A DATA STORAGE AND RETRIEVAL MODEL FOR LOUISIANA TRAFFIC OPERATIONS DATA

Summary of Report Number 297

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INTRODUCTION

The type and amount of data managed by DOTD are huge. Examples include sign inventories, traffic signal controller timings, etc. These data have several uses including traffic engineering studies and highway safety analyses. Presently, however, no shared indexing or archiving model for engineering reports and data is available, making the data retrieval process labor intensive and difficult. Of particular interest is the development of a geographic computer indexing model and associated procedures that could be distributed to district traffic engineers on a floppy disk, CD-ROM, or through direct network connections. Such an indexing model is quickly becoming an urgent need in Louisiana due to increasing regulations and liability considerations. In addition, developing a capability for retrieving historical data and reports efficiently could provide DOTD with a tool for generating management reports and statistics.

OBJECTIVES

The overall goal of this research study was to develop a prototype computer-based indexing model for traffic operations data in DOTD. Data from East Baton Rouge Parish were used as a case study.

METHODOLOGY

Extraction of State Road Network

The network of state maintained roads was retrieved from the geographic database developed for the Statewide Intermodal Transportation Planning Project. All roads in the highway network map were represented by single strings (sets of connected straight lines) following the Control Section-Log Mile model. All strings were linked to an attribute table. A map containing parish boundaries, names, and codes was also retrieved from the intermodal planning database. The parish code graphical feature was linked to an attribute table.

Development of Geographic Referencing Model

A geographic referencing scheme that allowed for the representation of point and linear features in the database was developed. With the highway network map in the background, all signalized intersections were located as points in a design file and then linked to an attribute table. Each point was assigned the same Traffic Signal Inventory (TSI) code as the one contained in DOTD records.

Engineering Report Database Schema

The geographic referencing scheme described above provided the foundation for a database to index engineering reports and data. This database is composed of six tables that summarize the engineering report production process.

Paper Cover Form and Data Entry and Query Forms

A paper form was developed to facilitate data extraction from existing traffic engineering reports. A computerized version of this form was developed to assist in the process of database population. Another form was also developed to perform a variety of queries on the database.

Engineering Report Database Population

Entries for traffic operations engineering reports produced by DOTD in East Baton Rouge Parish for the past 10 years were recorded.

Traffic Signal Inventory and Timing Relational Database

A basic model for traffic signal inventory and timing data was developed to provide insight regarding the configuration of a more comprehensive database structure. This basic model contains intersection geometry, route names and relative position, phases, speed limits, and sign inventory data.

QUERIES

Two types of queries are possible with the geographic database: through graphical features and through attribute tables. In the first case, queries are based on spatial relationships affecting both graphical features and attribute tables and require the use of the spatial analysis capabilities of the geographical information systems (GIS). In the second case, queries are based on relationships between the attribute tables only and, therefore, do not require the use of the GIS. However, a database package is required. This kind of query is particularly suitable for PC's in which a GIS package has not been installed or that is used mainly for other purposes such as document production and tracking.

CONCLUSIONS

A prototype computer-based indexing model for traffic operations data in DOTD was developed. This model was based on a procedure to link signalized intersections and road segments in a GIS environment. The prototype engineering report database developed in this project covers data from East Baton Rouge Parish for the past 10 years. A total of 1,146 entries, including engineering studies, inspection reports, Chief Engineers' orders, and others, were created.

A paper form was devised to facilitate the extraction of engineering report data from existing reports. A computerized version of this form was developed to assist in data entry. A query form was also developed for engineering data retrieving purposes. These forms will constitute the basis for a series of forms to allow users to communicate effectively with the database.

It is envisioned that the paper form (or a modified version of it) will constitute the cover page of all engineering reports. With the availability of powerful word processors, it is actually possible to develop complete document forms in which the cover form will be incorporated as an integral part.