GEOINFORMATICS IN LAW ENFORCEMENT – PART 2

MIRCEA BADUT CONTINUES HIS SERIES ON THE ROLE OF GIS IN CRIME AND LAW ENFORCEMENT SYSTEMS

This article continues on from Part One of this series, in the May issue, which led up to the role of crime statistics analysis in monitoring, prevention and response to criminal activity.

Criminalistic analysis

A software solution for crime treatment and for public safety control helps by providing more efficient marking of hot-spots in the area under investigation. The digital cartography approach also assists at preventing crimes through the fact that it can clearly identify crime behaviour, e.g. revealing it in different hypostases by specific geospatial analysis.

There are several ways in which such a GIS can assist crime fighting:

- fast and easy creation of trustworthy maps showing events and crime phenomena;
- revealing patterns of criminal actions (criminal's moving paths, recidivism, the temporal crime coordinate, geospatial high-risk spots/zones, etc);
- revealing criminal tendencies in the controlled area (by geo-temporal statistical analysis);
- reducing the time needed for identifying and comparing similar crimes; etc.

Hot-spot points can be highlighted on a digital map, for example distributed across the urban infrastructure configuration (aligned along an avenue; surrounding a commercial building; along a fuel pipe) or overlaid on the nature geography (on the river banks, at a forest-edge, on a valley, on a mountain crest). Identifying hot spots in this way serves two functions:

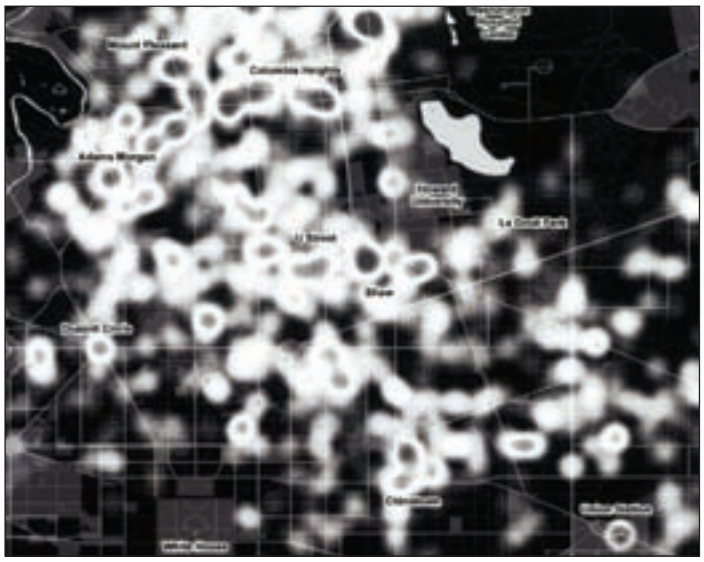
- provides visualization of the geospatial crime pattern, revealing tendencies and risk spots/areas,
- becomes a means of interaction (an interface element) where pointing by the user (with the mouse cursor) will bring on the screen information about the represented crime events.

Most such criminal information can be available to investigators by classical means, but scattered and in ways not easy to consult, e.g. as files, analogical archives, work annotations, people's memory, etc. Using the geoinformatics approach, the information is quick to retrieve, available from a unique and trusted source, and they can be aggregated in diverse forms and analyzed from different perspectives.

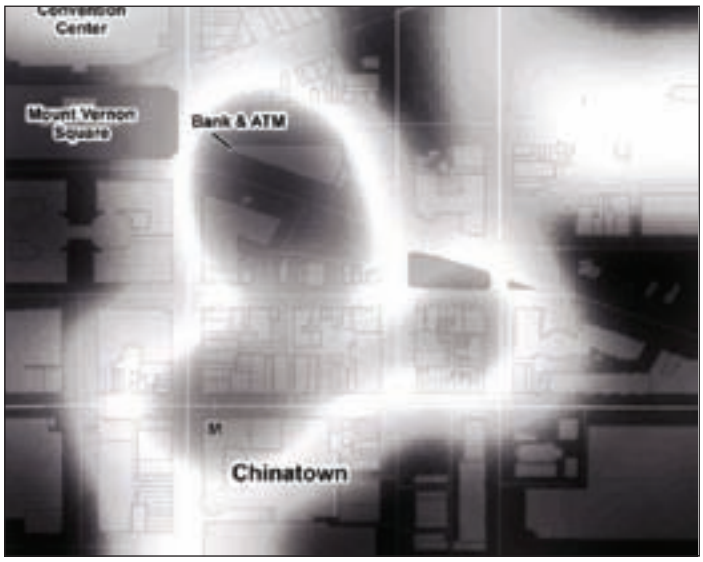
Crimes repeated by the same person usually have something in common, a pattern, a habitude, which – after being revealed with the IT assistance – helps the police to catch the criminal and/or to prevent the crime.

Another benefit of geo-information systems is support to police officers to draw the route by which the criminal can escape from the crime scene – as off-line scenarios (foresights) or as a result of real-time monitoring of that zone – with a positive effect over the on-line assistance given to the teams/patrols from the respective area as well.

Because from a graphical perspective the GIS has a metric character, the investigators benefit from the precision attribute when they analyse the moves done in criminal acts:



A typical hot spot map for robberies during 2007 in Washington, D.C



Example of crime hotspots displayed at street level

- representing/revealing the real/probable routes/paths of entering/departing in/from the crime scene,
- exact measurements of the distances between buildings and facilities,
- evaluation of the time lapses needed, inclusively for the transport of the means involved in committing crime; etc.

Hot-spot statistics, generated by time-conditioned GIS analyses, can say when/where there are possibilities that the next event will happen. Therefore the police can prevent/stop its deployment/occurrence. Such studies also help with the proficient placement of surveillance devices, i.e. establishing the most suitable locations and orientations.

Policemen know from their expertise that the crime phenomenon is not comprised of isolated facts, that there are causal or human relations between apparently distinct events. Therefore when a crime is solved, indices can appear to resolve other cases. On the one hand, by visually approaching the incidents – this being the substance of geo-science – specialists can see connections that otherwise are not obvious. On the other hand, the informational unification (assumed by implementation of such an information system) allows the current user to access results from the works of other investigators too.

From the management point of view, the assimilation of such information solutions can lead to the restructuring and optimization of the police/judiciary resources.

The cartographic representation of the criminal incidence can also be oriented outside the police department: toward public (for warning, with an educational purpose, or for public services transparency reasons); toward mass-media (press communication; (extra)ordinary reports); towards other interested/involved organizations (law-courts, prosecutors and attorney offices, educational institutions, social services, human rights institutions, European integration institutions, etc); or channelled to population categories who constitute with predilection the targets for crimes (such as store owners).

Revealing criminal patterns (disclosed through analysing the criminal incidents previously recorded in police databases) helps to solve related events as well as the prevention of future/probable events and the mitigation of their effects (by deploying proper measures).

The analyses revealing criminal patterns are most suitable for large urban communities. The geo-information system of a city will centrally record/store huge collection of informational entities:

- critical calls (signalling events before start, in their course, or after),
- complaints (signalling risk situations and potential ones),
- arresting the persons as flagrant offenders or as being pursuit by police as crime suspects.

Accessing these data, along with their analysing abilities courtesy of the geo-information system, helps investigators to more easily identify potential criminal situations and to respond more efficiently to the crime events. Police personnel can visualize the city circumscription-after-circumscription, and even have the ability to follow suspects towards the location where they are likely to run and hide following a crime.

*A **parametrical** interrogation example: "How many X-type events have occurred in Y days (salary days for the Z company) in an area surrounding the V barroom by W meters?"*

But more complex analyses, e.g. gearing more data types, aggregated from diverse perspectives, or even using spatial/alpha-numerical sub-queries, can reveal more subtle aspects (such as the time-shifted causality relations) or other indirect linkages between the geospatial configuration, phenomena, events and other conjunctures.

The strategic cartography capabilities provide criminalists with a intuitive manner of analysing and visualizing the crimes classified on diverse criteria (among which the geospatial component forms a valuable connector). The results of statistical analyses help the executive personnel to take measures for stopping the peaks of crime activities intensifying before becoming worrying tendencies. At operative levels, the same analysing functionalities become useful for criminal locating and arresting. Moreover, benefiting from "information-telecommunication" integration, police professionals can access such information by fast means (radio-telephony, e-mail, instant-messengers) before they arrive at the crime scene.

Also, geo-information can be used for analysing (and preventing) car crashes, because by studying the automobile accidents from an area (city, county) one can rapidly reveal and understand the causes/circumstances which provoked/favoured them. In this application the abilities of replaying certain analyses under different parameterization will be extremely useful – studying "what if" scenarios involving variation regarding speeds, weather conditions, traffic crowdedness, visibility, road surface type and state, vehicle power, tire type/state, etc – so unchaining an intelligence which can help with reducing collisions causality. Likewise, the operative activity of automobile-traffic police can benefit from such optimizations, mainly by assuring those locations and those day/week times which have revealed a high accident rate (by supplementing with agents and specific materials). Also, when accident occurrence thematic maps can be published, the GIS becomes a public education vector.

In the final part of this series, Mircea looks at the impact that use of crime GIS tools have made on society.

Images courtesy of Geography and Public Safety, quarterly bulletin of Applied Geography for the Study of Crime & Public Safety, vol 1 (1) Feb 2008.

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