

1.1.3 A Sign of the Times? Metro Nashville's Automated Sign Inventory

Presenter

Clifton Ogden
Civic Engineering & Information Technologies
ogdenco@civicinc.com

Co-Presenter

Dr. James Tsai
Georgia Tech University

Due to the mandates imposed on Cities and States by the U.S. Department of Transportation and the Federal Highway Administration to perform regular inspections on all traffic control signs to ensure that they meet the current guidelines set forth by the Manual on Uniform Traffic Control Devices (MUTCD), Metro Nashville utilized automated image recognition technology to produce an asset inventory and GIS dataset for all existing signs in Nashville & Davidson County.

The unified Metropolitan Government of Nashville and Davidson County services approximately 600,000 residents over a 526.1 square mile service area. Most cities the size of Nashville have thousands of signs on their roadways. The cost to inventory a city of this size has been estimated to be over \$500,000. Due to the image recognition algorithms developed by professors and students from the Georgia Institute of Technology, the ability to extract standard signs from digital images has greatly reduced the cost to produce an asset inventory of traffic signs.

Without an adequate sign inventory, cities cannot perform asset management, forecast routine maintenance, maintain adequate inventories nor meet the requirements set forth by the MUTCD. All signs deteriorate and are often damaged, stolen or defaced creating legal problems for agencies if not addressed in a timely manner. In addition, pending revisions to the MUTCD in regards to sign performance will heavily increase the need for a sign inventory.

Processing digital images of the roadway by applying automated image recognition is not 100 percent effective. However, image recognition can determine with a high level of confidence which digital images contain a sign assets. For instance, out of a sample of 20,000 images, approximately 6,000 images may contain sign features. Out of these 6,000 images, the algorithm would be able to determine the type of sign and inscription for 60% (or 3,600) of the images. This would leave 2,400 images out of 20,000 images that would require manual review. This results in an 88% reduction in the manual effort required to review and extract inventory data from the original 20,000 images. For images that cannot be processed by automated means, such images turned over to the agency for manual review. The agency will review the remaining images and populate the sign inventory database until complete.

The data extracted from the digital images is a snapshot for an asset group that literally changes daily through new installs, modification and repairs. To keep the inventory current and reliable, continued maintenance of the inventory must be integral to the agencies work process. Proper polices and tools and database rules must be implemented on the front-end to effectively maintain the asset inventory and keep the new dataset from growing outdated from day is it completed.