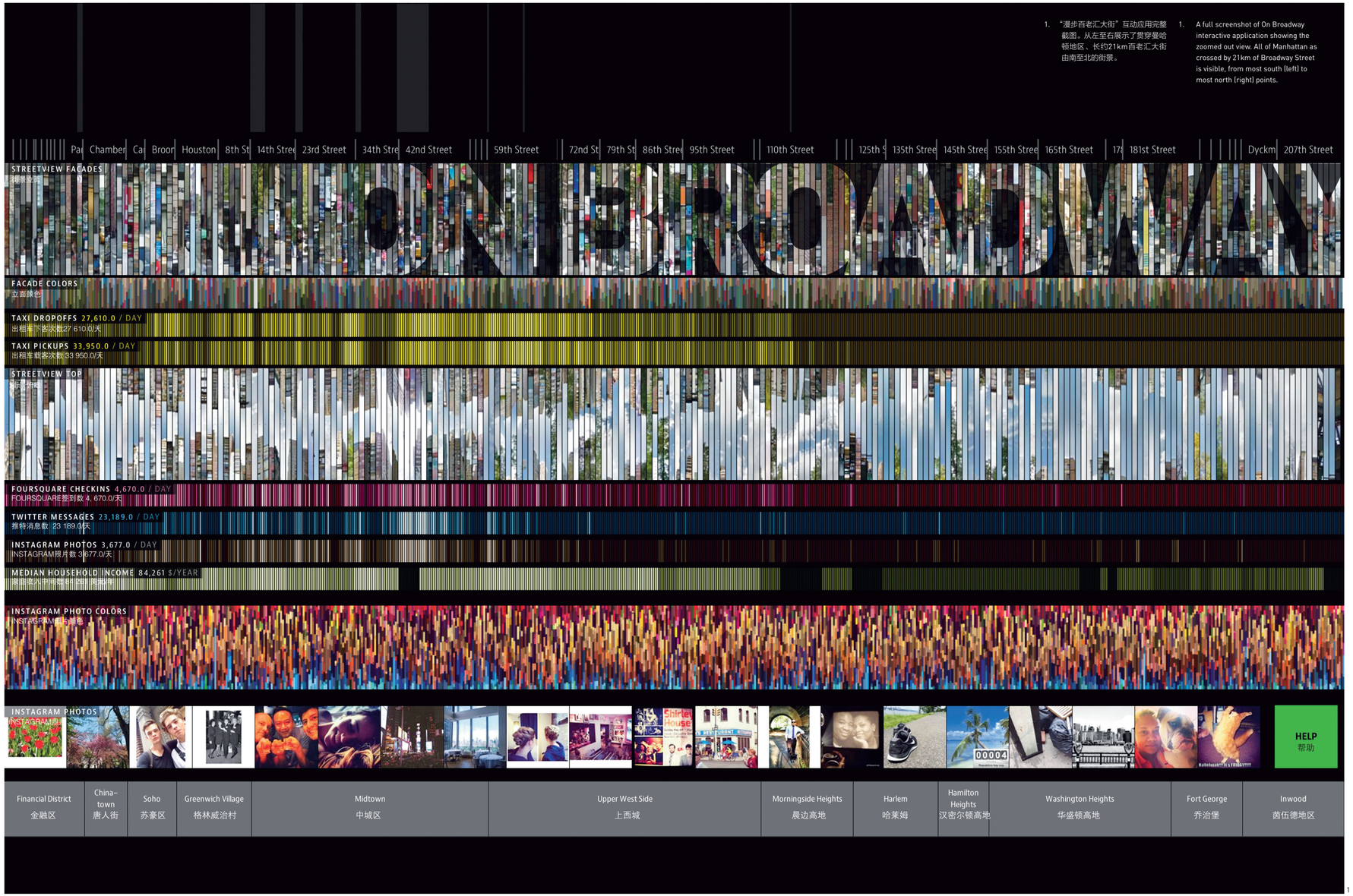


1. “漫步百老汇大街”互动应用完整截图。从左至右展示了贯穿曼哈顿地区、长约21km百老汇大街由南至北的街景。

1. A full screenshot of On Broadway interactive application showing the zoomed out view. All of Manhattan as crossed by 21km of Broadway Street is visible, from most south (left) to most north (right) points.

漫步百老汇大街
ON BROADWAY

丹尼尔 · 戈迪迈尔，莫里茨 · 斯特凡纳，多米尼库斯 · 鲍尔，列夫 · 莫诺维奇
/ Daniel GODDEMEYER, Moritz STEFANER, Dominikus BAUR, Lev MANOVICH

缘起

现代的作家、画家、摄影师、电影人和数字艺术家已经创造了很多令人惊叹的反映城市生活的作品。卡米耶 · 毕沙罗和皮耶尔 · 奥古斯特 · 雷诺阿创作的有关巴黎街道和咖啡馆的画作、柏林达达主义艺术家创作的蒙太奇图像、彼埃 · 蒙德里安创作的百老汇爵士乐、斯坦 · 李和史蒂夫 · 迪特科创作的蜘蛛侠漫画、雅克 · 塔蒂导演的电影《玩乐时间》、埃里克 · 费舍尔创作的居民和游客数据地图……这些都是艺术家以城市为题材创作的经典作品。而给“漫步百老汇大街”项目带来直接启发的是爱德华 · 鲁沙的作品《落日大道上的每座建筑》。这是一本艺术性的著作，展开后长达8.33m，它展示了落日大道上一段2.5km长的街道两旁连续而逼真的景象。

数据之街

今天，城市通过数据和我们“对话”。

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摘要

贯穿曼哈顿地区的百老汇大街绵延21km，通过对来自百老汇大街的图像和数据进行汇集整理，“漫步百老汇大街”这项研究展现了21世纪城市中的生活面貌。它利用成千上万的市民分享的活动和信息，创造了一种新型的城市景象。该项目使用了大约4 000万个数据点和图像，并制作了一个应用程序和一个互动装置。

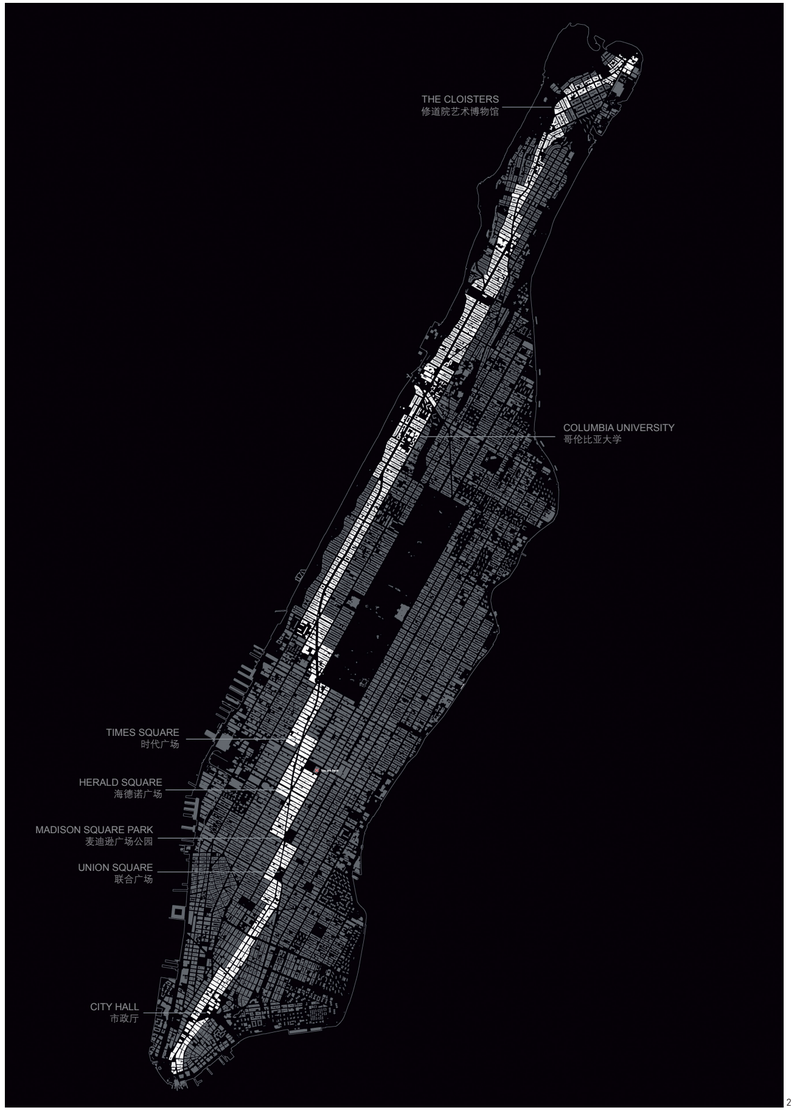
关键词
百老汇大街；曼哈顿；图像；大数据；城市

ABSTRACT

On Broadway represents life in the 21st century city through a compilation of images and data collected along the 13 miles of Broadway that span Manhattan. The result is a new type of city view, created from the activities and media shared by hundreds of thousands of people. The project uses approximately 40 million data points and images and includes an application and an interactive installation.

KEY WORDS
Broadway; Manhattan; Image; Big Data; City

译 张保利 涂先明
TRANSLATED BY Leo ZHANG Xianming TU



2

展览场地：
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软件研究创新组织（Mehrdad Yazdani、Jay Chow、Nadav Hochman）、Brynn Shepherd、Leah Meisterlin、纽约城市大学研究所中心博士研究生（Agustin Indaco、Michelle Morales、Emanuel Moss、Alise Tifentale）
展览时间：
2014年12月12日~2016年1月3日

EXHIBITION VENUE:
New York Public Library
CONTRIBUTORS:
Software Studies Initiative (Mehrdad Yazdani, Jay Chow, Nadav Hochman), Brynn Shepherd, Leah Meisterlin, PhD students at The Graduate Center, City University of New York (Agustin Indaco, Michelle Morales, Emanuel Moss, Alise Tifentale).
EXHIBITION DURATION:
December 12, 2014 – January 3, 2016

2. 从这张曼哈顿岛地图中，我们可以直观地看到百老汇大街在曼哈顿地区的位置。我们收集来自沿百老汇大街中心线宽100m的区域中的数据。
3. “漫步百老汇大街”中几组重要的数据源的分布格局对比图。

2. The map of Manhattan showing the Broadway Street. All collected data of NYC is filtered using the shape that goes through the center of Broadway and is 100 meters wide.
3. A graph comparing the patterns in key data sources used in On Broadway.



3

很多城市通过开放数据集和赞助“黑客马拉松”活动来鼓励人们利用这些数据开发出有价值的应用——例如，纽约市市长办公室对纽约市开放数据网站大力支持，其提供了超过1 200个数据集，这些数据集涵盖了从城市中的树木到自行车使用情况等方方面面的数据。于此同时，当地居民和游客通过推特、Instagram以及其他网络平台分享了海量的带有地理位置信息的视觉信息。诸如“Foursquare”这样的应用程序可以告诉我们人们会去哪些地方、人们会常去哪类场所。

我们如何应用如此丰富的数据和图像信息来描述21世纪呢？除了使用图表、数字或者地图外，是否还有其他的方式来展现我们的城市？

在该项目中，我们摒弃了大家所熟识惯用的地图，而是使用分层的数据来对城市进行展示。我们希望能创造一个城市“切片”，并对“切片”中的内容和形式进行探索。百老汇大街贯穿整个曼哈顿地区，所以我们选择沿着百老汇大街来对纽约市进行切片研究。

百老汇大街是从南至北贯穿整个曼哈顿地区的最长的连续街道——长约21km；同时它也是曼哈顿最古老的南北向街道——最初它是由居住于该地区的土著美洲人开辟的一

条小径。荷兰探险家大卫·德费里斯在1642年对其有过描述：“威克跨斯盖克路是印第安人日常通行的道路”。

数据集

百老汇大街就像人体中的脊椎一样，从曼哈顿岛的中央穿过。除了街道本身之外，我们希望把街道两侧的小范围区域也包含进来，这样我们就能够同时关注到百老汇大街及其周边的活动。为了界定这一范围，我们沿着百老汇大街中心线每间隔30m选取一个点，再以每个点为中心划出宽100m的矩形。最终形成一条长21 390m、宽100m的脊椎式的研究区域。

我们所应用到的图像和数据，包括66万张来自Instagram上分享的图片（发布的时间为2014年2月26日~8月3日）、来自推特上的附图的消息、Foursquare上自2009年以来的签到信息、谷歌街景、2013年2 200万次出租车上下客数据，以及来自美国人口普查局的经济指标（2013年度数据）。

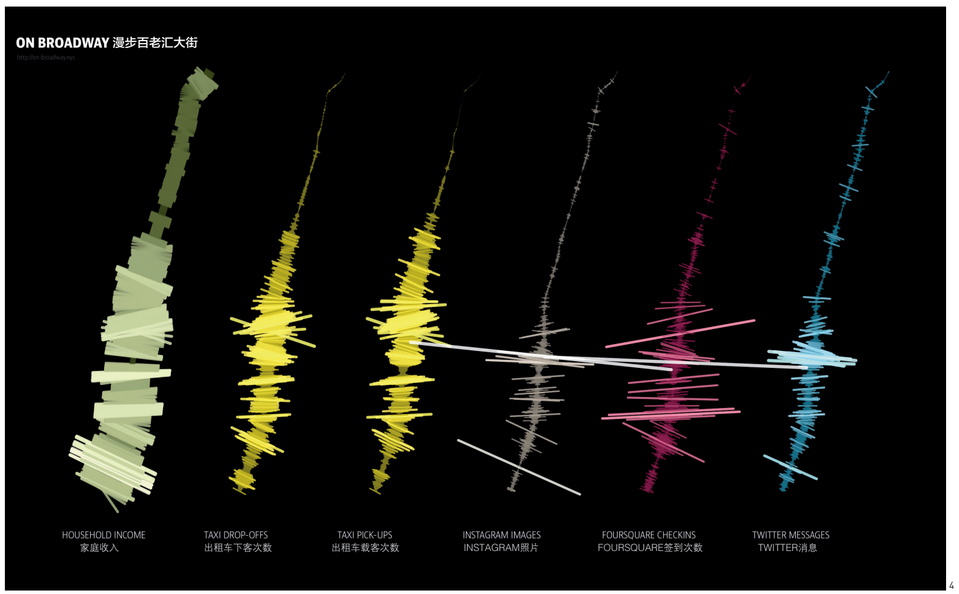
研究成果

我们研究的成果被命名为“漫步百老汇大街”，这是一个以丰富的视觉图像为主的交互界面，并在必要时配有辅助数据信息，而且没有使用任何地图。

该项目为我们审视城市塑造了一种新的视觉隐喻：垂直叠加的图像和数据层。该项目共设有13个图层，并沿着百老汇大街依地点一一对应排列。当你顺着街道行走时，能够看到每个区域的一组Instagram的照片、左右两侧和俯瞰的谷歌街景图片，以及从这些图像源中提取出的主色调。我们还展示了出租车上下客的平均数值、带有图像的推特消息，以及百老汇大街所在城区收入中位数。为了对游客提供导览服务，我们增加了一些图层信息，这些图层中包含有百老汇大街所穿过的街区、十字路口和地标性建筑的名称。

访问

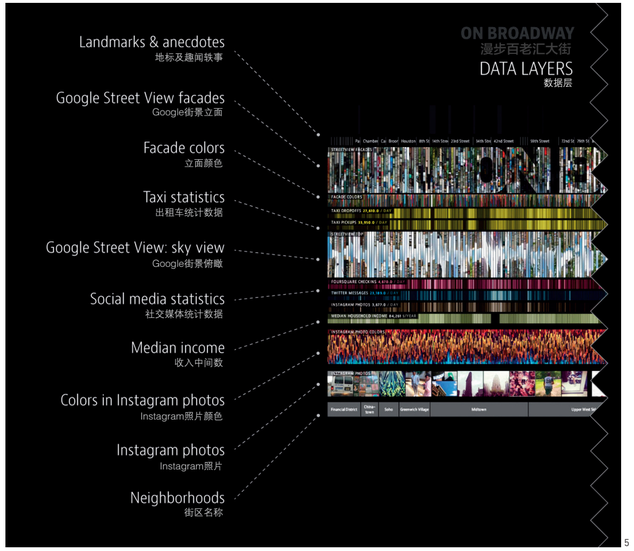
该互动装置正作为展览“公众之眼：分享摄影的175年”的一部分，于2014年12月12日至2016年1月3日在纽约公共图书馆展出。该项目的网页版应用[1]具有和实体展出装置一样的互动性和功能。



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4. 此图展示了不同的数据类型的数据量与地理位置之间的关系。这仅为该项目探索阶段所做的可视化设计表现图之一。
5. “漫步百老汇大街”应用程序中的数据图层

4. One of many possible visualization designs created during exploration stage. Each graph shows the data volume in relation to locations along Broadway Street.
5. The layout of data layers in On Broadway application



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① 网页版应用请访问：http://on-broadway.nyc。

列夫·莫诺维奇：“如今的公司、政府机构和其他组织收集了有关城市的海量数据，这些数据以很多不为我们所知的方式已得以应用。同时，很多城市通过开放它们的部分数据库，并赞助‘黑客马拉松’活动来鼓励使用这些数据以开发出有价值的应用。我们项目的目标是想让公众了解很多不同类型的城市数据之间是如何相互关联的，并让他们把海量的城市数据和他们的个人经验（他们居住或者到访的场所）联系起来。”

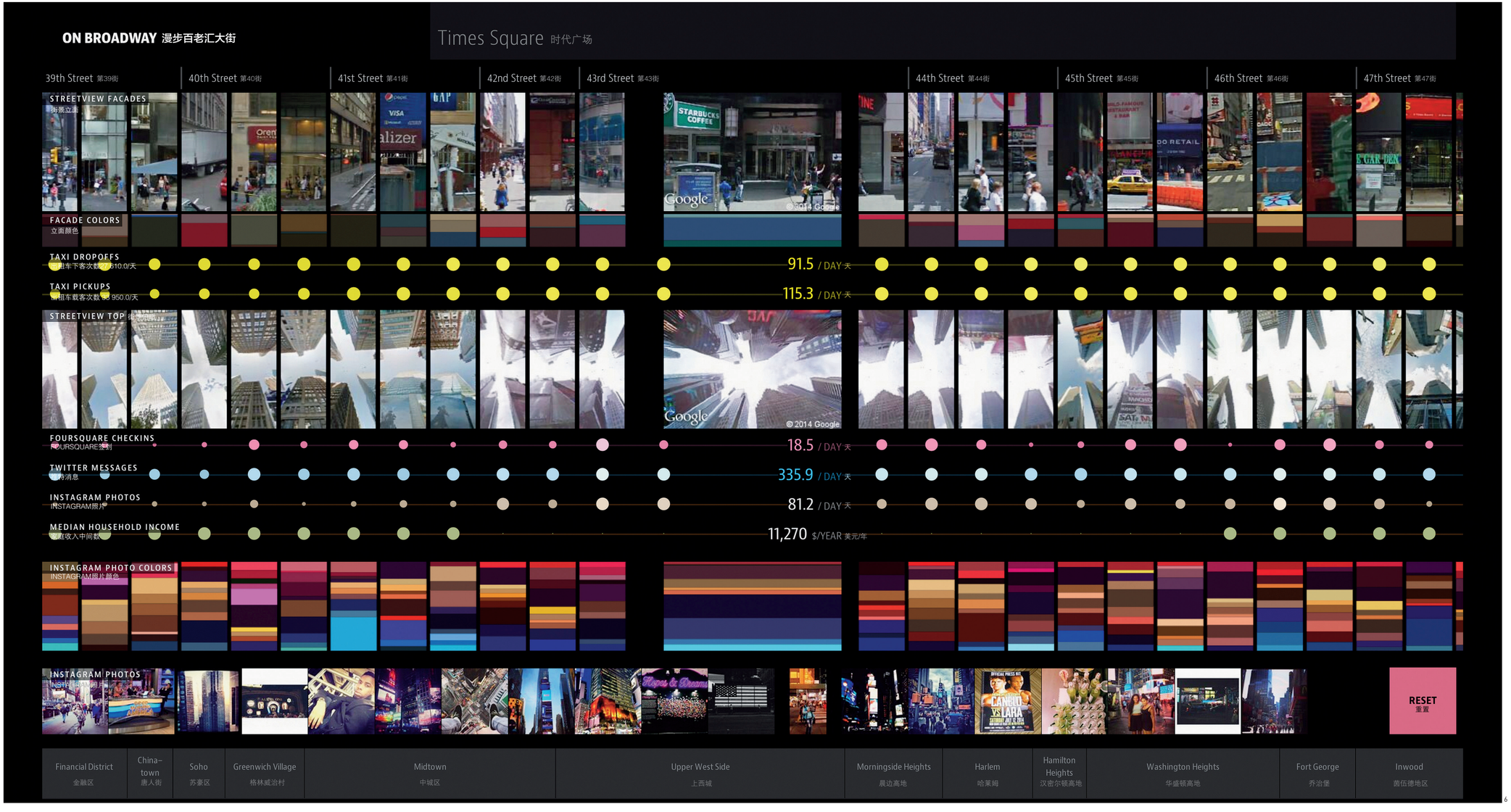
莫里茨·斯特凡纳：“从设计的角度来看，我们感兴趣的是如何能够实现从高度密集化的城市景象到放大的、充满趣闻轶事的数据之间的无缝导览。在该项目的研究阶段，我们对所获取的数据和图像资料进行了多种组合和剪辑试验。最终的应用体现了这种无限的数据多样性和丰富性：从出租车搭乘数据和收入中位数，再到主色调和推特消息。”

丹尼尔·戈迪迈耶：“如果说爱德华·鲁沙的《落日大道上的每座建筑》采用了1960年代的媒介（模拟摄影技术）来记录一段长长的街道的话，那么今天我们获取城市中成千上万市民的数字化行为的多样数据的方式，又将被称为什么呢？”

多米尼库斯·鲍尔：“从技术的角度来看，当你在一个普通的浏览器上浏览这个项目时，这个应用非常炫酷，它能够毫不费力地处理海量的图像，并在每次刷新时对数以万计的数据点进行渲染表达。但要想让它一直良好地运行，我们得在编写和优化代码方面狠下功夫。”**LAF**

注释

该项目由丹尼尔·戈迪迈尔、莫里茨·斯特凡纳、多米尼库斯·鲍尔、列夫·莫诺维奇共同创作完成，此前该团队还合作完成了另一个广为所知的“自拍城市”项目——对Instagram中来自5个全球性城市的3 200张自拍照片进行了分析。



6. “漫步百老汇大街”互动应用对于时代广场的放大视图的截图。

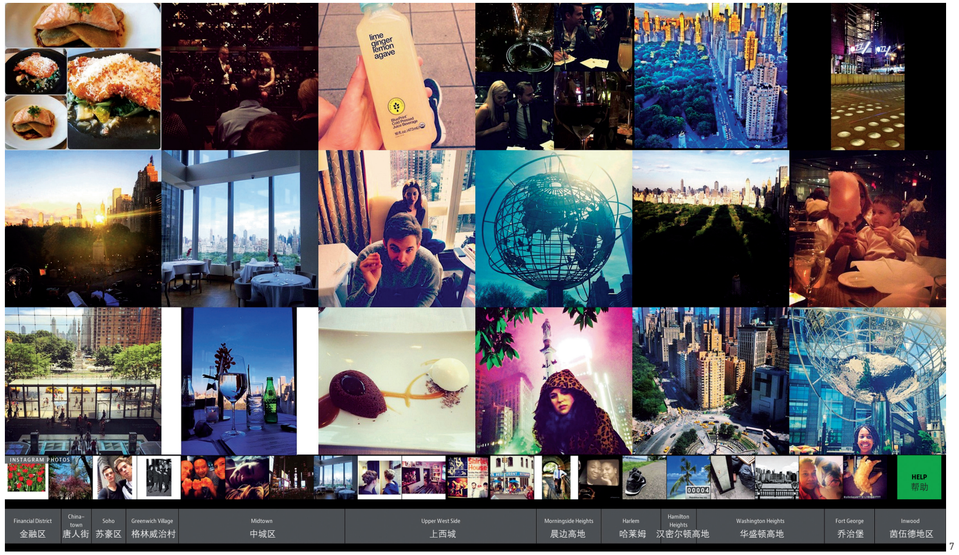
6. A screenshot of On Broadway interactive application showing the zoomed in view focused on Time Square.

Motivation

Modern writers, painters, photographers, filmmakers and digital artists have created many fascinating representations of the city life. Paintings of Paris boulevards and cafés by Camille Pissarro and Pierre-Auguste Renoir, photomontages by Berlin Dada artists, Broadway Boogie-Woogie by Piet Mondrian, Spider-Man comics by Stan Lee and Steve Ditko, “*Playtime*” by Jacques Tati, and Locals and Tourists data maps by Eric Fischer are some of the classic examples of artists encountering the city. The artwork that directly inspired our project is *Every Building on the Sunset Strip* by Edward Ruscha. It is an artist book that unfolds to 25 feet (8.33 meters) to show continuous photographic views of both sides of a 1.5 mile section of Sunset Boulevard.

The Data Street

Today, a city “talks” to us in data. Many cities make available datasets and sponsor hackathons to encourage creation of useful apps using their data — for example, NYC Mayor Office’s sponsored NYC OpenData



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website offers over 1,200 datasets covering everything from the trees in the city to bike data. Locals and tourists share massive amounts of visual geo-coded media using Twitter, Instagram and other networks. Services such as Foursquare tell us where people go and what kind of venues they frequent.

How can we represent the 21st century using such rich data and image sources? Is there a different way to visualize the city besides using graphs, numbers, or maps?

Our idea was to represent the city using layers of data, without using a familiar map convention. We wanted to make a "slice" through the city, and explore patterns across this slice. Since Broadway crosses all of Manhattan, it was logical to slice NYC along Broadway.

Broadway is the longest continuous street crossing all of Manhattan, from its south to the north point. Its length in Manhattan is 13 miles (21km). It also the oldest south-north street crossing Manhattan — originally it was a trail made by Native Americans who inhabited this area. The Dutch explorer David de Vries described it in 1642: "the Wickquasgeck Road over which the Indians passed daily".

The Dataset

Like a spine in a human body, Broadway runs through the middle of Manhattan Island curving along its way. We wanted to include a slightly wider area than the street itself so we can capture also the activities nearby. To define this area, we selected points at 30 meter intervals going through the center of Broadway, and defined 100 meter wide rectangles centered on every point. The result is a spine-like shape that is 21,390 meters long and 100 meters wide.

Image and data include 660,000 Instagram photos shared along Broadway between February 26 and August 3, 2014, Twitter posts with images, Foursquare check-ins since 2009, Google Street View images, 22 million taxi pickups and drop-offs in 2013, and economic indicators from US Census Bureau (2013).

Results

The result of our explorations is On Broadway: a visually rich image-centric interface, where numbers play only a secondary role, and no maps are used.

The project proposes a new visual metaphor for thinking about the city: a vertical stack of image and data layers. There are 13 such layers in the project, all aligned to locations along Broadway. As you move along the street, you see a selection of Instagram photos from each area, left, right, and top Google Street View images and extracted top colors from these image sources. We also show average numbers of taxi pickups and drop-offs, Twitter posts with images, and median income for the parts of the city crossed by Broadway. To help with navigation, we added additional layers showing names of Manhattan neighborhoods crossed by Broadway, cross-streets and landmarks.

① Please visit http://on-broadway.nyc for the web app.

Access

The interactive installation is shown at New York Public Library (NYPL) as part of the exhibition Public Eye: 175 Years of Sharing Photography, December 12, 2014 ~ January 3, 2016. The web app offers the same interactivity and functions as NYPL installation[①].

Quotes

Lev Manovich: "Today companies, government agencies and other organizations collect massive data about the cities. This data is used in many ways invisible to us. At the same time, many cities make available some of their datasets and sponsor hackathons to encourage creation of useful apps using this data. The goal of our project was to let citizens see how many types of urban data relate to each other, and let them relate massive city data to their personal experiences (places where they live or visit)."

Moritz Stefaner: "From the design perspective, we were interested in how we can enable seamless navigation between high-level condensed views of the city and zoomed in, anecdotal data. In the exploratory phase of the project, we experimented a lot with different remixes and montages of the many data and image materials we had available. The final application reflects this enormous data diversity and richness: from taxi rides and median income to color palettes and Twitter messages."

Daniel Goddemeyer: "If Edward Ruscha's *Every Building on Sunset Strip* documented a long stretch of a street using the medium available in 1960s (analogue photography), what would be its equivalent today when we have access to multiple data streams that capture the digital behaviors of millions of people in the city?"

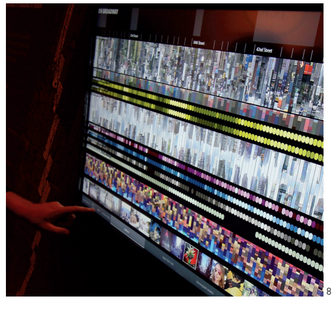
Dominikus Baur: "From a technical point of view, it is quite amazing what you can squeeze out of a standard web browser these days — the application effortlessly handles thousands of images and renders tens of thousands of data points per update. But to make it all run well, we had to work really hard on writing and optimizing the code." **LAF**

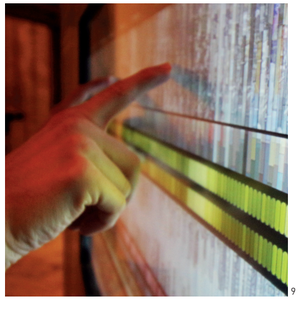
NOTE

The project was created by Daniel Goddemeyer, Moritz Stefaner, Dominikus Baur, and Lev Manovich. The team previously collaborated on a well-known project Selfiecity (an analysis of 3,200 Instagram selfies from five global cities).

7. 当用户“驻足”在百老汇大街的任意一处时，点击Instagram的图层，可以看到有关这个地点的一系列Instagram照片。
8-10. 在纽约公共图书馆展出的“漫步百老汇大街”装置现场照片。

7. When a user stops at a particular point along Broadway and clicks on Instagram layer, a selection of Instagram images shared in this location is shown.
8-10. The view of the On Broadway installation in New York Public Library.


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