Spatial Data Management Considerations for Crash Mapping and Analysis in Wisconsin

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Presentation Outline

- Wisconsin Crash Mapping History & Overview
- Existing Crash Mapping Applications
- CMAA Enhancements and Roadmap
- Spatial Data Management Considerations
Crash Mapping History: 1998-2010

Annual statewide shapefile of manually coded highway crashes with respect to the WisDOT State Trunk Network (STN) LRS.
Crash Mapping History: 2011-2016

Highway and local road crashes combined onto a single LRS network (WISLR). Monthly updates based on combination of manual and automated processing.
Crash Mapping History: 2011-2016

Crashes were still represented with respect to pre-ARNOLD centerline geometry.
Crash map is updated nightly from geocoded locations on the Wisconsin DT4000 crash report. Improved accuracy, completeness, and timeliness.
Crash Mapping Overview: Data Flow

High level data flow with respect to UW TOPS Lab WisTransPortal supported crash mapping and analysis applications.
Crash Mapping Overview: TraCS TLT

The TraCS Location Tool (TLT) was deployed in 2017 with the new Wisconsin DT4000 Police Crash Report and provides law enforcement agencies with a method to report crashes with geocoded latitude/longitude and LRS locations. Uses WISLR LRS as a base map.
Crash Mapping Overview: RP Coding

Highway crashes are hand coded to WisDOT State Trunk Network (STN) LRS locations through the Crash Database and Resolve System using STN Reference Points (RP Coding).
Crash Mapping Overview: WisTransPortal

The UW TOPS Lab WisTransPortal system serves as a “data hub” to support multiple end user crash mapping and analysis applications.
Applications: WisTransPortal Crash Map

WisTransPortal crash data query results page, tabular view.
Applications: WisTransPortal Crash Map

WisTransPortal WISLR crash map, statewide view.

The WISLR crash map is generated by TOPS Lab on behalf of the Wisconsin Department of Transportation for research and planning purposes. Any other use, while not prohibited, is the sole responsibility of the user.

The WISLR crash map contains Wisconsin police reported crashes since 2005. The map is updated on a monthly basis.

This map includes final 2017 crash data as of July 17, 2018. 2018 crash data is preliminary.

See the About Page for important information about this data source.

Download Selected Crashes (CSV)
Applications: WisTransPortal Crash Map

WisTransPortal WISLR crash map, higher zoom levels.
Applications: Community Maps

Community Maps - Wisconsin County TSC Crash Mapping

This crash map is updated from preliminary police crash report data and does not represent a final and complete source of Wisconsin motor vehicle crashes. [More]

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Home > Community Maps > Crash > Search

About | Search | Advanced | Analyze | Admin | TSC Resources | Contact | Help

Search Input
- FATALITY: Injury (A) Injury (B) Injury (C)
- Property Damage

Select the form below to filter the crash map based on high level crash attributes. Click Apply to apply your filters or Reset to go back to the default settings.

There are 630 of 637 total crashes displayed. [More]

Apply | Reset

Counties
- ALL
- Center

Date Range
- Begin Year/Month: 2019
- End Year/Month: 2019

Crash Severity
- Clear Selected
- (K) Fatality
- (A) Suspected Serious Injury
- (B) Suspected Minor Injury
- (C) Possible Injury
- (O) No Apparent Injury

Crash Flags
- Alcohol Flag
- Seat Belt Flag
- Bike Flag
- Speed Flag
- Drug Flag
- Teen Driver Flag
- Motorcycle Flag
- Work Zone Flag
- Pedestrian Flag

Combine crash flags using: AND OR

Deer Flag

County: CHIPPEWA
Municipality: EAGLE POINT (Town)
On: 1/7
At: 215TH ST
Date: 01/19/2019
Severity: INJURY (A)
Total Fatalities: 0
Total Injuries: 3
Flag(s): Alcohol

Minneapolis
St Paul

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Map data ©2019 Google Terms of Use
Applications: LEA Predictive Analytics
Applications: Safety Certification Mapping
Applications: High Risk Rural Roads
Applications: Regional Planning


Adjust the filters to refine the results in the maps. Only one point is shown per accident regardless of the number of individuals involved. When multiple modes of travel were involved in the crash, Pedestrian will be assigned before Bicyclist which will be assigned before Motorist. As you pan and zoom the graphs will update to reflect the collisions in current map extent.

Mode
- Bicyclist
- Motorist
- Pedestrian

Severity
- Incapacitating
- Fatal
- Non-Incapacitating
- Possible Injury

Factors
- Alcohol
- Construction Zone

Highway Name
None

Street Name
None

Accident Type
None

Road Conditions
None

Total Crashes
1,407

Hour of Day

Day of Week

Month of Year

Year

Earl, HERC, Germin, FAO, USGS, EPA, NPS
CMAA Enhancements and Roadmap

- Near term crash data quality improvements
- Near term crash mapping application improvements
- Roadmap planning for future CMAA spatial data management:
  - Identify key stakeholders
  - Needs assessment / use cases
  - Spatial data models and architectures to support those use cases
Near Term Data Requirements

- Display “real-world” crash coordinates from the DT4000 police crash report
- Update the crash map on a nightly basis with the other DT4000 ETL processes
- Use the same data source consistently across mapping applications
- Continue to manage STN and WISLR coded crash locations for LRS based analysis
- Automate the STN “RP” crash coding process
Near Term Application Requirements

- Replace locally hosted base map with cloud-based map services
- Replace ESRI WebADF components with a modern web mapping framework
- Incorporate the new, nightly crash data source (DT4000)
- Support complex, multi-year crash queries (display minimally five years of data on the map)
- Support complex selections (free form polygon, buffered roadway)
- Support a service based architecture
- Use out of the box tools to the extent possible
Crash Mapping “As Is” Diagram

1. Submit Query Parameters
2. Retrieve Data JDBC / SQL
3. Send Tabular Results
4. Pass SQL Query to App
5. Retrieve Data JDBC / SQL
6a. Send Results Web Graphics Layer
6b. Cached Map Service
7. Map Controls AJAX

* WISLR Crash Map controls are a mix of customized and out of the box JavaScripts.
Crash Mapping “Proposed” Diagram

- **Web Browser**
  - CMAA Crash Map
    - JavaScript OpenLayers
  - Map Picker
    - Retrieve Crashes by Query ID
    - Retrieve Info by Crash Number

- **Tomcat Server**
  - Crash Data Facility
    - Java Struts
  - Save Query

- **ArcGIS Server**
  - Geoprocessing Services
    - Python
  - Retrieve Data
    - cx_oracle

- **Oracle Database**
  - Crash Data & Location Tables

- **ESRI Cloud**
  - ESRI Base Maps

- **Future CMAA Applications**
Spatial Data Management Considerations

- Need to manage "real-world" and LRS network crash locations
  - Wisconsin has three basic sources: real-world, WISLR, STN
  - Multiple sources of crash data confusing to users
  - Crash map dataset != crash analysis dataset

- Work towards an authoritative crash mapping data source
  - Enabled through service based architecture
  - How to address errors in the crash data

- Source data management
  - Managed in a relational database (Oracle)
  - Spatially enabled through ESRI geoprocessing services
Questions?

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