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THE URBAN MONITORING SYSTEM AT VICENTE LOPEZ, ARGENTINA

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Abstract

The Vicente López district is one of the biggest urban agglomerations of Buenos Aires, located 20 kms north from Buenos Aires downtown. The district includes important neighborhoods, like Olivos, Florida and La Lucila. The Government of Vicente López has developed and operates an Urban Monitoring system since 2015, considered as a main tool to prevent and predict traffic accidents, spills of hazardous waste on public roads, and other public incidents. Other initiatives complement the system, such as anti-panic buttons, smart vests equipped with GPS used by police, and emergency phone line serving on 24x7 modality. Focusing mainly on the Urban Monitoring system, in this study, we discuss different aspects of such initiatives, like the sustainability of the system, in terms of investments needed to maintain the equipment and training for ensuring the availability of qualified human resources for operating the system and making quick and key decisions; the privacy of the information monitored and stored; and the use of big data to improve transport or the developed infrastructure.

Keywords

Sustainability; Big Data; Personal Privacy; Emergency Response; Public Safety

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1 Introduction

Vicente Lopez (VL)¹ is part of the urban agglomerate known as Greater Buenos Aires. It is an urban municipality in which the whole district is a city, formed by 9 neighborhoods. The Municipality is in the neighborhood of Olivos. In the 2010 census, 269,420 inhabitants were registered. It is located 9 km far from the center of Buenos Aires city. The municipality administers, among other educational establishments, a Day Secondary School, a Center of Visual Arts, Handicrafts and Crafts, an Institute of Music, Dance and Theater, a School for Children, a Youth Cinema, 10 kindergartens, 8 maternal gardens, and a School of Labor Training. Unlike what happens in other cities, the number of private schools and institutes of VL is greater than those managed by the public sector. The city counts with 6 cultural centers managed by the government and several by the private sector, owns seven popular libraries managed by the private sector. The oldest is called "Vicente López y Planes" which has 30,000 volumes. It has 3 hospital centers and 20 health care units. It is connected to the city of Buenos Aires by the Metrobus system and, 2 avenues, 1 highway and 5 railway branches.

Within the framework of the Comprehensive Security Plan of the Municipality of Vicente López², the Urban Monitoring System has been continuously strengthened since 2015 to prevent and predict traffic accidents, crimes, spills of hazardous waste on public roads, etc. The Urban Monitoring Center is an essential element of the system. A team of operators distributed in shifts monitor the images captured by cameras located at strategic points. Neighbors can contact the Urban Monitoring Center to report thefts, accidents or other incidents. The system is completed with other initiatives mediated by technology such as smart vests with GPS, anti-panic buttons and telephone lines to report and respond to emergencies 24 hours a day, every day of the year.

1 www.vicentelopez.gov.ar

2 <http://vicentelopez.opendata.junar.com/home>

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However, as these monitoring systems are becoming a more and more widespread feature around the world, they generate several privacy concerns that are essential to any democratic society. The use of sophisticated systems by police and other public security officials is particularly troubling, since they are likely means by which several types of abuse are conducted. In addition, conventional sources of information on urban areas are frequently inadequate. The involved data are often generalized, outdated, unreliable, not in standard format, or in some cases simply unavailable. As technology evolves, new incompatible processes may be introduced, and the problems magnify. For example, data that is not compatible is being fed into a big data analytic tool, so results may be unreliable and even worse existing data biases are replicated. Integration of available data preserving its meaning, and ethical awareness on controversial situations along all the processes, are desirable as a long-term objective.

2 Context/Problem

The maximum authority of the Municipality is the Major, position that is currently held by Jorge Macri. The management of the Municipality of VL is structured in 15 Secretaries; the Secretary of Modernization and Digital Government leads the project. The municipality has a team of 420 people working in this area, divided between the body of Street Guard, the patrols of Prevention, Transit equipment, Civil Defense and emergency dispatch attention.

The Urban Monitoring System initially presented the following challenges: sustain the investment required to keep the equipment updated and the personnel trained, and ensure compliance with the Center's action protocol by ensuring the privacy of the information monitored and stored through digital images. The control room has a central video wall where operators perform the visualization of the images captured by the cameras located at strategic points and it is the operative base of the mobiles, the panic button alert center and the central attention center, and the municipal numbers for complaints and emergencies about insecurity facts. In order to see the images in real

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time, a state-of-the-art fiber optic network is used, which spans different areas of the municipality. The camera park is made up of more than 600 units, some fixed cameras (they are always focused at a strategic location and cannot be moved remotely), and the domes, which can be operated from the Center with 360 turn radius degrees and can capture several hundred meters. Everything the cameras capture is recorded in a state-of-the-art control and storage room. It works in an adjacent room that hosts in a restricted way the digital image file system protected with double encryption.

3 Dilemmas

Prone to Abuse

The adoption of massive video surveillance methods and techniques in public spaces and streets has been severely criticized³. The main reasons are that these systems are susceptible to abuse, either by “rotten apples” in the management institution, or by the institution itself. As an example of the former, an investigation by the Detroit Free Press showed that a database available to Michigan law enforcement was used by officers to help their friends or themselves stalk women, threaten motorists after traffic altercations, and track estranged spouses. The later type of abuse is especially prone to happen in periods of social turmoil and intense conflict over government policies. During the Civil Rights movement and the Vietnam War, for example, the FBI - as well as many individual police departments around the nation - conducted illegal operations to spy upon and harass political activists who were challenging racial segregation and the Vietnam War.

In addition, video camera systems are operated by humans who bring to the job all their existing prejudices and biases. In Great Britain, camera operators have been

3 <https://www.aclu.org/other/whats-wrong-public-video-surveillance>

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found to focus disproportionately on people of color⁴. According to a sociological study of how the systems were operated, "Black people were between one-and-a-half and two-and-a-half times more likely to be surveilled than one would expect from their presence in the population". Experts studying how the camera systems in Britain are operated have also found that the mostly male (and probably bored) operators frequently use the cameras to voyeuristically spy on women. Fully one in 10 women were targeted for entirely voyeuristic reasons, the researchers found.

Effectiveness

Another criticism to massive video surveillance systems is that it has not been proven effective. The implicit justification for the recent push to increase video surveillance is the threat of terrorist attacks. But suicide attackers are clearly not deterred by video cameras - and may even be attracted to the television coverage cameras can ensure - and the expense of an extensive video surveillance system such as Britain's - which sucks up approximately 20 percent of that nation's criminal justice budget - far exceeds the limited benefits that the system may provide in investigating attacks or attempted attacks after the fact⁵. The real reason cameras are usually deployed is to reduce much pettier crimes. But it has not even been demonstrated that they can do that. In Britain, where cameras have been extensively deployed in public places, sociologists studying the issue have found that they have not reduced crime⁶. In addition, U.S. government experts on security technology, noting that "monitoring video screens is both boring and mesmerizing," have found in experiments that "after only 20

4 http://archive.aclu.org/issues/privacy/CCTV_Norris.pdf

5 <https://www.aclu.org/privacy/gen/30354res20070705.html>

6 <http://www.scotcrim.u-net.com/researchc2.htm>

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minutes of watching and evaluating monitor screens, the attention of most individuals has degenerated to well below acceptable levels"⁷.

Big Data Opportunities

Different surveillance based devices are constantly generating video data. In 2014, estimates put worldwide surveillance data generation at a staggering 3ZB. It is expected that by 2018, due to the development of high-quality visual lenses each surveillance camera is supposed to generate 100 GB of video data every month. At the same time, it is expected that the amount of such video data is supposed to grow at a 40% higher rate. This shows that data grows exponentially⁸.

The key essence of Big Data is its capability to handle huge amount of data of various types generated from multiple sources effectively. A well-defined Big Data with effective usage can bring huge improvement to an organization's business, in terms of improvement in manufacturing of product to sales. Efficient management of Big Data can make government agencies achieve a better understanding of their citizens and organizations, demands of services, feedback from different sources, etc, will allow the Government to better meet the goals of smart cities – improved livability, efficiency and sustainability⁹. Video processing and analysis is used for many computer vision tasks. Easy availability of digital devices and cheap sensors has increased the usage of surveillance systems also. Video analytic otherwise known as video content analysis (VCA), involves a number of approaches to oversee, analyze, and extract useful information from video streams. Video analytics can efficiently and effectively perform various surveillance tasks such as detection of suspicious movements, identification of

7 https://www.ncjrs.org/school/ch2a_5.html

8 Kwon O, Lee N, Shin B (2014) Data quality management, data usage experience and acquisition intention of big data analytics. *Int. J. of Info. Man.* 34(3):387–394

9 Lin J, Ryaboy D (2014) Scaling big data mining infrastructure: the twitter experience. *SIGKDD Explorations* 14(2):6–19

objects removed or left unattended in a scene, detection of loitering in a prohibited area, detecting attempts of camera tampering, etc¹⁰. Sensible handling of this huge amount of data is a big challenge.

The implications of applying such analysis to aggregated data sets are that they allow for a more holistic view of the needs of a particular community to be formed. Within smart cities, this data can be used as a reflexive tool when implemented within the urban ICT framework¹¹. Such benefits were found in Barcelona, where tracking of residents commuting patterns led to a revamp and simplification of the city's bus routes¹². Combined with the implementation of smart traffic lights **Error! Bookmark not defined.** that allow for central control, buses in Barcelona now run to a schedule that attempts to minimize the amount of time spent waiting at traffic lights.

Big data analysis is not without flaws in its approach. This is particularly true when applied to law enforcement, or where data is collected without the willing cooperation and consent of parties involved. Critics argue that there is an element of "mythology" surrounding big data that larger data sets offer deeper insights into urban issues with higher levels of accuracy and objectivity¹³.

4 Case development

The technical staff of the Urban Monitoring Center concentrates all communications related to emergencies and crimes, classifies the information that enters through the free line or captures the cameras, and drifts to the competent areas

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- 10 Subudhi BN, Nanda PK, Ghosh A (2011) Entropy based region selection for moving object detection. *Patt Recog Lett* 32(15):2097–2108
 - 11 Leydesdorff, Loet (2013). "Triple Helix Model of Smart Cities: A neo evolutionary perspective". In Deakin, Mark (ed.). *Smart Cities: Governing, Modelling and Analyzing the Transition*. Taylor and Francis. p. 77.
 - 12 <http://smartcity.bcn.cat/en/new-bus-network.html>, <http://smartcity.bcn.cat/en/smart-traffic-lights.html>
 - 13 Bennett Moses, Lyria & Chan, Janet (2014). "Using Big Data for Legal and Law Enforcement Decisions". 37(2) *University of New South Wales Law Journal* 643.

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to give an immediate response. The operator identifies who calls, from where they do it and classifies the degree of the emergency. The general coordinator is in charge of the logistics of work during an urban crisis. The operational coordinator in charge of the shift has terminals that allow access to the data, with the aim of sending personnel to the different events observed in the plant. For example, assigning police officers to a commission of a crime; giving warning to the emergency area, whether due to fallen trees, cut cables or flooding of streets and to health services for injured persons; and identifying opportunities to support interaction with other organizations.

Training of the Urban Monitoring Center personnel is considered a vital element of operation and maintenance, besides the incorporation of new equipment. This is especially true when new equipment is installed or emerging technology is being employed. It's important to the overall facility management program that facilities personnel be properly instructed and motivated. Training courses will familiarize personnel with the procedures necessary to operate and maintain such complex systems and equipment. Courses were developed for presentation by subject-matter experts/trainers, and multimedia technologies, ideal for individual/self-training in either a classroom setting or over the internet.

Another characteristic of the system is that it allows to visualize the collected data within the framework of the open government policy from the municipality¹⁴. The information gained through data collection by the Urban Monitoring System can guide policy and strategies, document the impact of an intervention or the progress towards specified security goals, and help set public priorities. The municipality of VL only acknowledges transparency and accountability as the objectives for this action, although in general open data portals are aimed also at promoting economic development and improving internal performance management, as well as increasing transparency and

14 <http://vicentelopez.opendata.junar.com/home>

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comparability¹⁵. Further steps in this direction are necessary, for example with applications to the transport and health secretaries.

5 Closing the case

It is true that the data-gathering technologies help cities improve their major decisions related to their role in infrastructure development, transportation, etc., but citizens and privacy experts feel this to be an interference with the life experiences of people. The operators of the Urban Monitoring Center are specialized to detect and receive emergency notifications and cover all positions and shifts to comply with the service 24 hours a day, 365 days a year. The actions that derive from the attention of an emergency are coordinated with external agencies, such as Federal Police, Naval Prefecture, Airport Police and even with others in the province of Buenos Aires.

The opening of data is based on the political will of the mayor, as the main reference of the municipality, to strengthen the transparency of management and promote citizen participation. Project leader manages the project, identifies needs and data requirements, defines what types of data are publishing in the portal and interact with the areas that provide them. There is no commitment on using open data as a resource for innovation and collaboration with private partners.

The creation and maintenance of the data platform is based on the teamwork, with capacities for oral and written communication, roles and functions that guarantee the administration of the project and the development of the required products and processes. The elaboration of the action plan of the project requires capacities to diagnose, formulate strategies, analyze information, define roles and assign functions, and interact with organizations and other sectors. In particular, it would be desirable to share the challenges, achievements and risks of the system with other municipalities.

15 <http://www.seattle.gov/tech/initiatives/open-data>

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Civil society is an active participant, but in order to be heard and taken into consideration, those responsible for the project must guarantee the fluidity of the communication channel. Because the technology has evolved so quickly, however, checks and balances to prevent the kinds of abuses outlined above don't exist. Two elements in particular are missing: a consensus on limits for the capability of the Urban Monitoring system, and legally enforceable rules for the operation of such systems. Unfortunately, history has shown that surveillance technologies put in place for one purpose inevitably expand into other uses. A societal consensus about how cameras should be used is important, but in the end they should be ruled by laws and rights that have their root in law. Rules are needed to establish a clear public understanding of such issues as whether video signals are recorded, under what conditions, and how long are they retained; what the criteria are for access to archived video by other government agencies, or by the public; how the rules would be verified and enforced; and what punishments would apply to violators.

The growing presence of public cameras will bring subtle but profound changes to the character of our public spaces. When citizens are being watched by the authorities - or aware they might be watched at any time - they are more self-conscious and less free-wheeling.

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