LAB 4: ODU SPRING 2019 CS411 TEAM SILVER PROJECT

Crime HotSpot User Manual

CS411W Spring 2019 Team Silver
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1 Introduction

(Thom Loftin, Editing: Dave Hall, Stephanie Zeil)

Crime HotSpot is a tool that will help you make effective and informed decisions about your safety. When was the last time you visited a new city? Did you feel secure in your knowledge of the safety of the areas you visited? Everyone wants to feel safe. When traveling to new locales, seeking a new home, or trying to find the perfect location for a new business, it is important to investigate the safety of a location in terms of criminal activity. Some websites use crime mapping to provide this information, but none offer the unique combination of features in Crime HotSpot.

The idea of crime mapping is not new. It is the process of overlaying data on criminal activity over a geographical map. There are two methods of representing crimes in such overlays. The first, and most common, method uses icons to identify the location and type of each criminal event. Unfortunately, this can lead to distracting visual clutter on the map which tends to reduce the effectiveness of the tool. Nobody likes to look at clutter be it at home, work, or in a computer application. The second crime mapping method uses heatmaps. On a crime heatmap, criminal activity is represented by a varying scale of color depicting heat levels, with 'hotter' colors indicating increasing levels of activity. While this method removes clutter, it tends to misrepresent the safety of an area. Locations such as shopping centers may show a high heat level, but that heat level could largely be due to shoplifting instead of crimes that threaten a person's safety. It is generally possible to look deeper into the dataset and find more meaningful information, but the hassle of doing so dissuades many users. Most users want to open an application and immediately receive valid, useful information. There is only one chance to make an impression, and the first impression is the most lasting.

The common flaw in both crime mapping methods is that they visualize crimes, not the danger those crimes represent. While you can delve into the data and extrapolate information about safety, many people do not wish to spend the time and would rather have such efforts be automated. To meet this need, Crime HotSpot relies not just on the numerical count of crimes but also applies a subjective score to each crime according to that crime's category. By using this subjective scale, Crime HotSpot provides a heatmap that represents not just the number of crimes but also the relative safety of the area. With Crime HotSpot, the local shopping center no longer looks like a hot bed of crime but rather the safe family atmosphere it is. If, however, your local shopping center really is the epicenter of a super villain's evil empire, it will still look dangerous.

Not all people have the same wishes when it comes to how they gather information. Some may wish to delve into the dataset and make their own decisions. In Crime HotSpot, this is made possible by use of the attached analytics page. On this page, you can identify date and time ranges to narrow the focus of the crime study, allowing identification of the predominate crimes as well as when most crimes occur. Crime HotSpot is a robust application that provides meaningful information so that you can make the best use of the only tool that can help keep you safe … your own sound judgement.

WARNING

Crime HotSpot is for informational use only. There are no guarantees of safety. The only person responsible for your individual safety is <u>YOU</u>.

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2 Getting Started

(Thom Loftin, Editing: Dave Hall, Raphael J. Sandor)

Crime HotSpot has been designed to operate with most modern web browsers. Google Chrome is recommended as the browser of choice, as the application is based on Google technology. Due to this, testing during development has primarily been conducted in Chrome. Other browsers may yield unpredictable results. To access the Crime HotSpot application, use your preferred web browser to navigate to http://411silvers19-mgmt.cs.odu.edu:3000/#!/main.

3 Map Page

(Thom Loftin, Editing: Dave Hall)

Crime HotSpot will load to the Map Page shown in **Error! Reference source not found.** and **Error! Reference source not found.**. This is the main page of the application and connects to each of Crime HotSpot's other pages. Detailed descriptions of items of interest can be found by correlating the number on the item with the subheading number below.

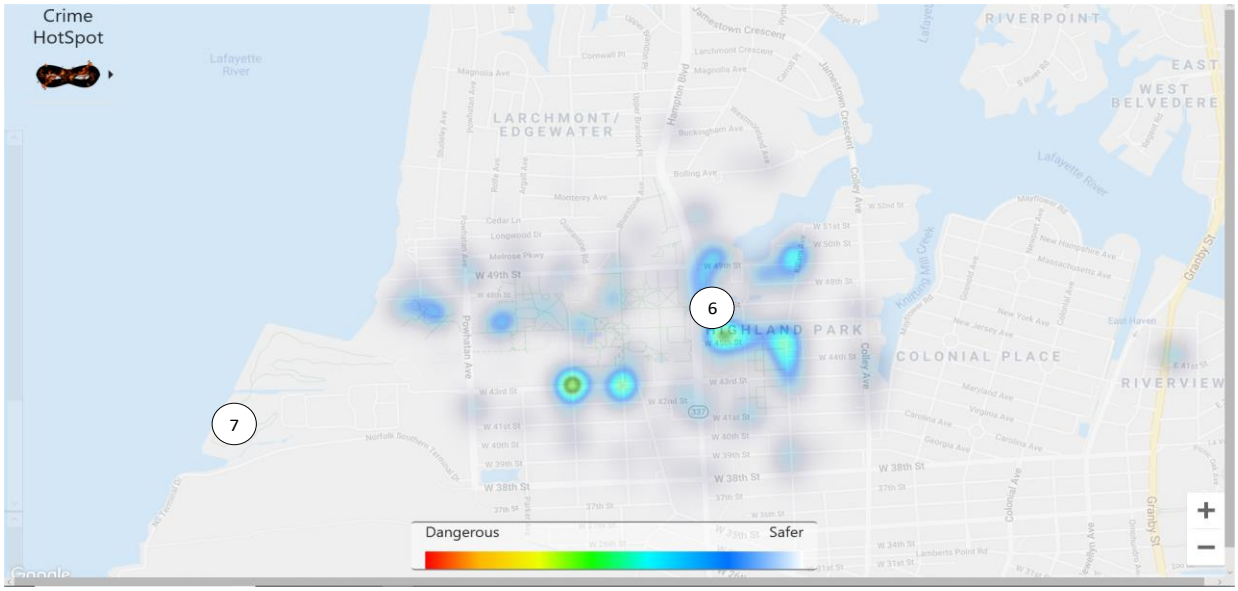

Figure 1: Map Page

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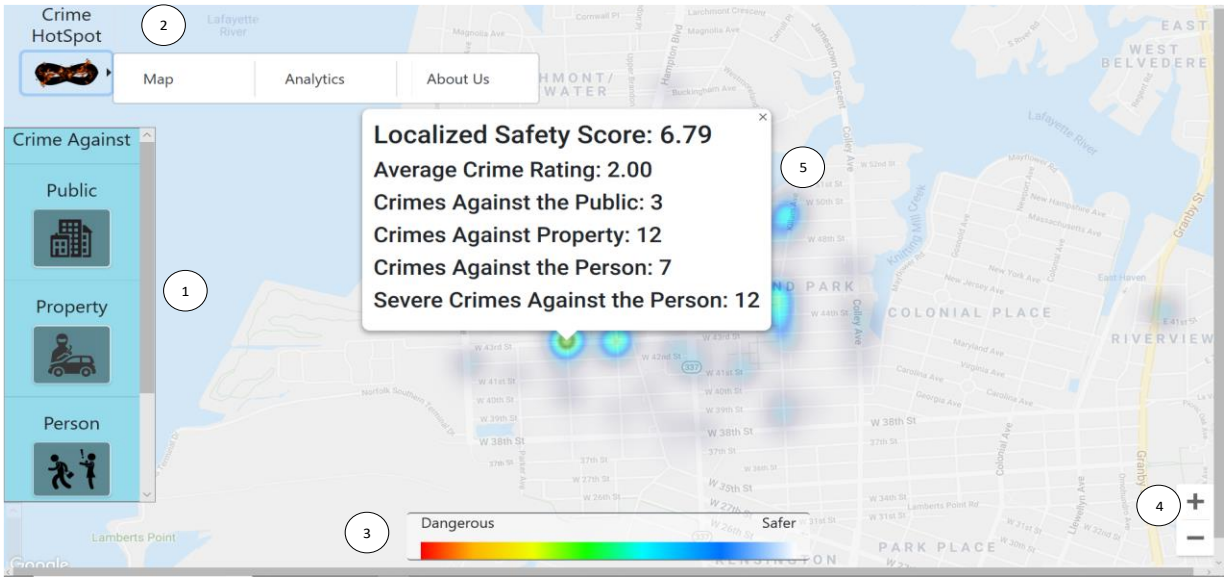

Figure 2: Map Page with Exploded View

3.1 Side Panel

(Thom Loftin, Editing: Dave Hall, Stephanie Zeil)

To access the Side Panel (number 1 on Figure 2), hover the pointer over the slider on the leftmost edge of the map. Once opened, the Side Panel displays four buttons labeled with the crime category each button controls. Clicking these buttons controls the crime category filters. As shown in Figure 3, the buttons have two states. When the filter is on, the button appears depressed and grey, and crimes in that category are displayed on the map and calculated into the Safety Score. When the filter is off, the button appears raised and white, and crimes in that category are not displayed or calculated.

Figure 3: Side Panel Buttons

3.2 Menu

(Thom Loftin, Editing: Dave Hall)

The Menu (number 2 on Figure 2) allows you to navigate to Crime HotSpot's other pages. Clicking on Analytics will take you to the **Error! Reference source not found.**. Clicking on About Us will take you to the Team Silver Home Page to learn about the processes and developers behind Crime HotSpot.

3.3 Color Scale

(Thom Loftin, Editing: Dave Hall, Stephanie Zeil)

In the lower, middle area of the Map Page is the Color Scale (number 3 on Figure 2). The color scale gives you a general idea of the safety level each color on the map represents. Colors on the dangerous side of the scale represent the most dangerous areas, and colors on the safer side represent areas that are generally safer. Colors on the heatmap radiate from crime locations. An absence of color indicates there is no data for that area. The lack of data is not an assurance of safety. Crime HotSpot is best used to augment your safety decisions; it cannot guarantee the safety of any area.

3.4 Zoom Buttons

(Thom Loftin, Editing: Dave Hall, Stephanie Zeil)

The zoom buttons (number 4 on Figure 2) can be used to alter the zoom level of the map. Clicking the button with the plus sign will zoom the map in. Clicking the button with the minus sign will zoom the map out. On many systems, the zoom functions can also be accomplished using mouse-wheel. The mouse wheel can be scrolled down to zoom out and scrolled up to zoom in. Both the zoom in and zoom out functions have limits set. The limit improves usability and protects the anonymity of the people involved in criminal events by preventing users from pinpointing event locations.

3.5 Click Function

(Thom Loftin, Editing: Dave Hall, Stephanie Zeil)

Clicking on the map activates the Click Function (number 5 on Figure 2). A textbox appears at the clicked location. This box provides statistics behind the color representation at that location.

The first statistic is the Safety Score. The Safety Score is a ten-point decimal score that represents the calculated safety of the area. As the number and severity of crimes in the area increase, so too does the score. The Safety Score is an estimate and should only be used as a reference to increase your safety awareness. Areas with a Safety Score of 0.00 are not necessarily safe. A value of 0.00 only indicates that no crime data affecting the area was found based on the current search filters and available dataset.

The second statistic is the average crime rating of the area. This statistic tells the user how dangerous any given crime is likely to be at that location. In areas more prone to violent crimes, the score will be elevated. Areas with crimes of less dangerous natures will display a lower score.

Finally, for each crime type, there is a count of criminal acts contributing to the scores presented for the location. Note that using the Side Panel filters changes the counts of the crimes and therefore also affects the Safety Score and average crime score.

3.6 Heatmap Overlay

(Thom Loftin, Editing: Dave Hall)

The heat map overlay (number 6 on Figure 1) shows the safety of an area based on the colors shown on the map. The **Error! Reference source not found.** should be referenced to determine the degree of danger that is calculated for the area. As you zoom in and out, the heatmap will adjust to match the position and scale of the map.

3.7 Map

(Thom Loftin, Editing: Dave Hall)

The map (number 7 on Figure 1) is the background of the Crime HotSpot web application. As the application is based on Google Maps, the controls are the same as those used to navigate standard Google Maps applications.

4 Analytics Page

(Thom Loftin, Kenneth Watson, Editing: Dave Hall)

The Analytics page presents statistical information about the crimes in an area via charts and graphs. The graphs show a breakdown of the types of crimes and the time of the day they are committed, relative to all crimes in that region. The Start Date-time and End Date-time fields let you adjust the date range of the statistics to only analyze crimes occurring within that date range. Details about each crime represented in the charts are listed at the top of the page. The Analytics Page serves as a powerful tool for analyzing the crimes in an area. Upon page load, it appears as shown in Figure *4*.

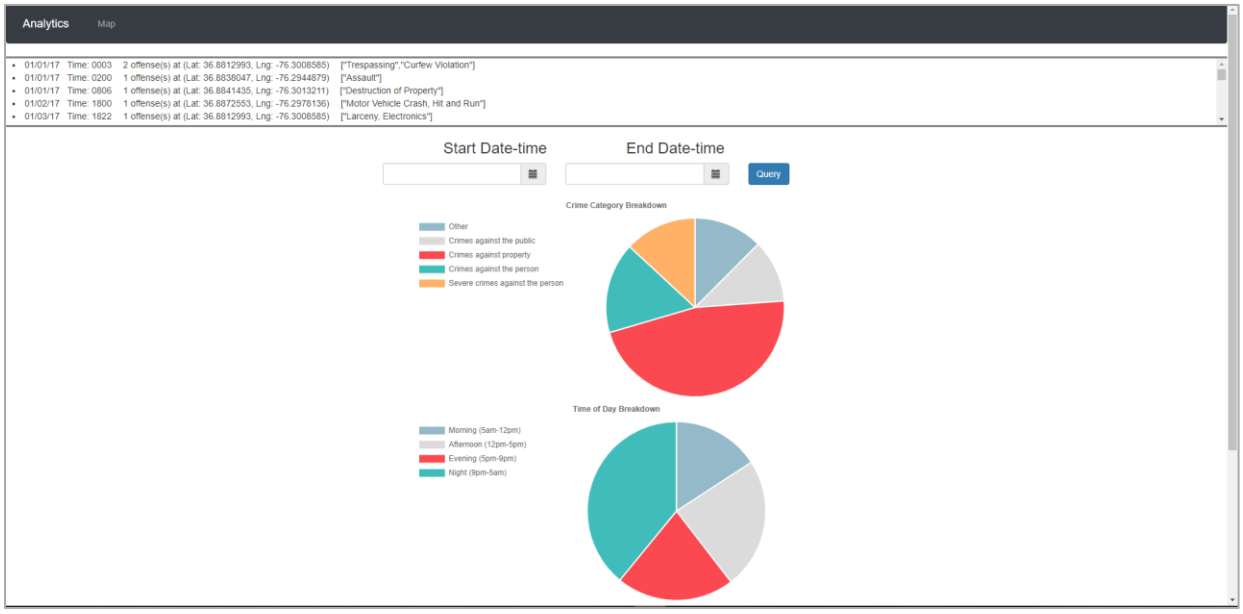

Figure 4: Analytics Page

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There are three charts available on the Analytics Page. Depending on your screen resolution and zoom level, scrolling may be necessary to reveal the third chart.

The three charts are as follows:

a. A pie chart breaking down the proportion of each crime category. The first four categories correspond to the crime category filters on the Map Page, and an "Other" category encompasses crimes that do not fit into a regular category, such as identity theft.
b. A pie chart displaying the proportion of crimes grouped by the general time of day they occurred. Crimes are grouped into one of four blocks of time: morning (5am-12pm), afternoon (12pm-5pm), evening (5pm-9pm), and night (9pm-5am).
c. A line chart showing the total crime counts for each day of the week. This is not an average, but instead a total sum of all crimes across the current dataset and date range.

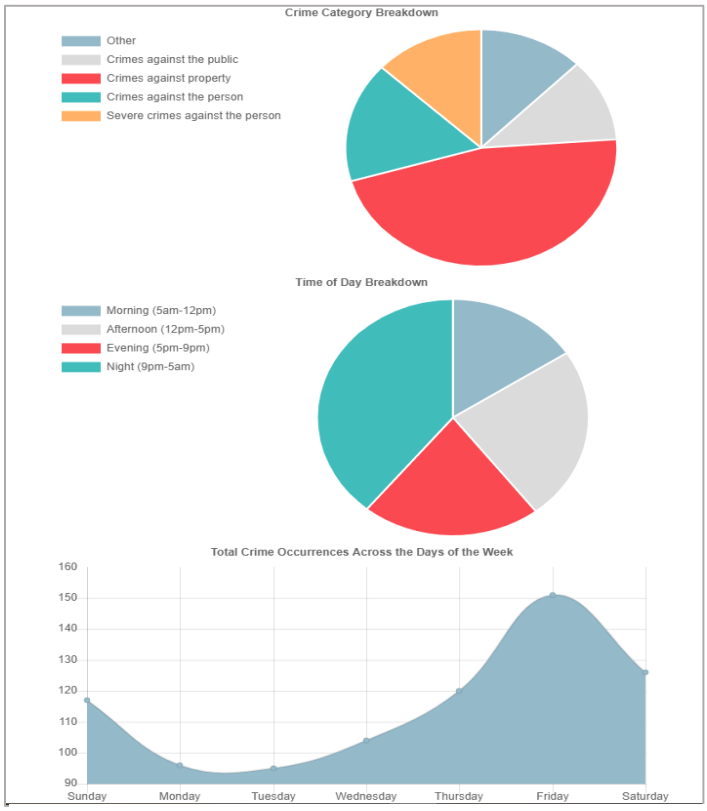

Figure 5: Three Analytics Charts

4.1 How to Use the Analytics Page

(Kenneth Watson, Editing: Dave Hall)

The primary interface includes two fields, "Start Date-time" and "End Date-time", where dates can be entered to filter crimes used in the three charts. The pie charts have additional interactive functionality detailed in section **4.1.2**. Crime report details are found above the date-time fields. To navigate back to the Crime HotSpot Map Page, click the word Map in the header at the top of the page.

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4.1.1 Changing the Date Range

(Kenneth Watson, Editing: Dave Hall)

By default, the Analytics charts reflect all crime records available for the overall area shown on the main Crime HotSpot map. To filter the crimes by date, enter a start date and end date in MM/DD/YYYY format. Specifying a time is optional. If a time is not specified, it will default to 12:00am. Dates can also be selected using the calendar widget (indicated by the calendar icon next to the date field). To apply the date filter, click the Query button. All three charts and the corresponding crime report details will update accordingly.

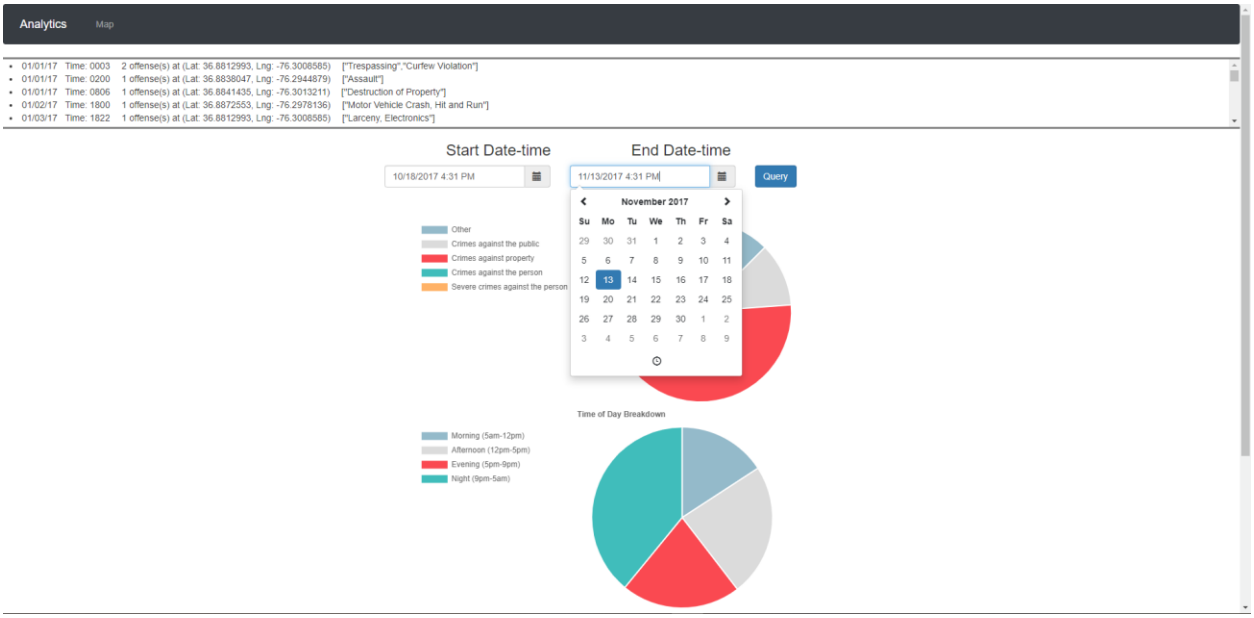

Figure 6: Selecting a Date

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4.1.2 Additional Features

(Kenneth Watson, Editing: Dave Hall)

Both pie charts are interactive and react to mouse clicks and mouse hovers. Hovering over any slice in the chart reveals the number of crimes that fall within the crime category. You can remove a chart category from consideration by clicking on the category in the chart legend.

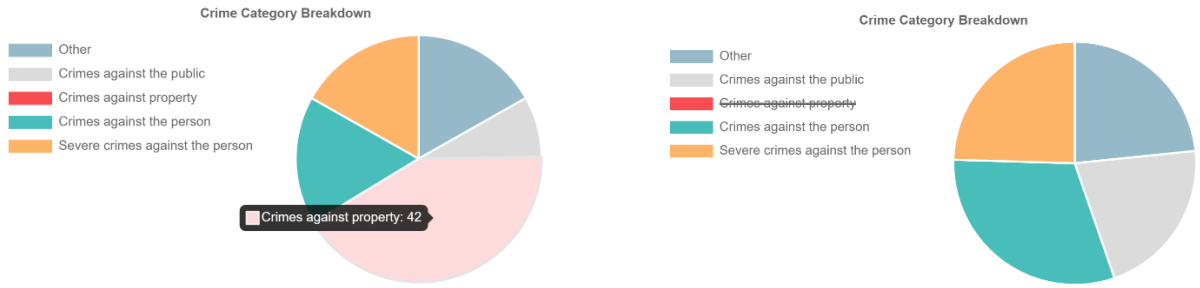

Figure 7: Pie Chart Hover and Removal of Categories

5 Key Terms

5.1 Safety Score

A measure of danger at a point on the map that is calculated based on the severity of nearby crimes, the times of those crimes, their distance from that point, length of time since the crime was committed, and the time of day and day of week that the crime was committed in relation to now.

5.2 Heatmap Overlay

A two-dimensional representation of data in which values are represented by colors. A simple heat map provides an immediate visual summary of information. More elaborate heat maps allow the viewer to understand complex data sets.