

# Spatial Pattern of Criminals in Chennai City: A Geospatial Based Approach

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## Abstract

GIS can support many central processes in policing and crime reduction in many application areas which include recording and mapping police activity, crime reduction projects, calls for service and crime incidents; supporting the briefing of operational police officers by identifying crimes that have recently occurred and predicting where crime may occur in future; identifying crime hot spots for targeting, deploying and allocating suitable crime reduction responses; helping to effectively understand crime distribution, and to explore the mechanisms, dynamics and generators of criminal activity, through pattern analysis with other local data; monitoring the impact of crime reduction initiatives; and using maps as a medium to communicate to the public using crime statistics for their area and the initiatives that are being implemented to tackle crime problems. Crime mapping is becoming central to policing and crime reduction in the 21st century. GIS and crime mapping will become an essential tool for criminological research.

**Keywords:** *Geospatial, Spatial Pattern of Criminals, Journey to Crime and Geospatial Data.*

## 1. Introduction

Crime mapping can play an important role in policing and crime reduction process, from the first stage of data collection to the monitoring and evaluation of any targeted response. It can also act as an important mechanism in a more pivotal preliminary stage, of preventing crime by helping in the design of initiatives that are successful in tackling a crime problem. Criminological studies have shown that the conditions conducive to producing crimes are not the same for producing criminals. Hence, criminals' residences cannot be explained away by the same factors that

account for the prevalence of crimes. Here an attempt made to describe the distribution of criminals. This study deals with the spatial patterns and processes of residences of the established criminals of the city of Chennai. GIS can support many central processes in policing and crime reduction in many application areas which include recording and mapping police activity, crime reduction projects, calls for service and crime incidents; supporting the briefing of operational police officers by identifying crimes that have recently occurred and predicting where crime may occur in future; identifying crime hot spots for targeting, deploying and allocating suitable crime reduction responses; helping to effectively understand crime distribution, and to explore the mechanisms, dynamics and generators of criminal activity, through pattern analysis with other local data; monitoring the impact of crime reduction initiatives; and using maps as a medium to communicate to the public using crime statistics for their area and the initiatives that are being implemented to tackle crime problems. Crime mapping is becoming central to policing and crime reduction in the 21st century. The GIS and crime mapping will become an essential tool for criminological research.

## 2. Previous Studies

Many previous studies of spatial nature have failed to explain satisfactorily the actual criminal behavior in geographical space. Most of the studies, concerned with criminal behavior, have tested empirically either a limited number of individuals or a limited sample of subjects but otherwise not broad enough to be representative of a community's total population. It appears as though the study of criminals' locations and behavior in cities has been neglected due to insufficient data. Spatial patterns of crimes in Lima, Ohio, as studied by Ackerman and Murray (2004) suggested that the city officials and policy makers recognize the

importance of a better understanding of the dynamics of crimes and they suggest that Geospatial and quantitative techniques have a vital role. Brantingham, (1981) environmental criminologists analysed how the fourth dimension of crime (Place) interacts with the other three dimensions to produce criminal events. Timms (1971), have been essentially based on criminals' locations. As far as India is concerned, Sivamurthy (1980, 1984, and 1988) has done pioneering research in crime mapping and spatial analysis of crime in India. And Mary (1993) and Jaishankar (2000, 2003) have done researches in the field of spatial analysis of crime using GIS.

### 3. Study Area

Tamil Nadu is the foremost state in the incidence of crimes among the southern states of India. Chennai city is the capital of Tamil Nadu and one of the leading million cities in India. It is highly urbanized with the highest density of population and also records the highest number of crimes in Tamil Nadu. When compared to other cities in Tamil Nadu, Chennai city recorded a greater number of crimes. Because of the sternness and uniqueness of the crime problem, Chennai city has been selected for the present study.

### 4. Aim & Objectives

The purpose of the study is to analyze the spatial patterns and processes of residences of criminals in relation to the known characteristics of different areas and to analyze the relationships between the places of occurrence of crime and the places of residence of criminals. The following objectives have been formulated as the basis for investigation of the problem of the study.

1. To analyze the residential areas of the criminals and the places of occurrence of crimes the same.
2. Identification of similar patterns in criminal residences to that among of different types of crimes.

### 5. Data and Methodology

Data pertaining to the places of residence of criminals have been collected for 2014 and 2016 in the same way as for the places of occurrences of crimes. But the

particulars regarding places of residence of criminals are not available for all reported crimes, maybe because many crimes go undetected. Hence, data for detected crimes alone have been collected for examination in this study. Therefore, the criminal data relating to the places of residence of criminals (origin), times of occurrence, dates of occurrence, victims' addresses, and places of occurrence (destination) have also been obtained for all detected cases.

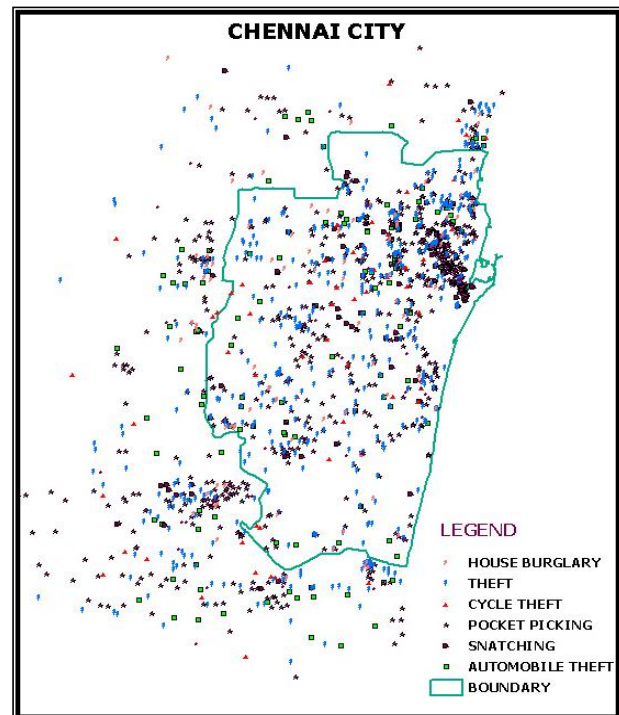


Fig. 1 Locations offender Residences -2014

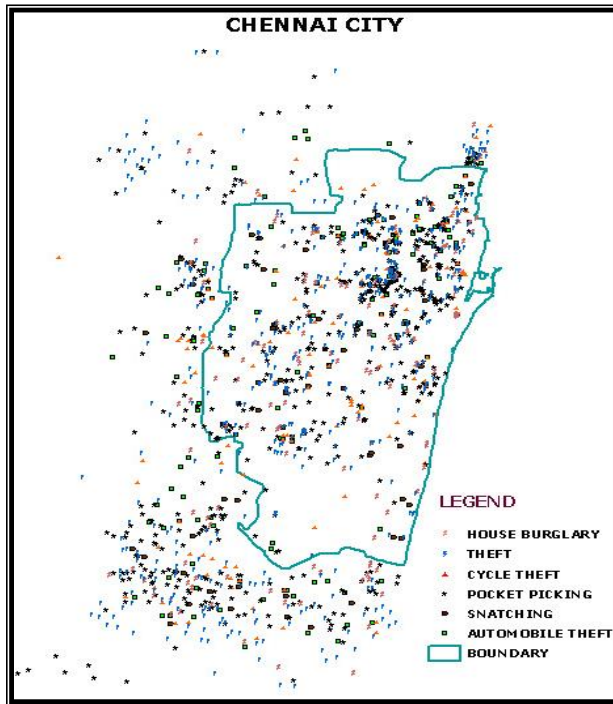


Fig. 2 Locations offender Residences -2016

### 6. Analyses and Interpretation

The measurement of criminals concentration is relatively difficult because an offender is a different unit of measurement from an offense since several people may jointly commit an offense. In the present analysis, if one offense is committed jointly by several criminals, all of them are considered as criminals of that particular offense. If one offender commits several offenses at different locations, each occurrence is counted separately. This is necessary in order to have a balance between the number of crimes and the number of criminals so that the relationships between the origin (residence) and destination (occurrence) could be analyzed. Criminals have been classified on the basis of types of crime for which they were charged. Thus, criminals charged with theft, house, burglary, picking pocket, cycle theft, automobile theft, and snatching have been included in the study.

Maps have been prepared for each type of criminals to show the spatial pattern of their residences. One map each (Figures 1 and 2) illustrates the locations of offenders' residences in the years 2014 and 2016.

These two maps reveal that offenders' locations and scenes of occurrences are not similar in many parts of Chennai city (Table 1.1).

Table 1.1: Offender Locations within and beyond city limits

Year	Offenders	Offenders locations within city limits	Offenders locations beyond city limits
2014	3,055	2,294	761
2016	3,300	2,384	916

### 7. Result and Conclusion

It has conclusively been observed that the places of residence of criminals are different from the places of their criminal operations and activities. There is always the expectation that there is some kind of interaction between their places of residence and their places of operation. The kind of interaction and levels of interaction are certainly expressed in their patterns of journey-to-crime by the criminals. This journey is a reflection of the environmental opportunities, types of offense, operational conveniences and individual decisions. Thus, the study of the travel – behavioral patterns of the criminals helps us to understand the power of attraction of the different neighborhoods and the level of interaction between the origins and destinations of criminals.

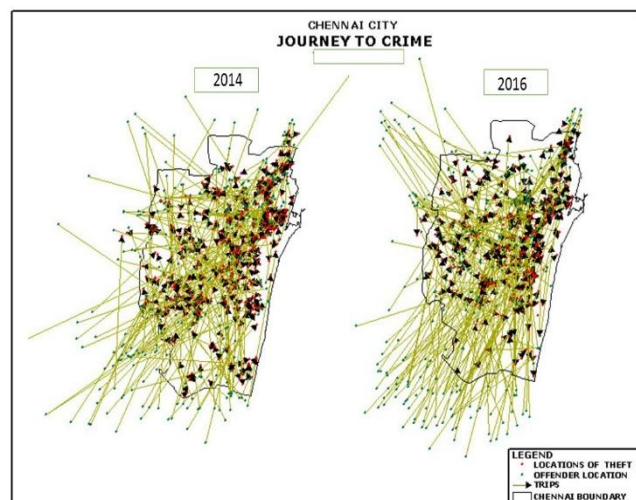


Fig 3 Journey to Crimes

The relationship between the residences of criminals and a scene of different kinds of crime. It was found during the analysis that a significant number of offenders originated from outside the city limit; especially in the year 2016 as a relatively large number of offenders were from the outskirts of the city (Figures 3). When the pattern of criminal residence for theft is compared with the pattern of occurrences of theft, it is found that the areas with high rates of criminals are essentially the areas with lower rates of occurrences of theft.

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