PURPOSE: Identifying where crime concentrates is one of the the principle aims of crime analysis. However, the spatial analysis techniques commonly used to identify 'hot spots' of crime typically assume that crime can occur anywhere in a study area and ignore the effect that the built environment has on the spatial distribution of crime. As some crimes are particularly constrained by networks (e.g. street robbery by the street network, bus crime by the transport network) it is important that there are appropriate analytical methods available to capture such linear concentrations.

Hot Routes was devised to be a straightforward spatial technique that analyses crime patterns that are associated with a linear network (e.g. streets and other transportation networks). It allows an analyst to map crime concentrations along different segments of the network and visualise this through colour. It is deliberately simple, meaning that an analyst just needs access to a regular GIS package and suitable data sets. More sophisticated tools are available[1], but access to them is usually limited by police IT systems protocols on installing software.

THEORY: According to crime pattern theory, the distribution of crime largely depends on how victims and offenders converge in space. In an urban environment an individual's 'activity space' is defined by streets and transport networks called 'paths' along which they travel to 'nodes' where they live, work, or engage in leisure activities. Crime tends to concentrate at the nodes and along the paths that connect them when the routine activities of individuals provide a regular supply of suitable targets for offenders. Certain shopping malls, transport hubs and streets become 'crime generators' because they attract large numbers of people, and therefore multiple opportunities to commit crime. Since streets and transport networks constrain the routine movements of individuals and their encounters with offenders, they strongly influence the spatial distribution of crime.

Crime pattern theory, and the crime concentration patterns predicted by it, is supported by an impressive body of research. A universal finding has been that a large proportion of crime occurs at a very small number of places. For example, one recent study reported that half of all crime in Seattle each year occurs on just 5-6% of the city's street segments. The same Seattle study found that crime was also relatively stable over space and time (over the sixteen year data period). There was also considerable street-to-street variability in levels of crime around Seattle. Some street segments with high crime were surrounded by streets that recorded little or no crime.

The knowledge that crime concentrates along certain street segments, remains stable over time, and occurs in discrete areas has had a profound effect on policing practice. 'Hotspots policing', which increases police presence at identified hotspot area, has the potential to significantly reduce crime in the short- to medium-term. Robust trials of such policing tactics have returned favourable results. For example in Philadelphia during the summer of 2009 it was found that violent crime in the targeted areas reduced by 23% (relative to control areas) when directed police patrolling was done for three months. Similar policing practices have been trialled on London Underground's 'hot' platforms with a 21% overall reduction in crime and calls-for-service compared with the control platforms.

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[1] In free software packages such as SANET (Spatial Analysis on a NETwork) and GeoDaNet

Hot Routes is a spatial technique that analyses crime patterns that are associated with a network. It allows an analyst to map crime concentrations along different segments of that network and uses colour and line-width to visualise the results (known as thematic mapping).

GENERAL RESOURCES

Network spatial analysis software:

SANET: http://sanet.csis.u-tokyo.ac.jp

GeoDaNet:

JDiBrief