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Chapter VII

Single Incident Geographical Profiling

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Abstract

This chapter describes the results obtained by using simulation software to determine the ability to rank the suspects of a single incident based on the geographic information derived from arrest records. The current software uses three different geographic filters. These geographic filters were based on the standard distance decay curve (DDC), an incident based distance decay curve (IBDDC) and the incident-based offender residence probability surface (IBORPS). These filters were rated on their ability to order suspect lists. Boundary effects due to the crude core-periphery population gradient characteristic of cities and sub-areal heterogeneities were found to be associated with the standard DDC analysis. The results indicated a definite utility value in these filters, which tends to support crime theories based on the premise that criminal activity patterns are systematically influenced by an offender's geographic setting. These results also have strategic significance in the formulation of policies that prescribe the assembly and

processing of suspect lists and serve as the basis for geographic profiling based on a single incident.

Introduction

Geographic profiling has been defined by Rossmo (2000) as "an information management strategy for serial violent crime investigation that analyzes crime site information to determine the most probable area of offender residence" (p. 259). The computer software portion of Rossmo's procedure, Rigel, recalculates a generalized distance-decay curve, adjusting it to fit the dimensions and pattern distribution of the crimes believed to be part of a series. The advantages of this method are that it only needs the locations associated with a series of crimes as input and the adjusted DDC is now tailored to the behavior of that particular individual. The disadvantages of the Rigel calculation is that unless the series contains a sufficient number of crime-related locations the results will be poor. Although the necessary number of crimes for good results varies with local conditions (Rossmo, 2000), it should not be expected to perform well on only one or two cases.

This chapter describes a method that attempts to extend quantitative geographic profiling into this case gap by describing a data intensive method that can be used with a single incident. This single-incident method makes the prediction of offender residence based on establishing the locational relative frequencies of offender residences obtained from arrest record data for all who have committed crimes around the incident location in the past. This method draws its justification heavily from the principals of environmental criminology with its emphasis on environmental setting and routine activity theory. In the application described here, it is assumed that a list of suspects has been generated which now has to be ordered using the empirically established probabilities linking offender residence location to incident location.

Conceptually, this method could be expanded for use in typical serial applications. However, the fact that the single-incident method employed here showed effectiveness does not imply that the compounded application with serial incidents would produce improved results. Only further research can answer this question. Should it show utility in a serial incident application, there would still be a question as to whether or not it offered any advantage to the widely used theory based technique employed by Rigel. Even if it turned out that these methods, based on data from aggregated arrest records, was superior only when the number of incidents was small, it would extend the conditions under which geographic profiling was useful.