CrimeStat IV

Part I: Program Overview

Chapter 1:

Introduction to *CrimeStat IV*

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Introduction to *CrimeStat IV*

CrimeStat® is a spatial statistics package that can analyze crime incident location data. Its purpose is to provide a variety of tools for the spatial analysis of crime incidents or other point locations. It is a stand-alone *Windows* program that can interface with most desktop geographic information systems (GIS). It is designed to operate with large crime incident data sets collected by metropolitan police departments.   However, it can be used for other types of applications involving point locations, such as the location of arrests, motor vehicle crashes, emergency medical service pickups, or facilities (e.g., police stations).

Uses of Spatial Statistics in Crime Analysis

Most GIS packages, such as *MapInfo*®, *ArcGIS*®, and *Maptitude*®, have very sophisticated data base operations (Pitney Bowes, 2012; ESRI, 2012a; Caliper, 2012). They have limited statistical methods, however, though this has been slowly changing over time as the programs have added various statistical functions. For most purposes, GIS can provide great utility for crime analysis, allowing the plotting of different incident locations and the ability to select subsets of the data (e.g., incidents by precinct, incidents by time of day). Most crime analysts visually inspect incident maps and, based on their experience, draw conclusions about shifts over time, 'hot spots' and other patterns suggested by the data.

There are times, however, when a more quantitative approach is needed.   For example, an analyst wishing to examine patterns of streets robberies over time will need indices which document how the robberies may have shifted. For a neighborhood showing an apparent sudden increase in auto thefts, there needs to be a quantitative standard to define the 'typical' level of auto thefts.   In assigning police cars to patrol particular major arteries, the center of minimum travel needs to be identified in order to maximize response time to calls for service. For research, as well, quantification is important. In examining correlates of burglaries, for example, a researcher needs to determine the exposure level, namely how many residences or commercial buildings exist in a community in order to establish a level of burglary risk. Or a precinct station may want to target areas for which there is a high concentration of incidents occurring within a short time ('hot spots'). While some of these analyses can be conducted with GIS queries, quantification can allow a more precise identification and the ability to compare different types of incidents. In short, there are many uses for quantitative analysis for which a statistical program becomes important.

The *CrimeStat IV* Spatial Statistics Program

       CrimeStat is a program designed to provide statistical summaries and models of crime incident data. The program provides crime analysts and researchers with a wide range of spatial statistical procedures that can be linked to a GIS.   The procedures vary from the simple to some very sophisticated 'cutting edge' routines. The reasoning is that different audiences vary in their needs and requirements. The program should be of benefit to different organizations. For many crime analysts, simple descriptions of the spatial distribution will be sufficient with the aim being practical intervention over a short time period. For these persons, many of the techniques provided in *CrimeStat* will be unnecessary.

       For other analysts, statistical tools can supplement a much larger GIS effort, such as the sophisticated crime analysis system built by the Baltimore County Police Department (BCPD, 2012). For other researchers, even more demanding techniques may be needed to detect the underlying spatial structure as a means for formulating a temporal-spatial theory. A pattern in and of itself has little meaning unless it is linked to some framework. The ability to quantify relationships with a large amount of data can address problems that previously were avoided and can be a first step in developing an explanatory framework or interventionist strategy. *CrimeStat* attempts to address both types of needs by providing statistics in a 'toolbox' framework. We recognize that today's exotic statistical techniques may become tomorrow's practical diagnostics and want the program to be useful for many years.

Input and Output

       CrimeStat is a full-featured *Windows* program using a graphical interface with database and expanded statistical functions. It can read files in various formats - *dBase*®, which is a common file format in desktop GIS programs, Excel (both 'xls' and 'xlsx' formats), *ArcGIS* Shape (shp) files, *MapInfo* data (dat) files, and files conforming to the ODBC standard, such as Lotus 1-2-3, and Microsoft Access (Microsoft, 2010). In addition, many other GIS packages, such as *Maptitude*® can read 'dbf', 'shp', 'bna' or 'mif' files.

       Output includes both displayed tables, which can be printed as text or copied to a word processing program, and graphical output. *CrimeStat* can write graphical objects to the *ArcGis*®, *MapInfo*®, *Maptitude* GIS programs, *Surfer*® *10, ArcGIS Spatial Analyst*© programs, and to those that can read Ascii grid files (e.g., *Vertical Mapper*®; Rockware, 2012; Golden Software, 2012; ESRI, 2012b).

Statistical Routines

CrimeStat IV includes statistics routines for both statistical description and modeling. These are divided into six general statistical categories with more than 80 individual routines:

Data Setup

Primary file
Input file with X/Y coordinates
Define coordinate system
Define data units

Secondary file
Input second file with X/Y coordinates as baseline
Define coordinate system
Define data units

Reference file
Create reference grid
Use existing reference grid

Type of distance measurement
Use direct distance
Use indirect distance
Use network distance

Spatial Description

Spatial distribution
Mean center
Standard distance deviation
Standard deviational ellipse
Median center
Center of minimum distance
Directional mean and variance
Convex Hull

Spatial Autocorrelation

Moran's "I" spatial autocorrelation index
Geary's "C" spatial autocorrelation index
Adjusted Geary's "C" spatial autocorrelation index
Getis-Ord Global "G" spatial autocorrelation index with simulation of credible
     intervals
Moran Correlogram with simulation of credible intervals
Geary Correlogram with simulation of credible intervals
Getis-Ord Correlogram with simulation of credible intervals

Distance analysis I

Nearest neighbor analysis
Ripley's "K" statistic
Assign primary points to secondary points

Distance Analysis II

Within primary file distance matrix
Between primary file and secondary file distance matrix
Between primary file and grid distance matrix
Between secondary file and grid distance matrix

Hot Spot Analysis

Hot spot analysis I

Mode
Fuzzy mode
Nearest neighbor hierarchical clustering with simulation of credible intervals
Risk-adjusted nearest neighbor hierarchical clustering with simulation of credible
     intervals

Hot spot analysis II

Spatial and temporal analysis of crime routine (STAC) with simulation of credible
     intervals
K-mean clustering

Hot spot analysis of Zones

Anselin's local Moran test with simulation of credible intervals
Getis-Ord local "G" test with simulation of credible intervals
Zonal nearest neighbor hierarchical clustering with simulation of credible
     intervals

Risk-adjusted zonal nearest neighbor hierarchical clustering with simulation of
      credible intervals

Spatial Modeling I

Interpolation I
Single variable kernel density interpolation
Dual variable kernel density interpolation

Interpolation II
Head-Bang analysis
Interpolated Head-Bang analysis

Space-time analysis
Knox index
Mantel index
Correlated walk model for analysis and prediction

Journey-to-crime analysis
Calibrate Journey-to-crime function
Journey-to-crime estimation
Draw crime trips

Bayesian Journey-to-crime analysis
Diagnostics for Journey-to-crime methods
Estimate likely origin of a serial offender

Spatial Modeling II

Regression I
MLE OLS and Poisson regression models
MCMC Poisson and Logit regression models
MCMC Poisson and Logit exposure regression models
MCMC spatial Poisson and Logit regression models
MCMC spatial Poisson and Logit exposure regression models

Regression II
Using OLS regression models to make predictions
Using Poisson spatial regression models to make predictions

Discrete Choice I
Create dataset for conditional logit model
Estimate multinomial logit model
Estimate conditional logit model

Discrete Choice II
Using multinomial logit model to make predictions
Using conditional logit model to make predictions

Time Series Forecasting
Time Series Data
Extrapolative Time Series Forecasting
Classical Decomposition: Seasonality
The Detection Problem

Crime Travel Demand

Trip Generation
Skewness diagnostics
Calibrate model
Make prediction
Balance predicted origins & destinations

Trip Distribution
Calculate observed origin-destination trips
Calibrate impedance function
Calibrate origin-destination model
Apply predicted origin-destination model
Compare observed and predicted origin-destination trip lengths

Mode Split
Calculate mode split for trips

Network Assignment
Check for one-way streets
Create a transit network from primary file
Network assignment of trips to travel network

Many of these routines allow variations yielding an even larger number of statistics to be calculated. Two features of the program should be noted.   First, and foremost, *CrimeStat* is a

program that specializes in the analysis of point locations. Over the years, many statistical tools have been developed for analyzing point locations. Many of these have either not been implemented as computer programs or were collected together as part of a specialized statistical system. They have been typically unavailable to crime analysts and the major statistical packages (e.g., *SAS*®, *SPSS*™, *Systat*®) do not include these routines. Consequently, we have collected those that are most appropriate for crime analysis and detection and organized them into a single package with a common graphical interface. They represent a wide variety of tools that can be used for crime analysis. *CrimeStat* can also analyze zonal data by treating them as 'pseudo' points. For example, the centroid of a census tract can be treated as a point and a value associated with the tract (e.g., its population) can be treated as an Intensity value (see chapter 3).

Second, *CrimeStat* includes a variety of modeling tools for analyzing multivariate relationships. These include spatial regression routines for analyzing skewed distributions along with spatial autocorrelation, discrete choice modeling routines for modeling unique decisions, time series forecasting routines for analyzing sudden changes in the level of incidents in a zone, and a crime travel demand module for analyzing crime patterns over an entire metropolitan area.

Program Requirements

Required Hardware and Operating System

CrimeStat IV was developed for the *Windows 7* and *Windows 8* operating systems, though it will also work with the *Windows 2000*, or *Windows XP* operating systems; it is not hardware dependent so that any processor that can run *Windows 7* or *Windows 8* will suffice. Some of the routines can also run on *Windows XP* and earlier Windows operating systems. However, the program was not designed around nor fully tested for those operating systems. It is highly recommended that the program be run on a more current version of *Windows*.

While it can run on a relatively slow computer (e.g., 250 MHz clock speed) with limited RAM (e.g., 64 MB), it will run much better on a 2.6 GHz computer (or faster) with more than 2 GB of RAM. In general, the faster the processor used and the more RAM, the quicker the program will run. The program is very intensive with respect to calculations. Some of the statistics produce very large matrices (e.g., the trip distribution routines in the Crime Travel Demand module). Depending on the size of the data files that will be processed, there may be hundreds of millions of calculations on any one run. It is critical, therefore, that the computer be fast and have sufficient amounts of RAM.

Available RAM Limits the Size of Files

For most of the simple statistics, a reasonably fast computer will be adequate. However,

the Markov Chain Monte Carlo (MCMC) regression routines, the discrete choice module, the temporal modeling module, and several of the trip distribution routines will push the limits of most computer systems. For example, the 32 bit Windows operating system has a maximum addressable limit of 4 GB (i.e., 4 billion bytes) of RAM (actual and virtual). With a trip distribution matrix, there are *M x N* cells where *M* is the number of rows (origins) and *N* is the number of columns (destinations). With 8 bytes (64 bits) being assigned to a number in a cell (including the decimal and decimal places), practically the maximum matrix that could be loaded into memory would be about 22,000 x 22,000. One would never be able to use this amount since a lot of RAM will be taken up by the program and operating system. Nevertheless, using the calculation, the storage space required to save such a matrix will limit the size of the database, aside from taking a very long time to be calculated. In short, the size of the files that can be processed will depend on the particular routines being run.

With a 64 bit operating system (e.g., Windows 7 or Windows 8), the theoretical maximum for addressable memory is 192 GB. Again, with 8 bytes per cell, the available RAM would allow a maximum square matrix of about 154,000 x 154,000 cells. Clearly, for large data sets, a 64 bit Windows operating system is preferable.

Multi-threading

CrimeStat is a multi-threaded application written to take advantage of multiple processors if the hardware and operating system support multiple processors. The program is designed to be multi-threading which means that it will take advantage of multiple processors (called 'cores') using *Windows 8, Windows 7, and Windows Vista* operating systems. These operating systems will support up to 64 core processors while *Windows Server 2008* R2 supports up to 256 processors. Earlier versions of Windows (e.g., Windows 2000) supported two core processors. Thus, if there are two processors and *Windows 7* is the operating system, *CrimeStat* will calculate routines in about half the time. If there are four processors and *Windows Server 2008* is the operating system, *CrimeStat* will calculate routines in about a quarter of the time.　The multiples are not exact since processing time must be allocated for input of data and output of tables. Also, some of the routines (the Markov Chain Monte Carlo regression models, the temporal modeling module) are sequential so that the advantages of multi-threading will not play much of a part.

For small data sets, this feature is not important as most runs will be very quick. However, for large data sets (e.g., 3000 cases or larger), the speed of calculations become important. For example, on a 1.6 GHz single-processor *Pentium M$^{®}$* computer with 1 GB of RAM running *Windows XP Professional*, it took about 4 minutes to complete a nearest neighbor analysis on 14,853 cases involving the calculating of distance from every point to every other point and identifying the 100 nearest neighbors. On a 2.4 GHz dual-processor *Intel$^{®}$ Core^{TM} 2*

computer with 4 GB of RAM running a 64-bit *Windows 7,* it took about 50 seconds to complete the same task. On a 2.4 GHz quad-processor *Intel® Core™ i7-2760QM* processor with 16 GB of RAM and running a 64-bit *Windows 7,* the task took 16 seconds, more than three times faster than the 'Core 2' processor and 60 times faster than the 'Pentium' processor. The larger the file that is being processed, the more critical becomes the calculating efficiency of the computer.

If a police department is expecting to run large data sets, it would benefit them to purchase fast multiple-processor computers with lots of RAM and fast hard disks to speed calculating times. The evolution of new processors is moving in this direction anyway so that multi-processor computers have become the norm.

Required Software

CrimeStat needs a Windows environment to operate.   The program was designed for a *Windows 7* operating system so it is better optimized for that system.   In particular, *Windows 7* and *Windows 8* have two features that allows *CrimeStat* to run more efficiently.   First, they are multi-threading operating systems and can utilize multiple processors, as mentioned above. Second, they address memory in a more efficient way, as a large flat block. The 64 bit version of Windows 7 or Windows 8 in particular, will handle larger data blocks (called *words*) than the older 32 bit versions of Windows 7 and earlier operating systems.

CrimeStat is a stand-alone program. Hence, it does not require any other program other than a Windows operating system. However, to be maximally useful, there should be an accompanying GIS program. While point data can be obtained from a non-GIS system (e.g., census files include lat/lon coordinates for the centroid of census units), the use of the GIS to assign the coordinates is almost necessary.   Further, many of the outputs of *CrimeStat* are for GIS programs. For example, to view an ellipse of a hot spot or to view a three dimensional interpolation produced by *CrimeStat* will require an appropriate GIS package.

Installing the Program

CrimeStat comes compressed in a zipped file called *CrimeStat.zip*. To install the program, it is necessary to have a compression program that recognizes the 'zip' format:

1. Create a directory using *Windows Explorer* and copy the file to that directory.

2. Double click on the file name in *Explorer*.   When the name *CrimeStat.zip* is visible in the dialog box name field, double click the name with the left mouse button and point the extraction to the directory that you defined. *CrimeStat* will be installed in that directory.

3.   The program help menu can also access the manual if the chapters of the manual are kept in the same directory as the program.

Adding an Item to the Start Menu

To add *CrimeStat* to the start menu:

1.   Click on the *Start* button in Windows followed by *Settings* then *Taskbar*.   Click on *Start Menu Programs* followed by *Add*.

2.   In the dialog box, click on *Browse,* point to the directory where *CrimeStat* resides, and click on its name followed by *Open*. When the name *CrimeStat* is in the dialog box name field, click on the *Next* button.

3.   Double-click on the folder to which *CrimeStat* is to be assigned.

4.   Finally, type a name for *CrimeStat* (e.g., CrimeStat) followed by *Finish*.

Adding an Icon to the Desktop

To add *CrimeStat* to the desktop:

1.   Double-click on *My Computer*.

2.   Double-click on the drive in which *CrimeStat* resides followed by the directory that it is in (it may be several levels down).

3.   Click once on the name *CrimeStat* with the left button and then hold down the right mouse button.

4.   While holding the right mouse button, scroll to *Create Shortcut*.

5.   The name *Shortcut to CrimeStat* will be placed at the end of the list of files.

6.   Highlight the name by clicking on it once.   Hold the left mouse button down and drag this name on to the desktop.

7.   You can rename it *CrimeStat* by clicking on its icon with the right mouse button followed by *Rename*.

8.   Alternatively, you can use *Windows Explorer* to create a shortcut and then drag the shortcut to the desktop.

Installing the Sample Data Sets

There are eight sample data sets that can be used to run the program, also in 'zip' format plus notes defining the variables. Since the data are *simulated*, they should not be used for real applications.[1] They are provided to allow a user to become familiar with the program quickly. Many of these data sets have *Read Me* files that explain their data structure.   However, ultimately, the value of the program must be tested on real data, rather than simulated data.

1.   **General Sample Data.zip**.   The data are simulated incident points from Baltimore City and Baltimore County in Maryland.

   A.   *Incident.dbf* - A simulated data set of 1061 incidents (e.g., robberies) in Baltimore County and the City of Baltimore

   B.   *Baltpop.dbf* - The 1990 population, area and population density of 1349 block groups in Baltimore County and the City of Baltimore

2.   **Jtc Sample Data.zip**.   There are three files of simulated data for use with the Journey-to-crime routine (Chapter 13).   The data should be stored in the same directory:

   A.   *JtcTest1.dbf* - A simulated data set of 2000 robberies in Baltimore County that can be used for calibrating a travel demand function.   Each record has a crime location and a residence location of the offender.

   B.   *JtcTest2.dbf* - A simulated data set of 2500 burglaries in Baltimore County that can be used for calibrating a travel demand function.   Each record has a crime location and a residence location of the offender.

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[1]   The data were simulated by a random number generator following the distribution of several types of crime incidents. Because the data were selected by a random generator, the points do not necessarily fall on streets or even stay within the boundaries of the jurisdiction. Their purpose is to provide a simple data set so users can become familiar with the program and should not be used for actual research.

C.   *Serial1.dbf* - A simulated data set of the location of seven incidents committed by a single serial offender.   To become familiar with the journey to crime routine, they can be treated as either robberies or burglaries.

3.   **Bayesian Jtc Sample Data.zip**.   There are six files of simulated data for use with the Bayesian Journey-to-crime routine (Chapter 14). The data should be stored in the same directory:

A.   Bayesian_calibration_file.dbf – A simulated data set of 963 crimes committed by 88 serial offenders.   Each record has an offender ID, the UCR code, and the crime location and residence location of the offender.

B.   Observed_OD_Distribution.dbf – A simulated matrix of crime trips from 533 origin zones in Baltimore County (MD) and the City of Baltimore (MD) to 325 destination zones in Baltimore County.   Each record includes the location of the origin zone, the location of the destination zone, and the number of crime 'trips' for each combination.

C.   Jtcfull.txt – A journey-to-crime calibration file that can be used to estimate the travel distance of offenders from each origin zone to each destination zone.

D.   S14A.dbf – the crime locations of an offender who committed 14 offences before being caught.   Each record includes the UCR code and the crime location and residence location of the offender.

E.   TS15A.dbf – the crime locations of an offender who committed 15 offences before being caught.   Each record includes the UCR code, the date, the time, and the crime location and residence location of the offender.

F.   Test_Bayesian_Jtc_routine.param – a *CrimeStat* parameters file for loading these data into *CrimeStat* to run the routine.

4.   **Correlated Walk Analysis Sample Data.zip**.   These are three files of simulated data for use with the Correlated Walk Analysis routine (Chapter 12):

A.   *PredictableOffender1.dbf* - A simulated data set for an algorithmic offender who committed 13 incidents.

B. *PredictableOffender2.dbf* -A simulated data set for an algorithmic offender who committed 12 incidents.

C. *RealOffender1.dbf* - A data set for a real offender who committed 12 incidents - 10 larceny thefts, 1 robbery and 1 burglary.

D. *RealOffender2.dbf* - A data set for a real offender who committed 15 incidents - 10 larceny thefts, 2 assaults, 2 burglaries and 1 robbery.

5. **Crime Travel Demand Sample Data.zip**.   There are 13 files of data, CrimeStat parameter files, and a spreadsheet file for modeling travel behavior in Baltimore County, Md.   They are examples used in the crime travel demand module (Chapters 25-32):

A. *Crime Travel Demand read me.pdf* - a file that explains the three data sets and their fields and describes the eight parameter files.

B. *BCOrigins.dbf* - a data set on 532 origin zones in both Baltimore County and the City of Baltimore from the late 1990s.   There are data on crimes originating from each zone and demographic, economic and land use variables associated with those zones.

C. *BCDestinations.dbf* - a data set of 325 destination zones in Baltimore County only.   There are data on crimes occurring in each zone and demographic, economic and land use variables associated with those zones.

D. *ObservedODTrips.dbf* - the actual trip distribution indicating the number of trips from each origin zone to each destination zone.

E. *Trip generation origin model.param* - Runs trip generation model using the Poisson regression for the origin zones affecting Baltimore County.

F. *Trip generation destination model.param* – Runs trip generation model for Baltimore County destinations.

G. *Make predicted origins.param* – Applies modeled coefficients for the origin model to the same data set from which it was modeled.   Then the routine adds in external trips.

H.   *Balance Origins and Destinations.param* – Balances the number of trips by origin and by destination.   In the example, the number of predicted destinations are held constant.

I.   *Calibrate Origin-Destination Model Coefficients.param* – Using the predicted origins and predicted destinations from the trip generation stage, estimates coefficients for distributing trips from origin zones to destination zones.

J.   *Apply Origin-Destination Model.param*   – Inputs the predicted origins and predicted destinations from the trip generation stage as well as the modeled coefficients from **H** above.   Outputs predicted trips for each origin-destination zone combination. For the graphic display, outputs top 200 trips.

K.   *Compare Observed and Predicted Trip Lengths.param* – Inputs observed (actual) and predicted trip distribution and compares them by trip lengths. Calculates coincidence ratio and then compares the top 200 origin-destination links.

L.   *Mode Split Model.param* – Inputs predicted origins, predicted destinations, and predicted trips along with estimates of the mode split function (see Excel spreadsheet below). Splits trips by origin-destination pair into specific travel modes. The output is both a table of origin-destination trips by mode as well as five *ArcGis* shape files representing zone-to-zone trips by mode.

M.   *Mode split impedance defaults.xls* - An Excel spreadsheet for estimating the coefficients of the mode split stage.   This should be used in establishing the parameters for the mode split routine.

6.   **Mode Split Impedance Defaults.xls**. A spreadsheet for estimating the parameters of the mode split impedance function (Chapter 30).

7.   **Discrete Choice Modeling Sample Data.zip**.   There are two files for running the multinomial logit model (Chapters 21 and 22):

A.   *HoustonWeaponUse.dbf* - A data set of weapon use during robberies in Houston ,TX. Each record contains an offender ID, a randomly assigned

crime location, the type of weapon used during the robbery (WEAPON) and 11 predictive variables. See the attachment to Chapter 22 for details.

B.   *Run MNL model of Houston robberies.param* – A *CrimeStat* parameters file for loading the multinomial logit model from these data.

C.   *TheHagueBurglars.dbf* – A file of 548 cleared burglaries from The Hague, Netherlands. The file contains information on the characteristics of the burglars and neighborhood identifiers.   This will be combined with the data set on neighborhoods in The Hague.

D.   *TheHagueNeighborhoods.dbf* – a file of 89 neighborhoods in The Hague for the years 1996-2001.The data set is for use an alternatives files in creating a data set for the conditional logit model.   This will be combined with the data set on burglars in The Hague.

E.   *TheHagueNeighborhoodsXBurglars.dbf* – this file is the result of matching the file *TheHagueBurglars.dbf* with *TheHagueNeighborhoods.dbf* using the 'Create dataset for conditional discrete choice model' routine under Discrete Choice I module.   It is used to validate the results of combing TheHagueBurglars.dbf with TheHagueNeighborhoods.dbf files.

8.   **Time Series Forecasting Sample Data.zip**.   There are two files for running the exponential smoothing and prediction routines (Chapters 23 and 24):

A.   *Weekly crimes by Tract.dbf* – A data set of weekly robberies by 140 census tracts in Pittsburgh, PA, between 1990 and 1999.

B.   *Monthly crimes by Tract.dbf* – A data set of monthly robberies by 140 census tracts in Pittsburgh, PA, between 1990 and 1999.

Again, to repeat, many of these data are simulated.   Though they are based on actual cases, the X and Y coordinates have been randomly assigned so that the real locations of the crime location or the offender's residence are hidden.   They should be used only to learn how to run individual routines.

To install any of these sample data files, it is necessary to have a compression program that recognizes the 'zip' format:

1. Create a data directory using *Windows Explorer* and copy the files to that directory.

2. In *Windows Explorer*, double-click on its name and then follow the instructions.

Step-by-Step Instructions

This manual will go through the program step-by-step to address how it can be used by a crime mapping/analysis unit within a police department. Chapter 2 provides a quick guide for all the data definition and program routines and Chapter **3** provides detailed instructions on setting up data to run with *CrimeStat*.   The statistical routines are described in parts II, III, IV, V, and VI.   Part II presents a number of statistics for spatial description. Part III presents hot spot analysis techniques for both points and zones.   Part IV presents a number of statistics for spatial modeling (called Spatial Modeling I) while part V presents multivariate tools for spatial modeling (called Spatial Modeling II).   Finally, part VI presents a crime travel demand module. The different statistics are presented and detailed examples of each technique are shown.

Options

There is an option tab that allows the saving and loading of program parameters and the setting of colors for each of main headings: Data setup, Spatial description, Hot Spot Analysis, Spatial modeling I, Spatial Modeling II, and Crime Travel Demand.   One can also output simulated data during the simulation runs; this will be explained in the appropriate section.

Short Applications

The manual also includes a number of applications conducted by other researchers and analysts. These are presented as one page sidebars at the end of each of the chapters. Most of these are from criminal justice. But, applications from other fields have also been included. The aim is to show the diversity of applications that researchers and analysts have used with the various routines in *CrimeStat*.

Online Help

In addition, there is on-line help for the program.   There is a *Help* button that can be

pushed to access all the help items. In addition, the program has context-sensitive help. On any page or routine, clicking on the *Help* button at the bottom of the screen will pop up an appropriate help item. The on-line help can also access the program manual. For this to be available, be sure to store the chapters of the manual in the *same directory* as the program.

Accessing the Help Menu in Windows

CrimeStat IV works with the Windows Vista, Windows 7, Windows Server 2008 R2, and Windows 8 operating systems. However, these operating systems do not include the help menu file that was available in previous versions of Windows (WinHlp32.exe) and clicking on the CrimeStat help button may not work. *If* you have this problem, Microsoft has developed a special file that allows help menus to be viewed. It will be necessary to obtain the file and install it. The URL is found at:

http://support.microsoft.com/kb/917607

Select the file that is appropriate for your operating system and follow the instructions on the page. Additional diagnostic information is also provided on the page.

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