The development of urban design by social media data scraping and visualisation

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Abstract: In the 21st century, cities are constantly renewed and evolving. Whether they are urban designers, city planners, landscape architects or architects, they constantly provide ideas for upgrading cities. At the same time, social media has become a tool for changing how people live and communicate. In the context of environmental information flows and rapid urban development, social media data has the potential to change urban decision-making."An important trend in Internet research is big data analytics that has a focus on collecting large amounts of data from social media platforms and analysing it in a predominantly quantitative manner."(Fuchs, 2017,55~57). Social media is a business that algorithmically manipulates its users, which allows for surveillance and control. This paper will discuss how data can be collected without infringing on the rights of social media users, capturing the views and perceptions of city residents on the built-up landscape and urban development, and filtering this data to visualise it and ultimately drive urban development. Identify and understand new relationships between data and cities and understand and know cities through data. How the development and progress of cities can be envisaged through data, what types of data are generated in the course of urban development and for what purposes they are used. How data interacts with the urban space, the mobile phone as a mobile device and how it transforms our urban experience into data and promote urban development. In this paper, various social media data scrapers are filtered and analysed, and the resulting data is feedback into the city and visualised.

1. Introduction

In the 21st century, People's lives have been significantly changed due to computers and the Internet. Social media has become a tool to change the way people communicate. In the context of environmental information flows and urban engagement, big data can influence rational urban decision-making. Citizens, scientists, and businesses generate and analyse the data, with governments acting as regulators in the process and using the data to govern cities on demand. (Kitchin et al.,2017)The process of the urban development process can be recorded in a vast database to provide directional opinions for the city's future. Unconsciously, the transformation of cities is documented on social media by people. More and more urban designers and decision-makers discuss and study urban development with the help of information technology. (Eden,2011)Capital flows into the process of urban expansion more rapidly with the support of information technology. More and more people get more opportunities to convey their views and emotions through social media. So far, most of the information expressed by the public has been terminated in the dynamics of social media, and its value has not been tapped.

Before we talk about social media data, we first need to understand what social media is. Danah Boyd and Nicole Ellison came up with a definition of social media in 2007——“web-based services that allow individuals to construct a public or semi-public profile within a bounded system, articulate a list of other users with whom they share a connection, and view and transverse their list of connections and those made by others within the system”.(Stewart, D). Users allow social media to read what they post and expand the reach and influence of social media networks，that Boyd and Ellison say make social networking sites unique.

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The core commonalities between these social media sites are evident in the most visited social media sites today. Social media is conceptualised in this entry as any internet-based service that operates on any connected device and allows individuals to share content, opinions and information; facilitates discussion; and build relationships(Beneito-Montagut et al., 2020). Whether the sites are primarily used for social networking (e.g. Facebook and Instagram), sharing videos and photos (e.g.YouTube, Pinterest) or sharing thoughts and ideas and other content via microblogging (e.g. Twitter, Tumblr), at their core, they are all transformative ways of human interaction.

As Clay Shirky has pointed out, social media is a tool that changes the way people communicate. "The tools that a society uses to create and maintain itself are as central to human life as a hive is to bee life ", Shirky wrote in 2008 (Clay Shirky), pointing out how social tools enable sharing in new ways and the private social media account data is brought into the public by these tools——led to the culture of sharing and voluntariness on social networks.(Stewart, D)Social media can be conceptualised as the context in which data is collected or generated and the digital social phenomenon itself.

Computers are no longer seen as mere tools for analysing the city but have become part of it. In cities, be it at underground stations, highway entrances or supermarkets with unmanned checkout machines, computers are becoming an integral part of people's lives. The progress of computers virtually promotes the rapid development of the world. A computer is a logical machine. It is this century-long endeavour to create an "algebra of ideas"(Bottazzi, 2018) that has eventually conflated into the modern computer, compressing a wealth of philosophical and practical ideas spanning over many centuries(Roberto,2018). The general formal logic on which digital computing is based also illustrates the "plasticity" of software: in addition to various interfaces for interacting with users, the final operation performed by any software involves binary codes composed of two digits: 0 and 1. This also explains why more and more software can perform similar tasks: for example, Photoshop and visual scripting languages Grasshopper allow manipulation of similar media objects, such as geometry and movies(Roberto,2018). The rise of computer systems has led to a "data revolution".

Scrape social media data through legitimate channels to get the opinions and perceptions of city dwellers on the urban built landscape and urban development, sift through such data and ultimately visualise these data. Find out and understand the new relationship between data and cities and how we can recognise and be aware of cities through data, how to envisage the development and progress of cities through data, what types of data are being generated in the course of urban development and for what purposes they are being used. The media’s development is dialectical. (Fuchs, 2017.)

Nowadays, people's information is collected on a large scale without knowing it, applied to data analysis of various channels. To a certain extent, it helps urban designers and planners to formulate urban development strategies. On the surface, social media users participate in urban construction, but they do not know about it. This thesis will further explore making social media users genuinely become part of urban design and construction.

2. The limitations of social media data

One of the most important things to consider when using social media data is the users who provide the data and the people to whom the findings apply. Social media can be a good illustration of the streetlight effect - the streetlight effect(Mukerjee, S., and González-Bailón, S. 2020) is when researchers study something because it is available, regardless of how useful it is. The name is introduced by a hypothetical story that may dawn on you when I finish telling this short story about a man who, after losing his keys in a dark alleyway, only looks for his keys under a streetlight - because there is light there and he can see if there is a key or not. Different social media platforms attract different types of users, so data from different platforms may be limited in examining their prevalence.

A second limitation of social media data is the non-neutral Nature of these data. In other words, these data are biased. People only share what they want to share on social media, so this data should be treated with caution when collecting it early on.

As Salganik mentions in Bit by Bit, he believes that significant data representation is limited, and here he gives an example. He refers to John Snow's study of the 1853 cholera outbreak in London. At the time, it was widely believed that cholera spread rapidly due to air pollution, whereas a non-representative area in a remote location in London showed that cholera was caused by water pollution (Salganik, 2017). Thus the representativeness of big data has limitations, but does not mean that it is useless for scientific reasoning and prediction; it only proves that big data's only represent the vast majority of possibilities.

3. The importance of the right to information

We live in an era when civil rights awareness and network technology have developed rapidly. The protection of citizens' right to know is particularly important under this background. Louis Henkin, a famous American constitutional scientist said: "Our time is an era of power. Human rights are the concept of our time and the only political and moral concept that has been universally accepted"(Henkin,1992) .Citizens' right to know is a social right in the Internet age, which should be protected.

All kinds of information are quickly transmitted and exchanged in the network. No matter where people are, they can quickly get all kinds of news happening worldwide through mobile phones and computers. People can also record their own lives and express their views on the news on the Internet through social media. However, citizens who use the Internet have become data providers unconsciously, Their data is being used without their knowledge, so the right to know information is fundamental (Lin,2009).

4. How to collect data without infringing on the rights of social media users

Sharing and voluntariness are complex concepts for the law to understand for the reason that the law often tends to seek stricter definitions and boundaries to regulate human affairs. As a result, legal definitions of social media often make it difficult to define these concepts precisely. Social media needs access to user data to understand how users feel about their use and to upgrade their services further, but this must be done at the expense of user privacy, and if the majority of users object to this collection of information, this will also make their user experience much less enjoyable. When you sign up to Little Red Book as a new user, you are forced to sign a user agreement. If you do not wish to have data collected by it, you will not be able to register successfully, and when you open the software and use it, you give your tacit consent to it monitoring your preferences. People are forced to give up their privacy.

Lawrence Lessig may well be right, as a consequence, that "Code is law"- that is, the hardware and software that makeup cyberspace determine its culture and use, so online personnel management is best left to code rather than legislatures and courts.

5. Fluidity of environmental information and rationality of social media opinion gathering

Cities are constantly being updated and developed. Whether urban designers, urban planners, landscape architects or architects, they are constantly working to provide ideas to upgrade cities. Therefore, environmental information as the premise of the design is crucial: designers need to have a basic understanding of the site in order to carry out design research. Nowadays, global information is closely connected, and it is not uncommon for designers to carry out design practices in other cities beyond regional restrictions. In the face of unfamiliar climate, urban context, vegetation attribute and cultural basis, the local government may provide perfect basic information to assist designers in site research. Designers can also access fragmented information via the Internet, books and other means to understand the site. Contradictions of urban renewal, however, have emerged. This information may only be sufficient for the designer to complete a 'top-down' design. In other words, the design practice in this case only satisfies the fantasy of the urban planner (government) and the designer about the city's future development. In many cases, the main body of

the city -- the urban residents, who are the users of most of the space in the city, their thoughts and feelings are ignored, and it is not easy to participate in the renewal of the city.

For example, in the 21st century, China has maintained a high rate of urban regeneration, and its local urban regeneration has become a laboratory for global designers. In Wangjing Soho in Beijing, the old hutongs and parks on the original site were demolished in a unified manner, and the area housed most of the activities of the surrounding city residents initially. After the completion of the project, the residents were less willing to use the area, and for a long time, the occupancy rate of businesses and shops was shallow due to the high cost of rent and the fact that the enclosed building structure was incompatible with the Beijing climate.

Gifu Media Cosmos is a relatively successful case in Gifu Prefecture, Japan, where the designer Toyo Ito conducted more than twenty presentations in the area during the design process. The residents have given a large number of feedback and opinions to the architects in these communication seminars. This "knowledge" guided the designers' design practice. Later, the urban renewal project became a hot spot for residents to use and gather. After its completion, the information-gathering-based design has not stopped, and through regular questionnaire distribution and feedback meetings, the designer has received new use feedback, around which the repair and maintenance work and partial redesign can be carried out efficiently.

Fig 1. Gifu Media Cosmos

From these two examples, we can conclude that the inhabitants of the city are the main body of the city and that they are the users of most of the spaces in the city, so their perceptions of the urban space are fundamental. When the urban space is adapted to the use of the inhabitants, the space is highly utilised; otherwise, the space is poorly utilised, resulting in a waste of urban space. Then, we can understand from these two cases that the residents' opinions and attitudes towards their surroundings come from the accumulation of their daily experiences, which are in most cases unconscious, and the architects' questioning of these opinions will to a certain extent, promote the urban subject (the residents) to reflect and summarise their attitudes towards the surrounding life phenomena, and the designer acts as a questioner. The designer is also the summarised and sifter, who summarises and sifts out the usable parts of the residents' daily experiences and transforms them into a design language and aesthetic language.

In conclusion, both the "top-down" and "bottom-up" approaches to urban regeneration are inextricably linked to time cost and efficiency issues. Strictly speaking, the design of questionnaires and the processing of feedback information are not within the scope of the design firm. If the work were to be handed over to the local government and neighbourhood councils, there would be a

series of communication and cooperation conflicts, and the time and cost challenges would remain unsolved. Therefore, social platforms' advantages—real-time questions, data integration, and data processing may solve this problem. Social media will ask questions about the unconscious feelings of residents in their daily lives. Some small activities like the hashtag, emoji emotion, memes, question and answer can trigger a wide range of discussions about a particular event, which is undoubtedly a new form of questionnaire and discussion in the current era. Real-time coverage, accurate push and convenient data feedback will save a lot of time and labour costs. Such data can also be used as a 'database' for other cities, providing reference value for their development.

In the future urban development process that pursues more efficiency, urban designers can make predictive planning and design for the use type of urban space. However, with so many variables and complex elements affecting urban development, it is of great importance to collect data on the use of built-up urban space at a later stage. If there were simple and easy ways to collect this data, it would significantly boost urban development. People widely use social media, and they can be seen in every corner of the city. Many social media users are likely to express their feelings when they arrive at an urban space, such as a park or a building (the linkage between tweets and map information on Instagram, Facebook and other software). If the data of such social media posts are collected and sorted, they will become precious urban data resources.

6. The interaction of data and urban design

To date, many urban designers have sought new understandings of urban development through the analysis of urban data, which can be used to intervene in urban development. However, the rise of urban data is not just giving rise to a new way of understanding cities. At the same time, intervention in analysing these data may lead to new forms and experiences of spatial organisation -- the computer data used to manage cities may lead to new spatial institutions, so the process of collecting, analysing, classifying and processing data is given more meaning. We are required to understand the role of various types of data scraping software and urban data in urban space and urban development. Various digital media interfaces provide researchers with information and stored experiences about the city. De Souza e Silva and Gordon argue that the mobile phone is a device that translates our urban experience into data allowing others to try or access this data later. (De Souza and Silva 2006)

Information networks and social media do not only act as gateways to address particular issues through access to information repositories; these devices also change how we perceive and express ourselves in particular spaces, i.e. how citizens publish their experiences and feelings about spaces through mobile devices and social media. For example, when a person walks through a park, she uploads her opinion about the space on social media, including the space she is satisfied with and the space she is not satisfied with, as well as the reasons, and can accurately located in the park. Apps on our mobile devices, maps, social media, the web etc., all have access to a variety of urban data that invariably changes our experience of urban spaces. These studies can be seen within the broader framework of urban studies, which are based on "situational", dating back to (at least) the 1950s study of Goffman (Goffman 1959). As Goffman has shown in his work, subjects take cultural codes from their surroundings and adjust their behaviour accordingly. So how do you get the data to interact with the urban space? To take the simplest example, urban road systems have been very well developed in today's society. The car became the primary means of transport for people, and in order to meet the needs of the city's inhabitants, urban designers and urban planners began to equip the car with a suitable road system. However, many urban designers and decision-makers did not anticipate the explosion of the urban population and the increase in car usage. As a result, traffic jams have become a persistent problem in many urban road systems as we enter the 21st century. People have to waste much precious time on the road, and very often, this waste of time could have been avoided - if they had been informed of road conditions in advance, bypassed traffic jams, and chosen roads with good traffic conditions. When the era of big data came, traffic data became very common, and people used navigation apps on their mobile phones, Uber, etc., all translating to traffic data. When Uber drivers find traffic congestion, they choose another road, and we can see

the efficient interaction of data with urban space.

Pokemon Go launched in 2016 and became the hottest topic on all social media throughout 2016, with the social genre game becoming a new urban phenomenon in just one week(Kamel Boulos, MN et al., 2017). First of all, this game simplifies many parts of the game, such as capturing, training and fighting, and instead focuses on discovering Pokemon in their surroundings. Most of the game's fun comes from sharing one's Pokemon collection with friends, swapping and exploring the surrounding pokemon world with them together.

Therefore, we can define it as a social game based on urban geography or socially-oriented software.

Fig 2. Pokemon GO, Niantic/Nintendo

To the non-gamer, the world around you is almost insane: sit for ten minutes in San Francisco's downtown plaza, look around, and all you will see is pedestrians staring at their phones looking for Pokemon, except for patrol officers on duty; walk through Riverside Park in Harlem, New York at midnight, and you no longer have to walk fast and watch your back, the park has gone from a haven for vagrants to a playground for Pokemon hunters. If someone suddenly approaches you, there is no need to panic - most likely have stepped on someone else's Pikachu. The game, developed by Nintendo and gaming company Niantic, is transforming the familiar urban landscape globally. The area has become New York's Central Park, Times Square, and even McDonald's on the corner has become the new urban hotspot - a new gathering place for city dwellers.

In this context, data acts as the underlying logic that operates these spaces, linking the different spaces and forming a smooth space. This is also in the context of modern urbanisation, where the globalisation of the economy, the spread of information across regions, and the evolution of transport with the times seem to be working to connect different geographical The local and global confrontation is, however, a significant problem. However, the dichotomy between local and globalisation, the differences in urban infrastructure and the allocation of resources between different regions have created invisible barriers, thus resulting in Splintering Urbanism.

Through data algorithms, pokemon go sets up areas with a high number of sources (mobile phone users) as "cities" in the game world, and open spaces or public areas in urban spaces provide habitats for Pokemon: they mostly congregate here. Users can often walk a few blocks to catch Pokemon along the way. Firstly, this has somewhat impacted splintering urbanism, and secondly, in 2016 and 2017, when the game was at its peak, many users used bicycles and walking as their primary means of travel rather than driving or using the underground. This confirms that social media or social games are changing how urban populations move and perceive their surroundings.

The less populated areas are designated as the suburbs of the game, where the number of Pokemon is relatively low, and the game does not have as many pokemon stops, dojos and NPCs as in urban areas, meaning that one will not meet a group of people with mobile phones capturing Pokemon in these geographical areas. This interactive approach enhances people's perception of

geospatial by reflecting spatial information from google maps on a three-dimensional geographic space, revealing some invisible phenomena buried on the Internet.

Although this phenomenal software is only an example, it has inspired many new software developers to start building virtual spaces based on urban geospace, representing a way of interacting between urban space and data space. So we can conclude: the interaction between data and urban space is accurate, and the blurring of the boundaries between geospatial and virtual space has created a whole new way for people to experience their surroundings. In addition to VR as a medium, more 'augmented reality (meaning that real-time images of the fundamental physical environment are augmented by computer-generated sensory information (sound, images, GPS data, etc.), which aims to nest the virtual world in the real world for interaction) will be created, offering more possibilities for interaction between virtual data and geospatial space. More possibilities.

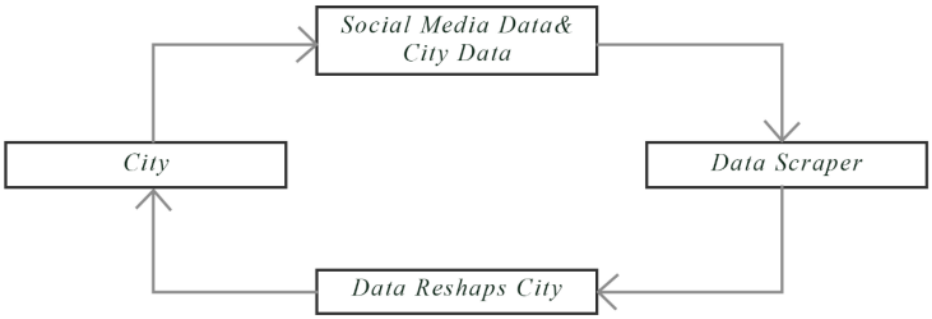

Fig 3. The Transform of Social Media Data and City

7. Conclusion

It is not difficult to find through the above description that the development of extensive data systems and information technology provides conditions for converting this useless information into valuable information, which will impact the development process of the city. It also provides a voice channel for the public. This channel is likely to break the cognitive limitations of design groups or decision-makers in the future, or reverse the "top-down" design structure of most current designs, give the public more opportunities to participate in the design and provide conditions for more "bottom-up" urban design events and urban activity events.

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