Community Maps – Analyze Interface

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The Community Maps **Analyze Interface** provides tools to identify crash hot spots based on historical trends and crash factors. These tools were developed to support law enforcement resource allocation but may also be used for generalized analysis of high frequency crash locations. This guide provides an overview of the Analyze Interface along with typical examples of its use.
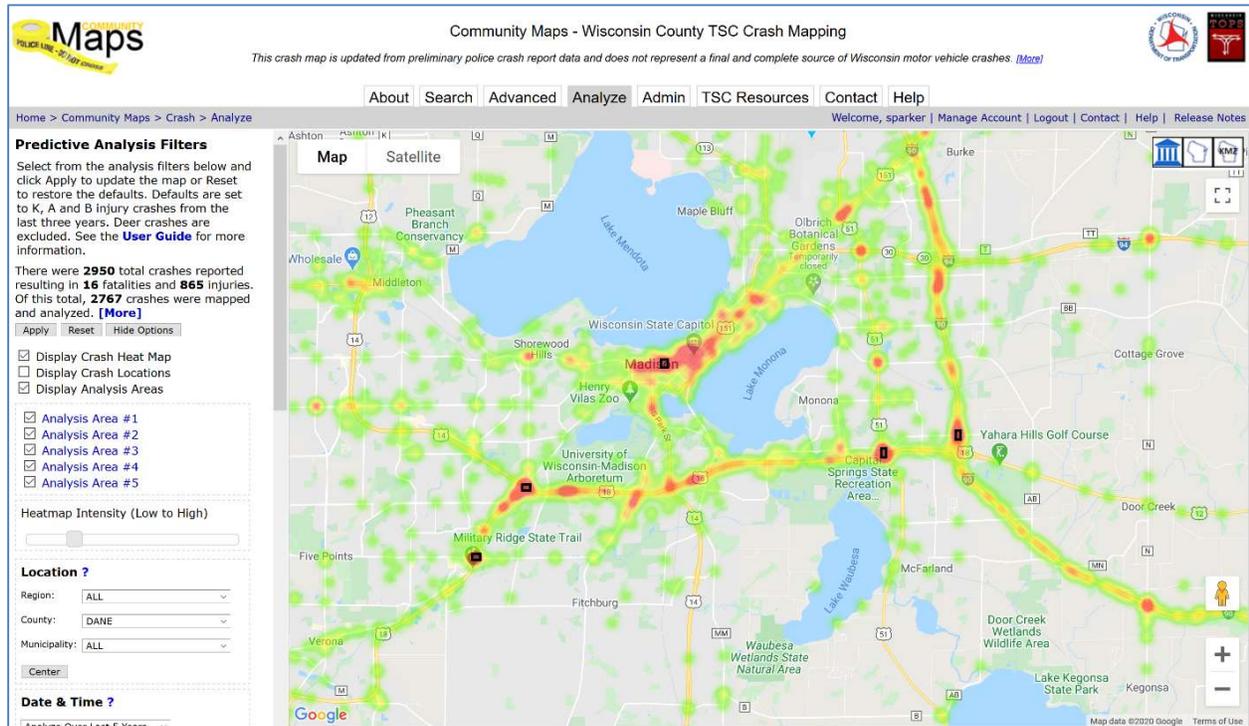
Figure 1. Community Maps Analyze Interface for Dane County CMV related crashes. The Crash Heat Map and Analysis Areas layers have been selected.

The Analyze Interface follows a similar design pattern as the Community Maps Basic and Advanced Search interfaces; selections from the left-side control panel determine the analysis results on the crash map at the right. Several selections, such as Location and Crash Severity, are common to all interfaces, whereas others, such as Date & Time, are customized for the Analyze Interface to streamline user interaction for law enforcement predictive analytics needs. Context sensitive help is available by clicking on the "?" icon with each side panel section.

Unlike Basic and Advanced Search, the Analyze Interface supports three map "layers" to represent the results of the crash analysis:

- Crash Heat Map – a color scale visualization that depicts areas of high crash concentration (i.e., hot spots) in red and areas of less concentration in green.

- Crash Locations – a point map of crash locations, similar to the Basic and Advanced search interfaces, color coded by crash injury severity.

- Analysis Areas – identifies rectangular areas of high crash frequency. The number and size of the analysis areas, along with other parameters, are configurable. See below.

The Analyze Interface is configured by default to include fatality (K), suspected serious injury (A) and suspected minor injury (B) crashes from the last three years. Deer, parking lot (PL), and private property (PP) crashes are excluded. Adjust the filters from the left-side control panel and click Apply to update the map or Reset to restore the defaults. It is possible to select / deselect one or more map layers at any time. The "Options" menu provides additional tuning parameters and functionality, described more fully in Example 2 and at the end of this Guide.

Example 1: Law Enforcement Predictive Resource Allocation

Identify locations in Dane County for high visibility enforcement (HVE) activities related to teen drivers.

Select the Crash Heat Map and Analysis Areas layers:

☑ Display Crash Heat Map
☐ Display Crash Locations
☑ Display Analysis Areas

Select Dane County from the Location section:

Location ?

Region:	All Regions ▼
County:	DANE ▼
Municipality:	Select Here ▼

Center Map | Clear Selection

Select the Teen Driver Flag:

Crash Flags ? Select **All** | **None**

☐ Alcohol Flag   ☐ Pedestrian Flag
☐ Bike Flag   ☐ Seat Belt Flag
☐ CMV Flag   ☐ Speed Flag
☐ Distracted Flag ☑ Teen Driver Flag
☐ Drug Flag   ☐ 65+ Driver Flag
☐ Motorcycle Flag ☐ Work Zone Flag

☑ Exclude Deer Crashes
☑ Exclude PL/PP Crashes

Accept the remaining defaults and click Apply. The system will display a crash Heat Map along with five "Analysis Areas" corresponding to high frequency occurrences of Teen Driver crashes.
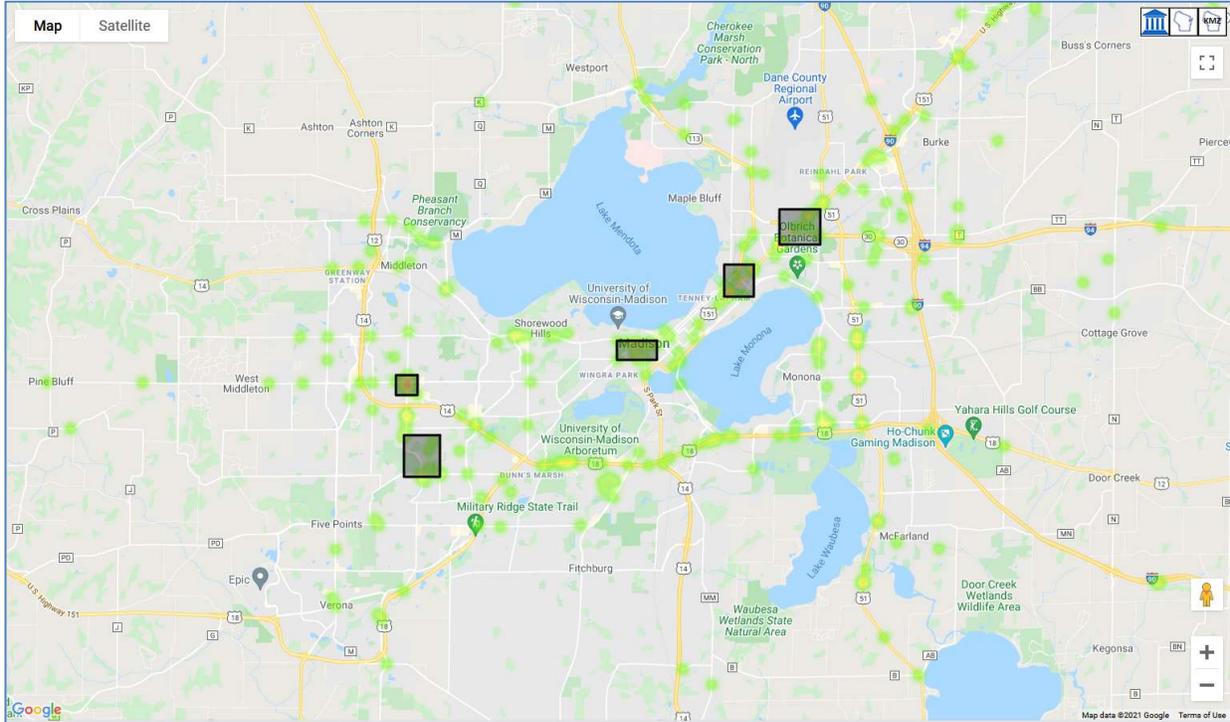
Explore the various Analysis Areas by clicking on the rectangular regions on the map (or on the resulting list of Analysis Areas in the left-side control panel) to display basic information and to zoom to a particular area. Turn on the Crash Locations layer to display the Teen Driver related crashes in that area.

☑ Display Crash Heat Map
☑ Display Crash Locations
☑ Display Analysis Areas

Analysis Area #1
MADISON (C)
Diagonal: 0.64 miles
Total Crashes: 9
• Teen Driver (9)
• 65+ Driver (2)
• Speed (1)
Zoom to Area | Download | Resize
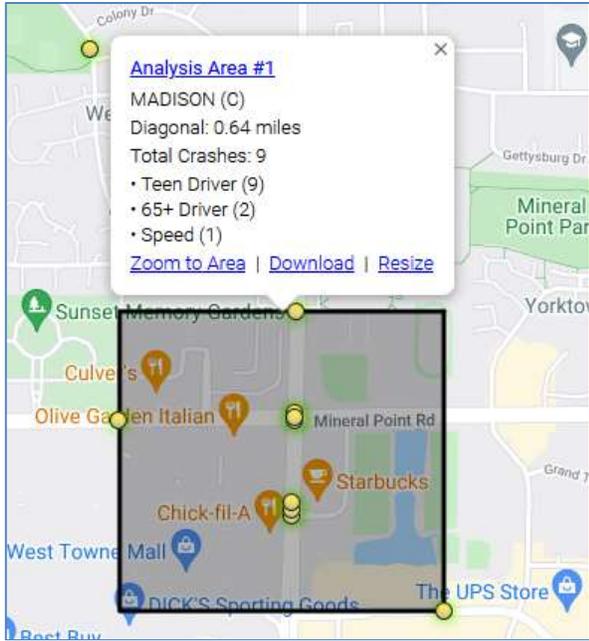
As an automated tool, there are benefits as well as limitations to the Analysis Areas detection algorithm. The current version of the tool attempts to find a best fit set of rectangular regions based on crash density considerations. In many cases, the tool may exclude nearby crashes from a given Analysis Area, or it may stretch an area to include a nearby crash that should not be considered part of the same hot spot. In general, the detection tool provides a starting point for crash hot spot identification and decision support subject to additional human judgment and considerations of the underlying sample crash data.

Example 2: Intersection Crash Hot Spot Ranking

Identify the top 10 intersection hot spots in the City of Oshkosh for 2018.

Select the Crash Heat Map and Analysis Areas layer:

☑ Display Crash Heat Map
☐ Display Crash Locations
☑ Display Analysis Areas

Select Winnebago County and the City of Oshkosh. Use the "Adjust Start and End Dates" feature to change the Analysis Period to January – December 2017. Deselect the crash severity filters to include all crash severities.

Location ?

Region: ALL

County: WINNEBAGO

Municipality: OSHKOSH (C), WINNEBAGO

[Center]

Date & Time ?

[Select Analysis Period]

[Restrict to Date Interval]

[Restrict to Day of Week]

[Restrict to Time of Day]

Additional Date Filters

Adjust Start and End Dates:

Begin Year/Month: 2018   JAN
End Year/Month: 2018   DEC

Restrict to Selected Months:

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
J   F   M   A   M   J   J   A   S   O   N   D

Crash Severity

☐ (K) Fatality
☐ (A) Suspected Serious Injury
☐ (B) Suspected Minor Injury
☐ (C) Possible Injury
☐ (O) No Apparent Injury

Click the Options button to expand the left-side control panel. Change the Total Analysis Areas to 10 and Min Radius to .03 miles.

Accept the remaining defaults and click Apply to generate the ten Analysis Areas.
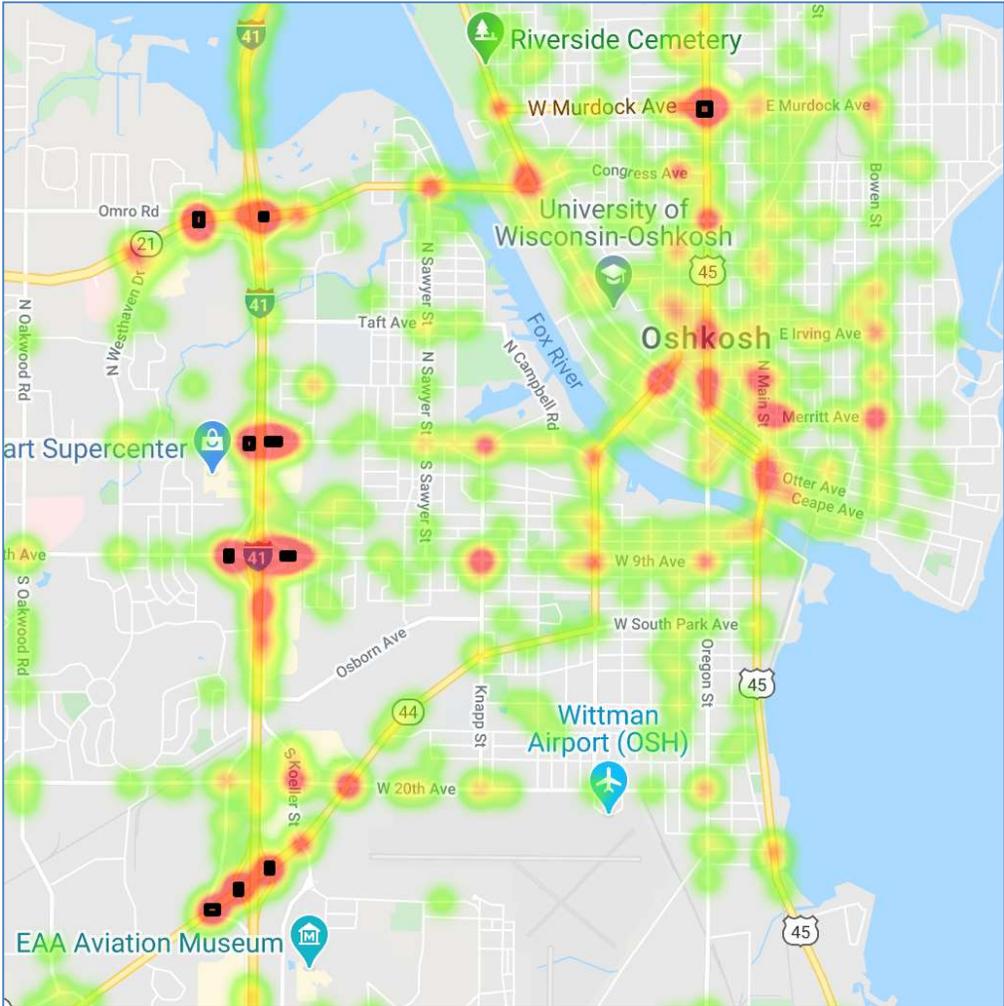
The Analysis Areas are ranked by crash density in the left-side control panel.

The checkboxes may be used to hide/show the rectangular Analysis Area regions on the map. Explore the various Analysis Areas by clicking on the list elements or on the rectangular regions to display basic information and to zoom to a specific area. Turn on the Crash Locations layer to display the crashes in that area.
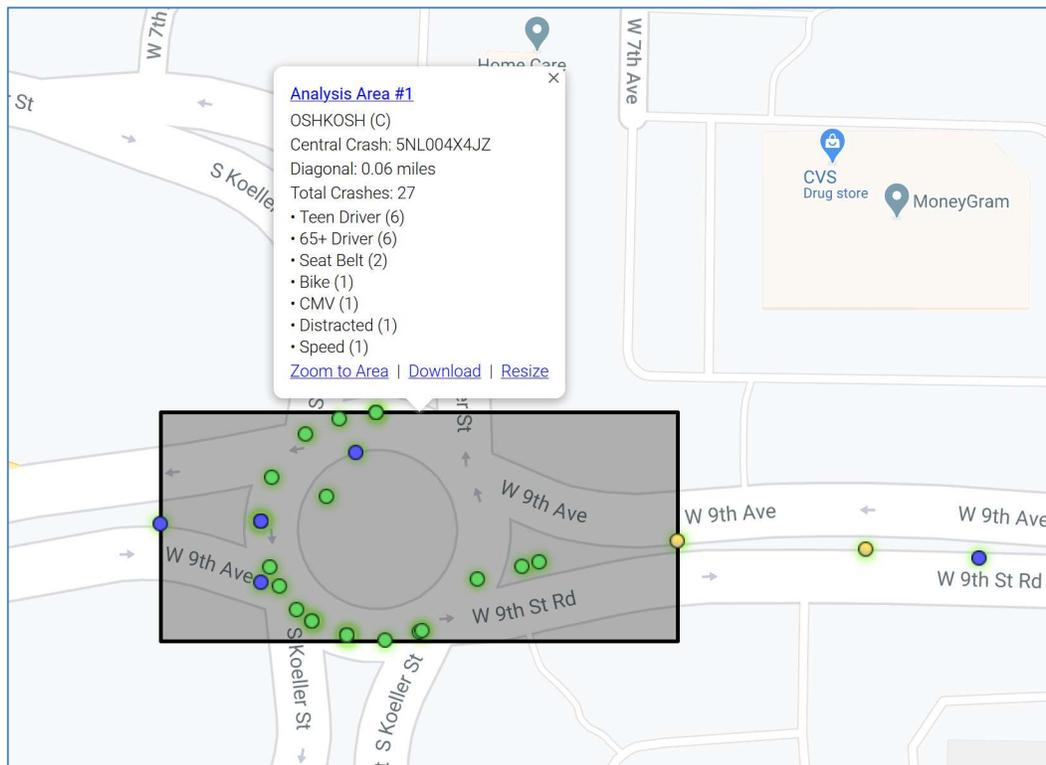
Note the Analysis Area popup window includes additional links to download the list of crashes for that area and/or to manually resize the rectangular region to include or exclude crashes based on additional considerations. Resizing a rectangular region window will automatically recompute the statistics for that Analysis Area but will not change its original rank.

Configuring the Analysis Areas

The following provides a quick reference for the Additional Options menu which may be used to configure the Analysis Areas.

- Total Analysis Areas – Defines the maximum number of analysis areas that will be generated by the system. Depending on data availability for the given filter selections, fewer analysis areas may be returned.

- Minimum Crashes – Defines the minimum number of crashes per Analysis Area. The "Auto" setting provides a logarithmic scale based on the total number of crashes mapped by the query.

- Min Radius (Miles) – Defines the minimum search radius in miles used by the detection algorithm for evaluating crash density over a set of candidate "neighborhoods." Smaller radius values typically lead to smaller Analysis Areas.

- Confidence Level – Controls which Analysis Areas to include in the result based on a test of statistical significance, as determined by an Analysis Area's computed *p-value*. Higher confidence levels are more restrictive and require lower *p-values*. Click on the top link of an Analysis Area infoWindow to view its *z-score, p-value,* and other computed information.

- Merge Factor – Controls the sensitivity when combining overlapping crash neighborhoods to construct the Analysis Areas. The default value is suited for most cases. Higher numbers are less sensitive and lead to larger Analysis Areas. Select None to prevent all merging.

- Analysis Sample Size – Limits the number of crashes that are used by the Analysis Areas algorithm in order to maintain acceptable system performance.

- General Query Limit – Limits the number of crashes returned by the Heat Map and Crash Locations layers in order to maintain acceptable system performance.

Questions and Additional Information

For questions about the Analyze Interface, email the UW TOPS Lab at community-maps@topslab.wisc.edu or see the Community Maps Contact Information page.