



Creating a Tool to Evaluate MMUCC Compatibility of State Crash Reports

Neal Paschal

Graduate Research Assistant, Dept. of Civil, Const., and Env. Engineering, The University of Alabama
www.gisresearch.ua.edu



CENTER for ADVANCED PUBLIC SAFETY

Introduction

- The Model Minimum Uniform Crash Criteria was first created to help set a standardization of crash report data between different States, as states may collect and report on different information.
- In the past, federal grant money has been tied with a certain level of MMUCC compatibility or proof that a State is in the process of becoming more compatible.
- MMUCC currently contains 77 main elements to be collected at the scene, and 33 elements to be derived or linked to later.

Objectives

- Create a tool that can:
 - Determine MMUCC compatibility of a crash report if a State's Data Dictionary is uploaded.
 - Generate a list of what items are missing to increase MMUCC compatibility.
 - Let users select items they know to map, but weren't selected by the tool. These items are saved by the tool for future use to help it "learn" because nomenclature may vary state to state.

Methodology

A data dictionary (DD) is uploaded for the tool to use. The user then selects from it two columns for the tool to use: one for the main elements (Ex. Weather Conditions) and one for the main attributes of each element (Ex. Windy, rainy, snow, etc.).

Preliminary mapping for each MMUCC element is done automatically to see if it has a corresponding match in the data dictionary. If there is a match at the element level, it next tries to match the attributes for that element with what is in the DD.

If there are elements/attributes that did not turn up a match result, the user has the option to select elements/attributes they know to match. The Tool then saves those selected items in a repository to be used as matching criteria for future elements.

For example, a data dictionary of the Wisconsin crash report was uploaded and had preliminary matching results shown here:

Elements Mappability % (attributes not included)			
Crash	Vehicle	Person	Linkage
63.16%	83.61%	70.04%	77.88%
Total Score			
82.39	109	75.59%	

Overall Mappability % (attributes included)			
Crash	Vehicle	Person	Linkage
48.18%	58.15%	48.87%	55.78%
Total Score			
58.69	109	53.84%	

MMUCC elements that did not initially map due to different wording or nomenclature were then selected from the DD and added to the repository.

After, the new mappability score is shown for Wisconsin:

Elements Mappability % (attributes not included)			
Crash	Vehicle	Person	Linkage
89.47%	94.44%	97.56%	81.82%
Total Score			
99.65	109	91.42%	

Overall Mappability % (attributes included)			
Crash	Vehicle	Person	Linkage
57.63%	63.98%	59.60%	56.68%
Total Score			
65.54	109	60.13%	

Identifier	MMUCC Element	MMUCC Attribute	Data Dictionary Corresponding Element	Match?	Element % matching	Data Dictionary corresponding Attribute	Match?	Overall elements
C10	Source of Information	Law Enforcement Agency Identifier	Enforcement Agency Name	1	100.0%		100	0
		Motorist	Enforcement Agency Name	1			100	0
C11	Weather Conditions	Clear	Weather Conditions	1	100.0%	Clear	1	1
		Cloudy	Weather Conditions	1		Cloudy	1	1
		Fog, Smog, Smoke	Weather Conditions	1			100	0
		Rain	Weather Conditions	1		Rain	1	1
		Sleet or Hail	Weather Conditions	1		Sleet/Hail	1	1
		Freezing Rain or Freezing Drizzle	Weather Conditions	1		Freezing Rain or Freezing Drizzle	1	1
		Snow	Weather Conditions	1		Snow	1	1
		Blowing Snow	Weather Conditions	1		Blowing Snow	1	1
		Severe Crosswinds	Weather Conditions	1		Severe Winds	1	1
		Blowing Sand, Soil, Dirt	Weather Conditions	1		Blowing Sand, Soil, Dirt	1	1
		Other	Weather Conditions	1		Other	1	1
		Unknown	Weather Conditions	1		Unknown	1	1
C12	Light Condition	Daylight	Light Condition	1	100.0%	Daylight	1	1
		Dawn	Light Condition	1		Dawn	1	1
		Dusk	Light Condition	1		Dusk	1	1
		Dark-Lighted	Light Condition	1		Dark/Lighted	1	1
		Dark-Not Lighted	Light Condition	1			100	0
		Dark-Unknown Lighting	Light Condition	1		Dark-Unknown Lighting	1	1
		Other	Light Condition	1			100	0
		Unknown	Light Condition	1			100	0

A data dictionary for the state of Alabama was uploaded and then mapped with access to the user selected elements from Wisconsin's DD. Afterwards, elements that still turned up without a match were selected from Alabama's DD and added to the tool's memory bank.

Wisconsin's data dictionary was run again a second time, but now using the saved words from Alabama as well.

Results and Conclusion

MMUCC element	MMUCC element	MMUCC attribute
C9	Manner of Crash/Collision Impact	Angle
C10	Source of Information	Law Enforcement Agency Identifier
C10	Source of Information	Motorist
C11	Weather Conditions	Fog, Smog, Smoke
V8	Motor Vehicle Body Type Category	All Terrain Vehicle (ATV)
V8	Motor Vehicle Body Type Category	Other Light Trucks (10,000 lbs GVWR or less)
V8	Motor Vehicle Body Type Category	Medium/Heavy Trucks (more than 10,000 lbs GVWR)
P9	Air Bag Deployed	Not Deployed
P9	Air Bag Deployed	Deployment Unknown
P10	Ejection	Ejected, Partially
P10	Ejection	Ejected, Totally
P12	Driver License Number, Class, CDL and Endorsements**	License Number
P12	Driver License Number, Class, CDL and Endorsements**	Class

The tool generates a report afterwards listing which MMUCC items are missing from the data dictionary and did not map, and can be added to increase MMUCC compliance.

After running the Wisconsin DD through the tool again using the saved words from Alabama also, the overall mappability still improved. This shows that as more data dictionaries are uploaded and more terminology that different states use saved in the tool's repository, it becomes more accurate just by being used.

Elements Mappability % (attributes not included)			
Crash	Vehicle	Person	Linkage
89.47%	98.61%	95.38%	81.82%
Total Score			
100.29	109	92.01%	

Overall Mappability % (attributes included)			
Crash	Vehicle	Person	Linkage
57.63%	67.31%	59.60%	56.68%
Total Score			
66.54	109	61.04%	

Future Work

- Upload more Data Dictionaries to create a bigger, more knowledgeable memory bank
- Make attribute-element matching more consistent and accurate
- Publish tool in a web format to be easily available for use to anyone with access

Acknowledgements

- Dr. Andrew Graettinger, Professor, UA
- The Center for Advanced Public Safety at UA
- Alabama Department of Transportation
- Wisconsin Traffic Safety and Operations Lab