

Spatial Analysis of the Crime Distribution: A Case Study in João Pessoa-PB-Brazil

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SUMMARY

Technological advancement the information has spread with great speed. This fact has contributed to the violence news become more frequent in the media. An important characteristic for the analysis location crime is understood that the event occurs at locations not accidental or unexpected. It's this feature that makes maximum Cartography is a powerful tool for research, it involves location. Thus, the article aims at reporting the experience of understanding aimed at mapping the spatial distribution of the occurrences crimes of violence against property in João Pessoa – Paraíba - Brazil, in the month of May 2012, presenting the phenomenon in thematic maps, which show the points where there are crimes with firearms and knives, as well as the map of high-density areas of crime. Specifically with the conclusion of this article can be identified as the cartography is useful for spatial analysis and may subsidize actions of municipal, state and federal, and local civil society, aimed at combating violence and crime in the city. The results shows that the mapping crime or any other phenomenon is important because it allows to know how it is distributed through space, and thus able to monitor mitigation policies. Therefore, the Cartography occupies an important place among the sciences to help fight crime, since based on a map with the spatial distribution of crimes in an area can provide efficient operational safety features. By analyzing the maps it is clear that the amount of crimes using firearms was very big, so it would be interesting to disarmament campaigns in neighborhoods, followed by installation of core security on site, minimizing the increase in cases of crimes violence against property. Cartography and crime mapping analysis can assist in planning, and implementation of action plans to minimize the cost of operations and more effectively, since the study area is already known and the whole strategy can be applied.

ANÁLISE ESPACIAL DA DISTRIBUIÇÃO DE CRIMES: UM ESTUDO DE CASO EM JOÃO PESSOA-PB, BRASIL

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RESUMEN

Com o avanço tecnológico as informações tem se propagado com grande velocidade. Este fato tem contribuído para que as notícias de violência se tornem mais frequentes nas mídias. Uma característica importante para a análise de localização do crime é o entendimento de que o evento não ocorre em locais acidentais ou imprevisíveis. É esta a característica máxima que faz com que Cartografia seja uma poderosa ferramenta de investigação, pois envolve localização. Assim, o artigo tem como objetivo relatar a experiência do mapeamento visando à compreensão da distribuição espacial das ocorrências dos crimes de violência contra patrimônio em João Pessoa, ocorridos no mês de maio de 2012, apresentando o fenômeno em forma de mapas temáticos, que mostram os pontos onde ocorrem os crimes com armas de fogo e com armas brancas, assim como, o mapa de áreas de alta densidade de crimes. Especificamente com a conclusão deste artigo pode-se identificar o quanto a Cartografia é útil na análise espacial e permite subsidiar ações dos governos municipal, estadual e federal, bem como da sociedade civil local, voltadas ao enfrentamento da violência e da criminalidade no município. Como resultados observa-se que o mapeamento da criminalidade ou outro fenômeno qualquer é importante, porque permite conhecer a forma como ela se distribui pelo espaço, e assim poder acompanhar políticas mitigadoras. Portanto, a Cartografia ocupa um lugar importante entre as ciências para auxiliar no combate a criminalidade, uma vez que tendo como base um mapa com a espacialização dos crimes de uma área pode-se disponibilizar recursos operacionais eficientes de segurança. Através da análise dos mapas percebe-se que a quantidade de crimes que utilizam armas de fogo foi muito grande, assim, seria interessante fazer campanhas de desarmamento nos bairros, seguidos de instalação de núcleo de segurança no local, minimizando o aumento dos casos de crimes violento contra o patrimônio. A Cartografia e a análise de mapeamento de crime podem auxiliar no planejamento, e na execução de planos de ação, minimizando o custo das operações e com maior eficácia, visto que a área de estudo já se faz conhecida e toda a estratégia pode ser aplicada.

SPATIAL ANALYSIS OF THE DISTRIBUTION OF CRIME: A CASE STUDY IN JOÃO PESSOA-PB, BRAZIL

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1. INTRODUCTION

With technological advancement information has spread with great speed. This fact has contributed to the news of violence become more frequent in the media, whether transmitted by newspapers, television, radio or internet. The Violent Crime against Heritage (VCH), rated burglary, for example, the subtraction of unrelated things through violence. This crime can be considered a phenomenon that happens in space a given place and time. By involving aspects of location, there would be no better than Cartography science to solve situations for analysis and interpretation.

The difficulty of analyzing spatial data through tables have shown that visualization is in forms of maps and more natural interpretation of information is made in full. Thus, as one of the goals of Cartography is the preparation of documents with reference maps to display information in an accessible and clear. In this context the elaboration of thematic maps will assist in analyzing the spatial distribution of crimes.

The VCH is questioning the fact that there is no fixed location to happen, is a social phenomenon that can take place anywhere. The monitoring actions organized by the Center for Analysis and Criminal Statistics (NACE), the Ministry of Social Security and Defense (SEDS), have contributed to the reduction of crime rates in João Pessoa.

1.1 Purpose of the Study

The paper aims to report the experience of mapping aimed at understanding the spatial distribution of the crimes occurrences in João Pessoa, in the month of May 2012, presenting the phenomenon in the form of thematic maps, which can be observe the spots where crimes occur with firearms and melee weapons, as well as the map of areas of high density crimes.

Specifically with the conclusion of this article can identify how much is useful in mapping and spatial analysis allows subsidize actions of municipal, state and federal, and local civil society, aimed at fighting violence and crime in the city.

2. TECHNICAL MAPPING VIOLENT CRIME AGAINST HERITAGE

2.1 Mapping crime: general aspects and evolution

According Kumar and Chandrasekar (2011a), an important feature for the location of the crime analysis is the understanding that the event does not occur in places accidental or unpredictable. Instead, criminal offenses may occur in conspicuous structures that are harmed by the landscape in which they occur, and psychological factors that govern the motion of the offender. It's this feature that makes maximum mapping is a powerful research tool, it involves location.

The traditional story of the mapping of crime consisted in the use of pins nailed into a concentrated representation of a jurisdiction. According to Freitas and Vieira (2007), the old maps pins were useful for allowing the visualization of where crimes occurred, but relied on

serious limitations in that it was updated, the old patterns criminal records were lost. While the raw data could be archived, the maps do not, unless they were photographed. The maps were static, not allowing manipulation or investigation of crime.

Kumar and Chandrasekar (2011b) state that by the early '90s, people began to understand the advantage of using pins and wall maps detailing the distribution of crime events. By incorporating the maps in investigations, detectives were able to visualize and observe the spatial distribution of crimes and their relationship with the surrounding landscape.

New technologies open up possibilities for progress and welfare, but that advantage only occurs as a result of the management and effective use of information processed. The use of so-called Geoinformation Technologies applied to urban management should target the subsidy and implementation of public policies, through monitoring and data processing, always seeking the benefit of social order total (Souza et al, 2005).

2.2 Methods and techniques in analyzing crime hot spots

According Kumar and Chandrasekar (2011b), the mapping of crime is a very effective method for the detection of crime in high-density areas known as hot spots. Crime hot spots is an area where the number of criminal events or disorder is higher than in any other places, or an area where people have a higher risk of victimization. This suggests that the availability of places or areas less than the average amount of crime. And some hot spots may be hotter than others.

Chainey, Tompson and Uhlig (2008), the mapping of kernel density estimation is considered as the technique of spatial analysis more suitable for viewing crime data. It is a method increasingly popular due to its availability of growth, the perception of precision in the identification and aesthetic appearance of the resulting map. A map is produced with a smooth surface, showing the density variation point / crime throughout the study area, without the need to conform to geometric shapes.

2.3 Mapping points

According the Eck (2005), the most common approach to display location patterns of crime mapping is the point. Point mapping technique is the most popular, mainly because it's a traditional version by the method of placing pins for representing crime events on a map on the wall.

According the Eck (2005), a digital application, if these individual objects are properly assigned geographical point with information, such as the code describing the type, date and time, sets of points that satisfy the particular conditions can be simple and quickly selected. These selections can be displayed using appropriate symbology representing the category displayed crime. However, trying to interpret the spatial patterns and hot spots in the data points of crimes can be difficult, especially if the data sets are large.

3. CASE STUDY

3.1 Study Area

The city of João Pessoa is the capital of Paraíba state, has an area of approximately 210.45 km² and 723,514 inhabitants (IBGE, 2010). With hot and humid tropical climate, vegetation type Atlantic. Limited, to the south with the municipality of Conde, the west with the municipalities of Bayeux and Santa Rita, north with the municipality of Cabedelo and east by the Atlantic Ocean (Fig. 1). Access to the city is through the federal highways BR-101 and BR-230 and state PB-08 and PB-04.

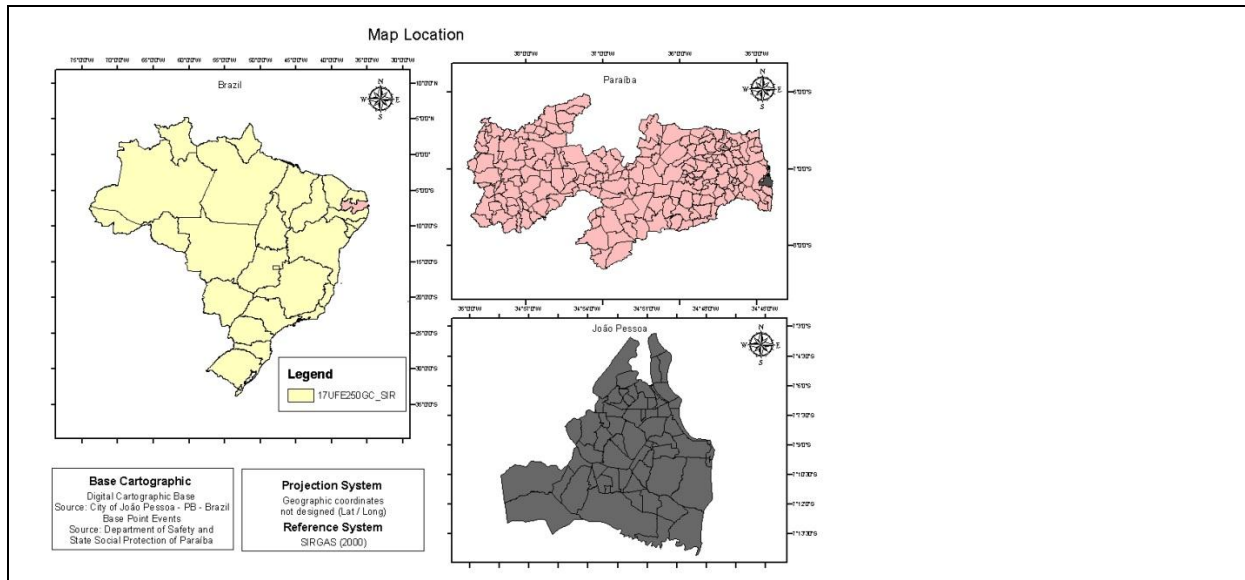


Figure 1 - Location of the study area.

4. STUDY METHODOLOGY

4.1 Stages of study

The acquisition of cartographic base consists of the municipal grid IBGE (2010) and the basis of occurrences of crimes that was released by the Center for Action and Criminal Statistics (NACE) of the Ministry of Social Security and Defense (SEDS) in the state of Paraíba. Both shapefile format files (.shp).

4.2 Technological Resources

Using ArcGIS 9.3 software for thematic mapping.

4.3 Spatial Databases

The base map has the following features:

- Projection System: No Projection, Geographic Coordinates (Lat-Long)
- Reference System: SIRGAS 2000
- Digital Cartographic Base (City of João Pessoa / IBGE)
- Basis of Point Events: Department of Social Security and the Defense of the State of Paraíba (SEDS / PB)

5. RESULTS AND DISCUSSION

The present thematic maps and analysis on the spatial distribution of crimes in João Pessoa. For preparation of the map made up of grouping features and timely implementation, which represents the spatial distribution of crimes against property and its location, in May of 2012. There was no stratification method used for variable visual graphics occurrence.

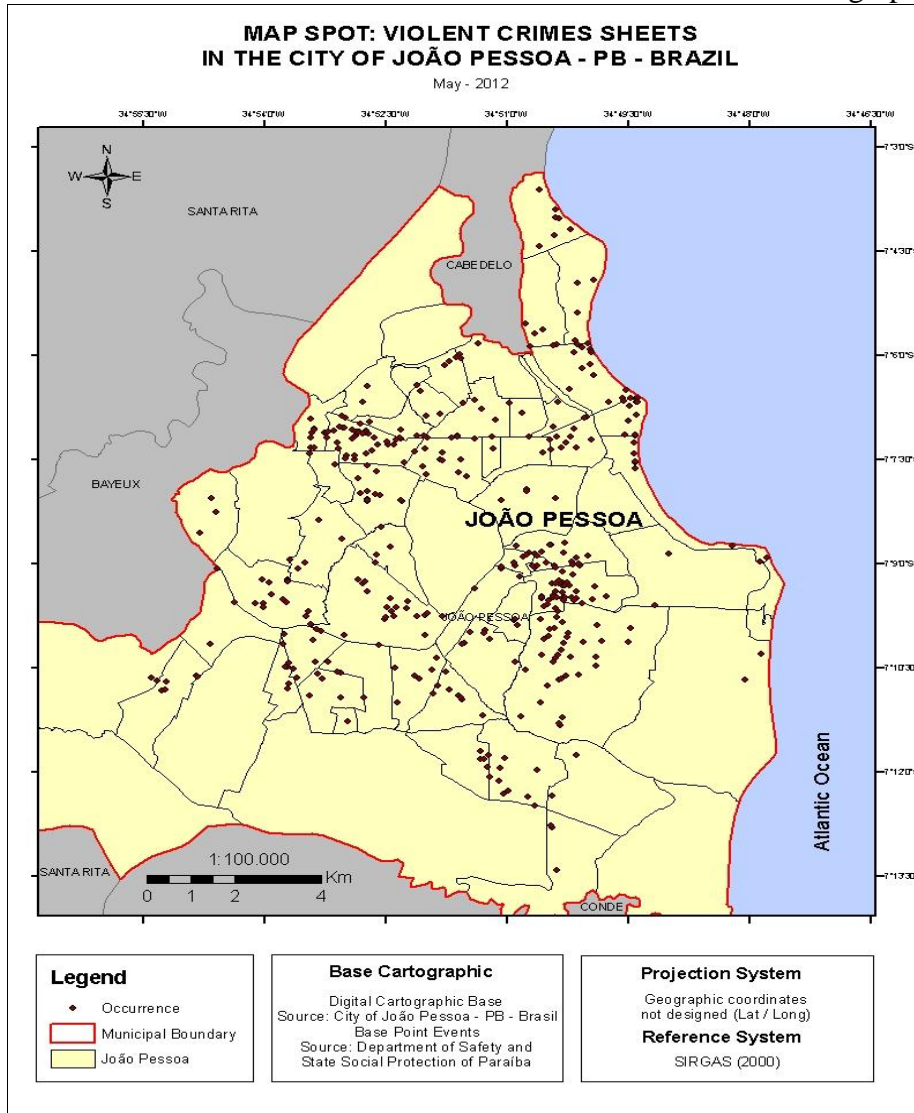


Figure 2 - Map of Spot violent crimes against property in the municipality of João Pessoa – PB

Figure 2 depicts the city of João Pessoa - PB, and boundaries of districts. Each dot represents the location of occurrences of CVP generally without concern that it will be a crime of firearm or weapon.

In the map below, the implementation type of the variable occurrence is visual punctual, but made up a classification subdividing points crimes by the instrument used, respectively, melee weapon, firearm and uninformed.

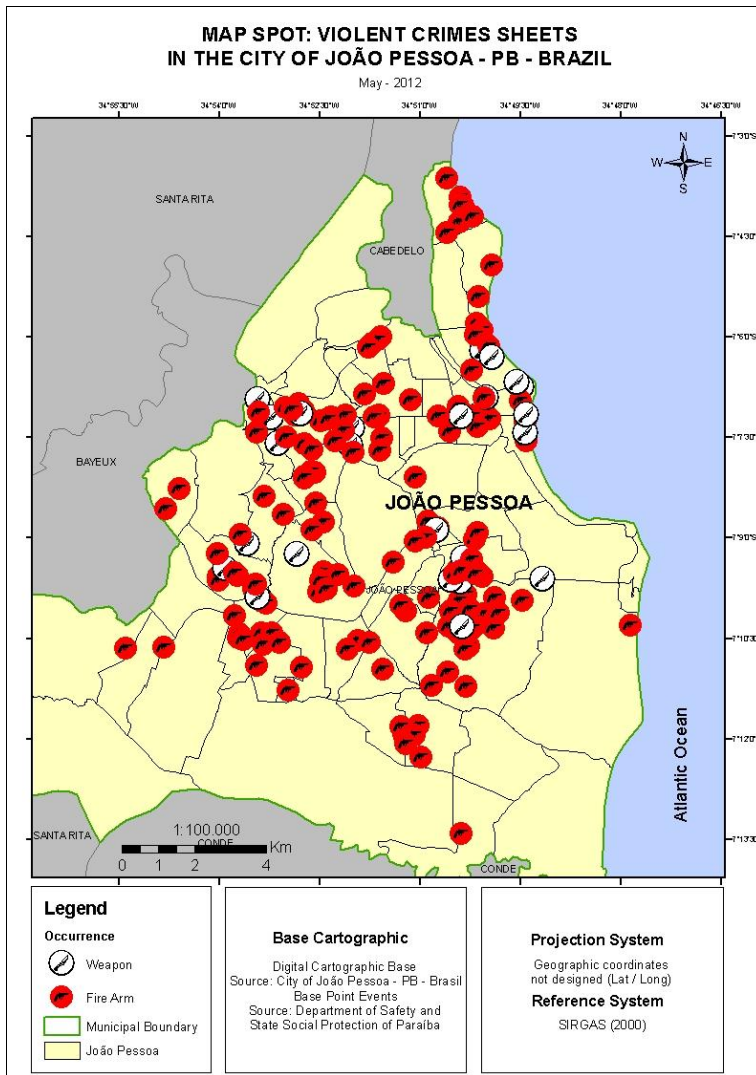


Figure 3 - Map occasional violent crime equity in João Pessoa - PB.

In Figure 3 we can see that the number of crimes with firearms is far greater than the Knife.

In the next map, was used for timely implementation tool Kernel Density ArcToolbox software ArcGis 9.3, this function is to transform vector data to raster.

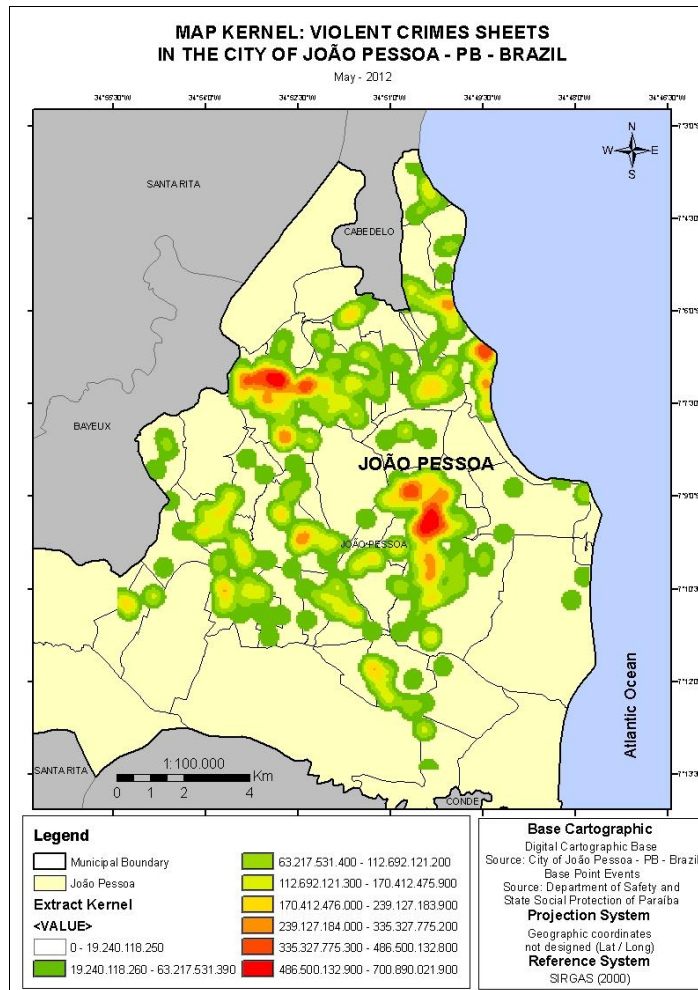


Figure 4 - Map Kernel: Violent Crime sheets in the city of João Pessoa – PB

The Figure 4, a map was created Hot Spot coming to present a statistical spatial distribution of the variable occurrence of crimes, showing the location of the highest rates of crime. This case are being evaluated all types of CVP, with firearms, white and unidentified.

The area of highest crime rate located further north of the map of Figure 3 is the very center of the city of João Pessoa, where many shops, banks and people hanging out. That is, an environment conducive to this event VCH. The other area located further southeast of the same map is a neighborhood of the city, where residents have a high purchasing power.

A implicador for using this tool is that it does not respect boundaries (Figure 5), ie, given a vector structure and the transformation applied to acquire the raster data, administrative boundaries previously existing in basemap are not respected due to lightning the scope defined by the interpolator. What is necessary to extract a new feature of this raster data for map information does not represent impropiciente.

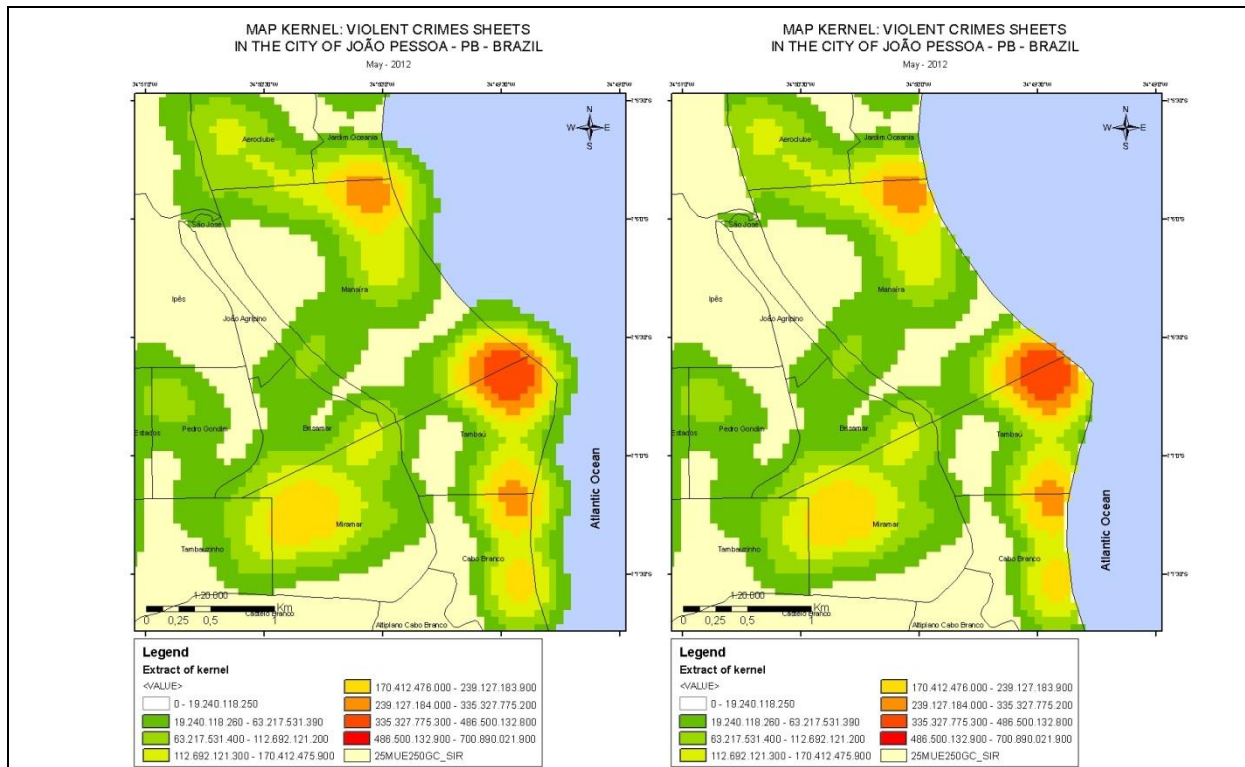


Figure 5 - Map of Kernel Comparative cutout area of raster

6. CONSIDERATIONS FINAL

The mapping of crime or any other phenomenon is important because it lets you know how it is distributed through space, and thus able to monitor mitigation policies. Therefore, Cartography occupies an important place among the sciences to help fight crime, since based on a map with the spatial distribution of crimes in an area can provide resources efficient operational security.

The analyzes, there is the made in Figure 4, which shows the spatial distribution of statistical graphics variable occurrence. This is not crafted with due accuracy provide false information under the territorial distribution in space, implying a poor perception of the facts and inconsistency of information for public management.

Through the analysis of the maps we can see that the number of crimes using firearms was very large, so it would be interesting to disarmament campaigns in neighborhoods, followed by installation of core security on site, minimizing the increase in cases of crimes violence against property.

The Cartography and analysis of crime mapping can assist in planning, and implementation of action plans, minimizing the cost of operations and more effectively, since the study area is already known and the entire strategy can be applied.

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Teaches at the Federal University of Pernambuco, develops teaching and research in Cartography and Geoinformation Systems - GIS. In the area of geosciences research Spatial Data Modeling for building spatial database, primarily with themes related to urban studies. In school still operates on Methodology of Scientific Research.

Cartographer Engineer graduated from University Federal de Pernambuco (1987), with a Masters in Civil Engineering from Universidade Federal de Santa Catarina (1993), Doctorate in Transportation from the University of São Paulo - School of Engineering of São Carlos (2001), and Postdoctoral New University of Lisbon - Instituto Superior de Statistics and Information Management (2006).

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