



RESEARCH ARTICLE

**WEB SOLUTION FOR BURGALARY MONITORING IN KUMBAKONAM TOWN USING GPS DATA
BASE**

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ABSTRACT

Web-based GIS is an exciting new method of disseminating information organized using Geographic Information Systems (GIS). It became possible and popular due to the fast growing Internet technology and became a good source of providing better decision support in land use and environmental protection since mid 1990s. Many research activities and commercial efforts have been put into this field. The traditional and age-old system of intelligence and criminal record maintenance has failed to live up to the requirements of the existing crime scenario. Manual processes neither provide accurate, reliable and comprehensive data round the clock nor does it help in trend prediction and decision support. It also results in lower productivity and ineffective utilisation of manpower. The solution to this ever-increasing problem lies in the effective use of Information Technology. Geographic Information System (GIS) uses geography and computer-generated maps as an interface for integrating and accessing massive amounts of location-based information. GIS allows police personnel to plan effectively for emergency response, determine mitigation priorities, analyse historical events, and predict future events. GIS can also be used to get critical information to emergency responders upon dispatch or while en route to an incident to assist in tactical planning and response. GIS helps identify potential suspects to increase investigators suspect base when no leads are evident.

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INTRODUCTION

GIS to Measure Crime in Public Housing

The incidence of crime in public housing has yet to be routinely and systematically measured. In the vast majority of jurisdictions with public housing, official police statistics on crimes specific to those areas are just not available. The majority of law enforcement organizations base their statistics on relatively large geographic areas often called precincts or districts. Police rarely publish official crime statistics for small parcels of land such as public housing developments. Few of the biggest public housing developments (i.e., 1000+ units) come close to even qualifying for consideration as distinct crime reporting zones. In any event, these 1000+ unit developments are exceedingly rare, appearing in less than one-half of one percent of the Nation's 3300+ public housing authorities. Furthermore, these very large developments constitute less than one-half of one percent of the roughly 14,700 public housing developments in the United States. While a handful of criminologists have attempted to gauge the levels of some crimes in public housing, even the most rigorous attempts have been unable to generate comparisons between ostensibly high-crime public housing developments and their adjacent neighborhoods or even adjacent blocks. That being the case, it is possible that many inner-city public housing developments by comparison may prove to be calm islands in the midst of neighborhoods beset by crime and disorder.

Converting Address Data into Map Locations

Police crime reports include the physical address of the crime location. Important tasks here are to locate these address data on a map in order to display the map locations and to determine their locations relative to public housing—for instance, whether a crime fell within the boundaries of a public housing development or within a specified distance of a public housing development boundary. Fortunately, the GIS provide the tools necessary to convert the physical address to a map coordinate location. The process of converting address data to coordinate data is called geocoding or address matching. It relies on the GIS's ability to compare the elements of each address to the attributes associated with each line segment until the elements match (or in the case of the street number, until the number falls within the range of addresses associated with a particular line segment). The exact location is determined by interpolating the available range of addresses to determine where the specific street number lies along the line segment.

The output of the geocoding process is a point layer showing the location of each address in the same coordinate system as the street centerline layer. In other words, the output can be used to create a map showing the crime locations and the streets. The map will show each crime as a point on or near the actual street address of the crime. In addition, each point is linked to any other attribute data contained in the original database—that is, all the other information extracted from the written crime reports. Geocoding normally requires some

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amount of data preprocessing to achieve acceptable results. The address given on the police report commonly does not match an address available within the street centerline layer. Reasons may include that the street name does not exist, the name was spelled incorrectly on the report, the street number does not fall within a valid address range, the street type is incorrect, or the street's locational designation (e.g., North Main Street) is omitted or does not exist. Also, police reports often give the location as a name (e.g., county jail) or a street intersection rather than an address. Finally, the report may contain a valid address that is missing from the street centerline layer (e.g., an address within a new subdivision that has not yet been included in the street centerline layer or the street centerline attributes may be incomplete).

Problem

House break theft (Burglary) is a day-to-day affair in the majority of urban centers, particularly in the metropolitan areas. The main reason for this continued theft is socio-economic inequality and the recent reports indicate that the unemployed youths are involved in such type of activities. With ever increasing population in the urban areas due to immigration in search of jobs and less man power in the police department to monitor is one of the reasons for this criminal activity. This can be managed with the friendly police concept. Basic initiative in the project is to pass confidential information to the Police department as and when a house is locked for quiet some time / unattended for longer time periods / which may likely instigate an intruder to break the house. Police department, which, if a house is unattended for longer time interval, the period of absence may be intimated to the nearest police station, is informing the Public and they in turn keep additional watch during night patrols to curtail and reduce the burglary in urban areas.

Objectives

1. To map the existing urban crime pattern in Kumbakonam using GIS Technology for the data, to available time periods and select the highest burglary incidence ward for sample analysis,
2. To devise a GIS based WEB solution to the sample ward of 23 in the study area and gather all the household location/ information using GPS and connect the household and police department in a common platform, to exchange details when they are away,

METHODOLOGY

Geographical Information System developed by the ESRI, U.S concern has been used as a common platform to connect the Household and Police department on a WEB solution with a software designed using .NET: Household is the information provider and the Police department is the end user/ decision maker. In the present study , based on the highest house break theft data available in the Kumbakonam Police jurisdiction, ward No. 23 have been selected for a sample study. The entire ward has been converted into digital maps and all the household details were attached with attribute tables. Global Positioning System (GPS) has also been used to re-register the individual household with satellite tracking mechanism. The street wise maps (9 street) were digitally converted into images (using scanner) and they were re-registered using GPS control points. There are 358 house

holds in this ward has been re-surveyed using GPS to exactly demarcate the locations of individual households. Then a WEB based GIS software has been devised using .NET. It works simple and the household information provider and the end user are connected on a common network. If a household is to enter the information on the web site (specifically designed) they have to clear the entry by given user name and password. Then they have to enter the date in which they intend to leave the house locked and the date in which they would return back home. Once the data is entered using any gateways, then the end user, the police department would list the details on their end to view the locked houses on that day. They can keep an additional watch on the locked houses during their night petrol. Though there are 358 households in this sample wards only the houses locked and entered on the web site only BLINKS and the use of mouse pointer would give the details of the household to mark the police personal for monitoring. This type of system would reduce the day to day burglary event in near future.

Location

Kumbakonam, one of the special grade Municipal Towns of Tamil Nadu, is the second bigger town in Thanjavur District. It is situated 10° 57" north latitude and 79° 28' Longitude. It is located about 313 Kilometers away from madras on the south, about 90Kms. from Tiruchy on the east and about 40kms from Thanjavur on the North East. The town is surrounded by two rivers namely River Cauvery on the north and River Arasalar on the south. It has a gentle slope towards south from North. Kumbakonam is located at 10.97° N 79.38° E. It has an average elevation of 24 metres (78 feet). Kumbakonam is located 273 km south of Chennai, 96 km east of Tiruchirappalli, and about 40 km north-east of Thanjavur. Two rivers bound the town, the Kaveri River on the north and Arasalar River on the south. There is a gentle slope from north of the town to south.

GIS based WEB solution for Burglary

To design a WEB based solution to manage the house-break theft (burglary) in Kumbakonam the details of criminal records were gathered from the Town police jurisdictions. Based on the data various GIS maps were designed to show the urban crime pattern in the town. This ward consists of 358 households with the necessary facilities of shopping complexes hospital and temples. Ward 23 is the come under the jurisdictions of North police limits in the town. With the aid of Global Posituioning System the complete survey makes in ward 23 to find out the owner of the land along with the survey numbers show the spatial distribution of theft cases recorded for the past four year: that is from 2004 to 2007. Based on the Policestation crime records and GIS maps has been an increase in the theft cases from 2005 to 2006 and further reduction in 2007. To design a WEB solution the entire map (ward No. 23) has been digitised using ArcGIS 9.0. The household details were attached with an attribute table which provides all the information of the selected household. For the purpose of WEB design, the exact location of each and every house hold has been surveyed using Global Positioning System (GPS) and few GPS locations were used as control points for re-registration process.

The WEB solution for the burglary, which is termed as WEB GIS to Link Household to Police Information System which is

designed to manage housebreak theft in the town. There are two security registrations in the web site: one is the user login and another is the administrative log-in. The user login is the 358 households in the sample ward and the administrative log-in is the end user/ managers of the police department. The sample ward has been divided into eight streets for GPS survey of each and every household (Figure1). The user login initially needs to register and as default the house number and the head of the family is registered. For example if any one of the household is away from today then he has to feed the date on which he intend to leave and the date in which he intends to return. On the other end the police personal every day they would login through the administrative login and would view the number of blinks on the ward map which shows that the household are away from theirir home/ or locked for specific time periods. Figure-2 shows the blinked houses on the GIS map format along with the details of the household/ to be locked on a particular day. It shows a steet detail along with the locked houses (blinks) and the gross-root level detail of the household. Figure-3 is the report of the houses which is to be locked for some time from the day of administrative login and now the police personal can monitor the houses during night petrol/ or with the help of friendly police concept. The software has been devised using .NET. Basic idea behind this software is that: the police personal inform the general public that if a house is locked for a specific period, they should inform the police so that they can keep a watch on the locked houses. In larger towns/ cities it is difficult to identify the locked houses and if the person informs the police through this WEB site the houses that blink on a particular day shall be monitored and this would also reduce the burglary in due course of time.

Report ID	Head of the House	From Date	To Date
1	SANTHA	08/03/2008 12:00:00 AM	10/03/2008 12:00:00 AM
2	SANTHA	08/03/2008 12:00:00 AM	10/03/2008 12:00:00 AM
103	HILA	09/03/2008 12:00:00 AM	20/03/2008 12:00:00 AM
102	RAJ	09/03/2008 12:00:00 AM	20/03/2008 12:00:00 AM
278	MOHAN	09/03/2008 12:00:00 AM	20/03/2008 12:00:00 AM
118	JANANI	10/03/2008 12:00:00 AM	27/03/2008 12:00:00 AM
129	VEJAYAL	10/03/2008 12:00:00 AM	17/03/2008 12:00:00 AM
120	CHATHRA	10/03/2008 12:00:00 AM	19/03/2008 12:00:00 AM
128	KALITHAN	10/03/2008 12:00:00 AM	20/03/2008 12:00:00 AM
17	KANNAYAN	11/03/2008 12:00:00 AM	13/03/2008 12:00:00 AM
113	MARUDAYAN	10/03/2008 12:00:00 AM	20/03/2008 12:00:00 AM
1	SANTHA	10/03/2008 12:00:00 AM	20/03/2008 12:00:00 AM
16	KANNAN	26/03/2008 12:00:00 AM	28/03/2008 12:00:00 AM

CONCLUSION

Burglary is becoming common in urban centers. Every day there is a reported case in Tamil Nadu and it is difficult to manage this crime by the police personal. People’s participatory approach is the need of the hour and based on the friendly police concept, being in existence in most of the urban centers in Tamil Nadu this can be controlled. This WEB-GIS solution has been developed using .NET transmits the day to day information about the information provider (about their absence period) to the police department for on line monitor and they will be able to at least locate the houses to be locked for some time and access to overall list on that particular day and post their personal for additional monitoring during night patrols. This software has been implied for a specific ward as a sample, and this can be applied to other towns and cities for better monitoring and management, to curtail the burglary

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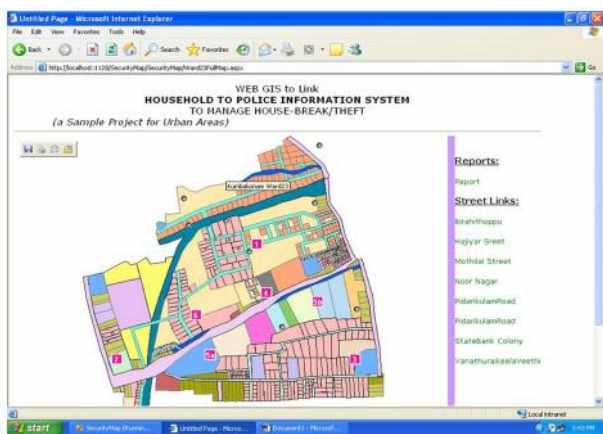


Fig -1

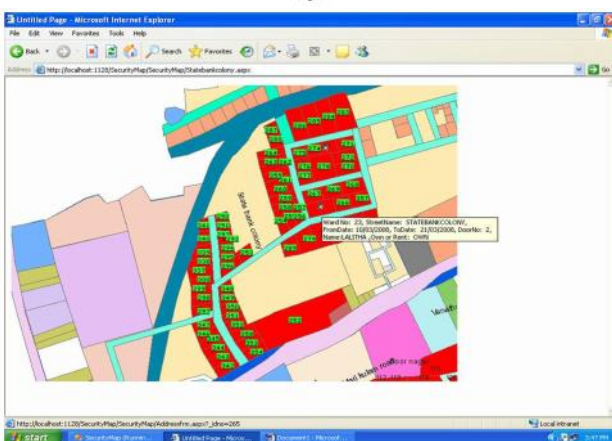


Fig -2

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