

A Dynamically Configurable Network-Scanning Tool for the Spatial Cluster Analysis of Linear Network Feature Corridors

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ABSTRACT

Many current state-of-the-practice crash analysis methodologies designed for crash clustering analysis are limited by several key data topology factors. These factors are products of limited analysis software capabilities and data production and maintenance methods and do not lend themselves well to producing objectively comparable corridor ranking results.

This research wishes to address the issues associated with statically segmented spatial network analysis. It is expected that a dynamic linear feature of homogeneous length and capable of 'walking' a vector-based network topology at discreet increments would produce analysis results that are more objectively comparable and therefore yield better informed safety improvement decision-making.

To test this hypothesis, a software tool implementing the aforementioned behaviors is being developed. Whereas similar tools have been previously developed, it is anticipated that user interface design and the greater amount of analyst interaction afforded by the software architecture will further advance the state of the art in this arena. In addition, this research eventually intends to explore the potential benefits of coupling this type of tool with pattern-recognition software such as Artificial Neural Networks for spatially contextual, dynamic, and graphically interactive data-mining operations.

As this research is in its early stages, the focus of this submittal will be on the functional design and desired capabilities of the proposed tool. In addition, a real-time analysis using a prototype implementation will be performed and the results discussed. Any limitations and obstacles relating to the hardware, software, and data encountered during the research and development process will also be presented. Finally, the submittal concludes by posing critical questions yet to be addressed by research such as the statistical relevance of analysis results and their sensitivity to key analysis configuration parameters such as test feature-length, step increment, and spatial selection distance.

This submittal will potentially be of interest to the transportation safety, GIS, or software engineering professional.

Key words: corridors—crashes—network