Research Project

04-1SS

C a p s u l e

Technology Transfer Program

LTRC

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Urban Data Warehouse / Data Mining Component for ITS: Statewide Planning Phase

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LTRC

Louisiana Transportation Research Center

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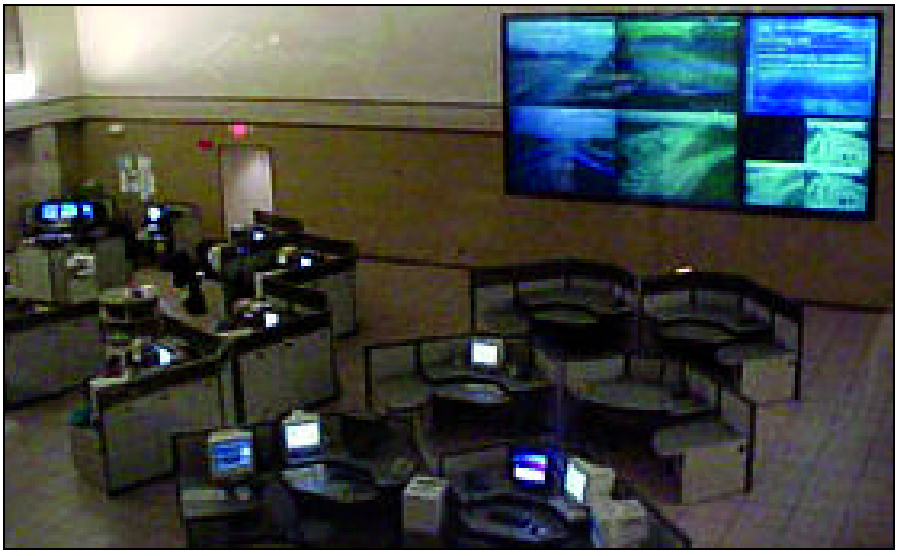
Problem

Intelligent transportation systems (ITS) are deployed to improve existing transportation applications. The DOTD Baton Rouge Advanced Traffic Management and Emergency Operations Center (ATM/EOC, also known as TMC) is currently using the Management Information System for Transportation (MIST) to administer its freeways. Independent of the DOTD TMC, the City of Baton Rouge runs an arterial management ITS.

To most effectively operate these ITS services, it is important to collect, integrate, and warehouse available data and procedures to draw maximum benefit from the employed systems. This data warehousing / data mining problem consists of 1) gathering, understanding, and unifying existing data sets and legacy systems that are important to the performance of ITS functions, 2) proposing mechanisms for automatically refreshing warehouse information, and 3) providing functionality that assists planners, emergency personnel, and motorists.

This research will attempt to offer the best solution(s) for warehousing ITS information for Baton Rouge. Ultimately, regional TMCs in New Orleans, Lafayette, and Shreveport



Aerial view of the communications floor at Baton Rouge ATM/EOC

will be connected to the Baton Rouge TMC. The integrated system is expected to provide benefits that are greater than those obtained from the individual systems.

Objective

The primary objective of this research is to summarize the best possible solutions for ITS integration in Baton Rouge, providing a framework for a statewide data warehouse and data mining system. To accomplish this objective, the following steps are proposed:

1) Identify all potential sources of transportation data that can be integrated into a centralized data warehouse in Baton Rouge.

2) Identify issues related to data accuracy, timeliness, resolution, and other attributes for each candidate source.

3) Identify anticipated needs of travelers, agencies, and researchers with respect to the proposed warehouse.

4) Devise a suitable data warehouse system that integrates data from all possible sources and meets the needs of all interested entities.

5) Provide an implementable warehouse system design / architecture, potential scalability issues, and marketing recommendations.

Description

Initially, a working committee will be selected to determine and solicit input from critical stakeholders. Since the ITS will need to be compatible with the DOTD enterprise database, careful planning is required to ensure effective data sharing between the two systems.

All transportation-related data sources that may be integrated in the proposed data-warehousing system must be identified. Emphasis will be placed upon static (e.g., geometrics) and dynamic (e.g., traffic volume) data sources. Due consideration will be given to attaching personal travel data or socioeconomic data at a later stage, but these latter data types will not be incorporated in this project.

For each data source considered, data quality will be measured in terms of accuracy, level of detail, timeliness, availability, resolution, accessibility, reliability, and extent of coverage. Examples of data that can be collected include speed, lane occupancy, traffic flow rates, and incident type and location. This information can be gathered in real time and compiled into a data warehouse that feeds processed data back to the traveling public and interested agencies. Integration with geographic information systems (GIS) is highly desirable for more efficient spatial displays of information.

Two major challenges face traffic managers today: 1) how to extract the most relevant information from the vast amount of available traffic data, and 2) how to use the wealth of data to advance understanding of traffic behavior. Basic transportation statistics from Baton Rouge traffic data will provide a starting point for comprehension of overall warehousing requirements.

Once a data warehousing scheme is developed, data mining can be used to estimate the current state of the traffic system and the effect of system changes. Data mining will be performed using appropriate statistical and visualization tools.

Implementation Potential

The development of a data warehouse / data mining system will enable transportation officials to better use available traffic information.